Shree H.V.P. Mandal's

Degree College of Physical Education, Amravati.

(Multi-faculty NAAC Accredited "A" Grade Autonomous College)

FACULTY OF SCIENCE AND TECHNOLOGY
(ENGINEERING GROUP)

MASTER OF COMPUTER APPLICATION
(TWO YEARS P.G. PROGRAMME)

SYLLABUS

(Choice Based Credit System)

Programme Code: MCA2020
Introduced from the session 2020-2021

Shree H. V. P. Mandal's

Degree College of Physical Education

Autonomous College, Amravati

Course Structure for MCA

1. **Course Name in Complete**: Master of ComputerApplication
2. **Course Name in Short**:MCA
3. **Natureofthecourse(Certificate/Diploma/UGDegree/PGDiploma/PGDegree):** PG Degree
4. **Objective:** The Programme Educational Objectives of MCA programmes are:
    1. To prepare graduates who will be successful professionals in industry, government, academia, research, entrepreneurial pursuit and consulting firms.
    2. To prepare graduates who will contribute to society as broadly educated, expressive, ethical and responsible citizens with provenexpertise.
    3. To prepare graduates who will achieve peer-recognition; as an individual or in a team; through demonstration of good analytical, design and implementation skills.
    4. To prepare graduates who will thrive to pursue life-long learning to fulfill their goals.
5. **Duration of the Course:** Two Years; Full Time
6. **Examination Pattern (Annual/Semester):**Semester
7. **If Semester pattern then Number of Semesters:** Four Semester
8. **Marking Scheme (Percentage/Credit):** Credit Based
9. **Eligibility:**AsprescribedbyAICTE,NewDelhiandApprovedbyDTE,Mumbaiand S. G. B. Amravati University, Amravati from time to time.
10. **Total working days:** Per Annual session : 200days
    Per Semester: 100 days
11. **Teaching and Examination Scheme:** As prescribed in the curriculum design by the Board of Studies and approved by Academic Council from time to time.
12. **Admission rules/conditions for every year/semester**.

Sr. No	Course and Level	Type of Admission	Eligibility	Remark
1	MCA Semester-I	Direct Admission	As prescribed and approved by AICTE/ DTE	First Year of MCA
2	MCA Semester-II	Natural Growth	---	
3	MCA Semester-III	Natural Growth	Passed Minimum 50% of total passing heads of FYMCA Semester I and Semester II	Second Year of MCA
5	MCA Semester-IV	Natural Growth	---	

13. **Programme Specific Outcome :** MCA programme has been designed to prepare graduates for attaining the following program outcomes:
    1. An ability to apply knowledge of mathematics, computer science and management in practice.
    2. An ability to identify, critically analyze, formulate and develop computer applications
    3. An ability to select modern computing tools and techniques and use them with dexterity
    4. An ability to design a computing system to meet desired needs within realistic constraints such as safety, security and applicability
    5. An ability to devise and conduct experiments, interpret data and provide well informed conclusions
    6. An ability to understand the impact of system solutions in a contemporary, global, economical, environmental, and societal context for sustainable development
    7. An ability to function professionally with ethical responsibility as an individual as well as in multidisciplinary teams with positive attitude
    8. An ability to communicate effectively
    9. An ability to appreciate the importance of goal setting and to recognize the need for life-long learning

Semester I

Programme Code	MCA2020
Course Code	20MCA101
Course Name	**Computer Organization and Communication Technology**
Credits	04 **Course Type:** Core
Course Objectives (CO)	1. To understand the structure, function and characteristics of computer systems. 2. To understand the design of the various functional units and components of computers. 3. To identify the elements of modern instructions sets and their impact on processor design. 4. To explain the function of each element of a memory hierarchy, 5. To identify and compare different methods for computer I/O.
Mapping with Programme Outcomes (PO)	An ability to design a computing system to meet desired needs within realistic constraints such as safety, security and applicability.
Prerequisites	Basic knowledge about computers and its components and their function is essential.
Course Outcomes	1. To increase students' awareness about the basic architecture of the system and system component. 2. Students would be familiar with advanced microprocessor architecture and supercomputer architecture. 3. Introduce students with array processor, vector processor and their functions. 4. Memory subsystem and I/O subsystem and application of the internet increase awareness of students

Unit	Contents	Hrs
1	Distinction between Organization and Architecture Functional block diagram of computer system. Function of I/O, memory, CPU. Bus structure. A complete processor organization. RISC and CISC Architecture. Design of ALU, Co-processor. Instruction pipelining and parallel processing. Instruction pipelining Hazard. Control and structural Hazard. Overcoming Hazard.	10
2	Parallel Processing. Instruction level parallelism. Types of parallel processor system. SISD, SIMD, MISD, MIMD. VLIW processor. Vector processor. Data Level parallelism. Array processor. Multi-threaded processor.	10
3	Memory Subsystem; Memory Hierarchy levels, Address, Memory chip organization. Memory word size and word length expansion. Cache memory; Architecture of Multi level cache. Virtual memory.	10
4	Input /Output Subsystem; I/O modules, Function, Structure, Memory mapped I/O, I/O mapped I/O. Programmed I/O; command, instruction. Interrupt driven I/O. Interrupt processing.DMA; DMA controller.	10
5	A Data communication model , The transmission of info. Network; LAN, WAN, Wireless network, Internet; origin, key element, Internet architecture, A networking configuration,, Protocol, Traditional internet based application, mail transfer protocol, File transfer protocol, TELNET, Electronic mail and network management. Internet directory service; DNS (Domain Name System), DNS name resolution, DNS operation, Web Access HTTP, HTTP overview, Gateway, response Message	10

	Text Book : 1. Computer Architecture and Organization. By Nicholas P Carter. Schaum's Outlines Series. 2. Computer Architecture and organization . By SubrataGhoshal,Pearson.Computer organization WilliamStallings.	
	Reference Book : 1. Data and Computer communication By William stallings. PHI.	

Programme Code	MCA2020	
Course Code	20MCA102	
Course Name	**Problem Solving and Programming Methodology**	
Credits	04	**Course Type:** Core
Course Objectives (CO)	The objective of this course is to make the student understand the concept of programming, stepwise refinement in problem solving, decomposing complex problems into subproblems, programming language, decision making and looping, designing Functions, Handling complex data structures like arrays, structures unions, etc. The main emphasis of the course will be on problem solving aspect i.e. developing proper algorithms.	
Mapping with Programme Outcomes (PO)	An ability to apply knowledge of mathematics, computer science and management in practice.	
Prerequisites	Knowledge of mathematical concepts for basic programming.	
Course Outcomes	1. Students will gain the ability to illustrate solutions to model solutions to the problem through flowchart and algorithm. 2. Learn programming language constructs (C Language) 3. Learn techniques to write programs in a programming language (particularly C) for a given problem 4. Learn and use conditional and iterative statements 5. Learn to develop programs using complex constructs like functions, pointers, arrays, structures, etc. 6. Learn how to save and retrieve data using files.	

Unit No	Contents	**Hrs**
1	**Introduction to Programming:** How to develop a program, Algorithms, Flow-charts, Testing and Debugging a program, Documentation. **Basics of Programming** : Data types, constants, variables, macros, overflow and underflow of data, Operators, Expressions, precedence and associativity of operators, type conversion. Input and Output: Character I/O, formatted I/O, **Decision Making, Branching and Algorithm**: if, if..else, go to, conditional operator, switch statement	12
	Mapping of COs:1, 2, 3	
2	**S**olving problems with iteration, divide and conquer methods, while, do-while and for loops, Jumps in loops, break and continue statements. **Arrays**: defining array, searching, sorting and binary search, finding Min, Mode, Median, Variance, Standard Deviation, defining matrix and using to solve problems, multi-dimensional arrays, **Strings:** defining strings, searching different types of characters in strings, searching for patterns, splitting strings into tokens separated by delimiters, identifying and counting different types of tokens in a string, table of strings.	12
	Mapping of COs: 4,5	
3	**Functions:** Top down approach of problem solving, call by value and call by reference, recursion, calling conventions. **Storage Classes**: Scope & life of variables, auto, extern, static, register storage classes, spanning code in multiple files, standard library functions, defining our	12

	own string handling and math functions. **Structures:** Defining& initializing structure, structure to represent entities and use in problem solving, structure and array. **Unions:** Definition and use, union vs. struct.	
	Mapping of COs: 4,5	
4	**Pointers**: pointer basics, pointer variables, initialization, chain of pointers, pointer increment and scale factor. **pointer and array**: array of pointers, pointer to array. **pointers and functions**: pointers as arguments, functions returning pointers, pointers to functions, defining string handling functions using pointers, **pointers and structures:** pointer members, pointer to struct, passing structures to functions as value and as reference, returning structure as value and as pointer. **Dynamic Memory Allocation:** using malloc, calloc, realloc,free functions, creating linked list, insert and deleting elements.	10
	Mapping of COs: 4,5	
5	**File Processing:** Different modes of opening file, file pointer, text files, binary data files, input/output operations on files, copying one file to another, file I/O error handling, Command Line Arguments, Enumeration, bitwise operators and bit fields: arithmetic on bit fields, masking of bits. Graphics: basics, drawing line, circle, drawing solid figures, Creating simple animation.	10
	Mapping of COs: 6	
	Text Books: 1. R.G. Dromey, "How to solve it by Computer", Pearson Education. 2. Byron S Gottfried "Programming with C", Tata McGrawhill. 3. KanetkarY,"Let us C", BPBPublications. References: 1. Hanly J R &Koffman E.B, "Problem Solving and Programm design in C", Pearson Education,2009. 2. B. W. Kernighan & D. M. Ritchie, "The C Programming Language", PearsonEducation. 3. E. Balagurusamy, "Programming with ANSI-C",TataMcGrawHill. 4. VenugopalK. R and Prasad S. R, "Mastering 'C'", Tata McGrawHill. 5. Kochen Stefan, "Programing in C",	

Programme Code	MCA2020	
Course Code	20MCA103	
Course Name	**Data Structures & Algorithms**	
Credits	04	Course Type: Core Course
Course Objectives (CO)	1. To understand, basic concepts of data structure, file and algorithms,operations. 2. To analyze, design and implement different data structure algorithms. 3. To understand, analyze, design and implement searching and sorting techniques. 4. To analyze, design and implement hierarchical data structures. 5. To understand, analyze, design and implement different file formats, file organization methods.	
Mapping of Programme Objectives (PO)	An ability to identify critically analyze formulate and develop	
Prerequisites	Basic Knowledge of C Language	
Course Outcomes	1. Ability to understand, basic concept of data structure, file and algorithms, operations. 2. Ability to analyze, design and implement different datastructure algorithms. 3. Ability to understand, analyzes, design and implement searching and sorting techniques. 4. Ability to analyze, design and implement hierarchical data structures. 5. Ability to understand, analyze, design and implement different file formats, file organization methods.	

Unit No	Contents	Hrs
1	**Introduction**: Types of Data Structure: Linear & Nonlinear data structure, DS operations, algorithm, Complexity of algorithm, Abstract data types. **Arrays:** Linear Array, Memory Representation of linear Arrays, Operation on Linear Array, Multidimensional Arrays.	8
	Mapping of COs: 1	
2	**Linked List:** Linked List Representation, Types of Linked List: Simple Linked List, Doubly Linked List, Circular Linked List, Operations: Insert, Delete, Traversal **Stacks:** Introduction to Stack, Stack Representation, Operation on stack, Stack implementation using arrays and linked list, Stack's applications: Infix, Postfix & prefix expressions, Infix to Postfix conversation, evaluation of postfix expressions, Recursion. **Queues:** Introduction to queues, Primitive Operations on the Queues, Dqueue, Circular Queue, Priority Queues. Queue Application.	10
	Mapping of COs: 2	
3	**Searching:** Introduction to Searching & Sorting, linear search, binary search. Jump Search, Interpolation Search, Exponential Search, Ternary Search. **Sorting:** bubble sort, selection sort, insertion sort, Merge Sort, Shell Sort, Quick Sort, Radix Sort, Heap sort.	10
	Mapping of COs: 3	
	Trees: Terminology and Concepts, Binary Tree, Representation, Linked	

4	representation of binary trees, Binary Search Tree, Operation on Binary search trees: Insert, Delete. Tree Traversals: Preorder, Inorder, Postorder, AVL Search Trees, B Trees, Application of Tree. **Graphs:** Terminology and Graph Representation: Adjacency matrix, Adjacency list, Traversals: Depth first and Breadth first, Minimum spanning tree, shortest path algorithm, topological ordering, Application of Graph. **Indexing and Hashing:** B-tree indexing, multilevel indexing, B+ tree, Hashing, Collision processing, Bucket Hashing, Dynamic Hashing, Linear Probing, Linear Hashing, Extendible Hashing, Application of Indexing and Hashing. Mapping of COs: 4	11
5	**File Concepts:** Files, Types of File: Master file, Transaction file, Work file, Text file, Binary file, Program file, File Processing Operation: open, close, read, write, seek. File Format: CSV, JSON, ascii text, Microsoft Excel, Audio-Video Interleave, ZIP. **File Organization:** Sequential organizations, Random organizations, Linked Organizations, Inverted files. Mapping of COs: 5	08
	Text Books: 1. Data structure by Seymour Lipschutz. 2. Practical approach to Data structure and algorithm by Sanjay Pahuja. 3. SartajSahani, "Data structure algorithms and Application in C++", McGrawHill	
	Reference Books: 1. Introduction to data structure with applications. By Tremblay &Sorenson. 2. Introduction to data structure by T.L Naps &BhagatSingh. 3. Data management & file structure by Merry E.S.Loomis 4. Tanenbaum, Langsam, Augenstein, "Data structure using C", PHI 5.S.B.Kishor, "Data Structures" 6. Maek Allan Weless, "Data structure and algorithm analysis in C++", Addison Weslay	

Programme Code	MCA2020	
Course Code	20MCA104	
Course Name	**Database Management System**	
Credits	4	**Course Type: Generic**
Course Objectives (CO)	1. To be familiar with basic database storage structures and accesstechniques. 2.Tobe able to write queries and understand the use of Structured Query Language (SQL),DDL. 3. To understand the concept of a database transaction and related database facilities, including concurrencycontrol. 4. To be able to apply normalization techniques to normalize thedatabase. 5. To learn and practice data modeling using the entity-relationship and developing databasedesigns. 6. To learn database systems andarchitectures	
Mapping of Programme Objectives (PO)	An ability to select modern computing tools and techniques and use them withdexterity	
Prerequisites	Basic knowledge about database and tables	
Course Outcomes	1. Ability to describe data models and schemas inDBMS 2. Acquire knowledge about the features ofdatabase management systems and Relationaldatabase. 3. Able to use SQL; the standard language ofrelational databases. 4. Ability to understand the functional dependencies and design of thedatabase	

UnitNo	Contents	Total Hrs
1	**Introduction to Database Concepts:** Purpose of Database systems, Overview of physical storage media, File system. **File Organization:** Organization of records in a file, Data dictionary storage. Mapping of COs: 1	12
2	**Indexing and Hashing:** Basic concepts, ordered Indices, B+ trees index Files, Static Hashing, Dynamic Hashing. **Transaction Management:** The ACID properties, Transactions and schedules, concurrent execution of transactions. Mapping of COs: 1,2	12
3	**SQL:** Basic Structures, set operations, Aggregate functions, null values, nested sub-queries, derived relations. Views, Modification of databases, Joined relations, Data Definition Language.(Introduction to Procedures, Functionsand Triggers) **Integrity Constraints:** Domain constraints, Referential Integrity, Assertion. Mapping of COs: 2, 3	12
4	**Relational Database Design:** Decomposition, Normalization using functional Dependencies, Normalization using join dependencies, Domain key normal form.ER Designs Diagrams, Entities Attributes and Entities Sets, Relationship and Relationship sets, Additional features of ER Model, Conceptual designs withER Model. Mapping of COs: 2, 3, 4	12
5	**Database systems and Architectures:** Introduction of	12

	Centralized System, Client-Server System, Parallel System, Distributed System, Architecture for Parallel Database and Architecture for distributed Database.(NoSQL Databases) Mapping of COs: 2, 3, 4	
	Text Books: 1. Abraham Silberschatz, Henry F. Korth, S. Sudharsan, Database System Concepts, Fifth Edition, McGraw-Hill , 2006 2. Raghu Ramkrishnan, Johannes Gehrke, Database Management Systems, Third Edition, McGraw-Hill ,2003 3. C.J.Date, An Introduction to Database Systems, Third Edition, Vol. 1, Narosa Publishing House,1998	
	Reference Books: 1. Jeffrey A. Hoffer, Mary B. Prescott, Fred R. McFadden, Modern Database Management,Pearson Publication, 6thEdition. 2. Thomas Connolly, Carolyn Begg, DatabaseSystems 3. A Practical Approach to Design, Implementation and Management, Pearson Publication, 4th Edition.	

Programme Code	**MCA2020**	
Course Code	**20MCA105**	
Course Name	**Soft Skill Development**	
Credits	**2**	**Course Type:** Ability Enhancement
Course Objectives (CO)	1. To develop an ability to demonstrate teamwork with the ability of leadership, analytical reasoning for solving time critical problems. 2. To develop strong human value for responsive professionals.	
Mapping of Programme Objectives (PO/PSO)	An ability to communicate effectively	
Prerequisites	Basic knowledge in communication and a good understanding of English	
Course Outcomes	1. Understand the significance and essence of a wide range of softskills. 2. Learn how to apply soft skills in a wide range of routine social and professionalsettings. 3. Learn how to employ soft skills to improve interpersonal relationships 4. Learn how to employ soft skills to enhance employability and ensure workplace and career success.	

Unit No	Contents	Hrs
1	**Getting Started** 1. Soft Skills: An Introduction – Definition and Significance of Soft Skills; Process, Importance and Measurement of Soft Skill Development, Soft skills vs HardSkills. **2.** Self-Discovery: Discovering the Self; Setting Goals; Beliefs, Values, Attitude and Virtue. **3.** Positivity and Motivation: Developing Positive Thinkingand Attitude; Driving out Negativity; Meaning and Theories of Motivation; Enhancing Motivation Levels, Power Lessons and Strategies of ArmedForces. Mapping of COs: 1	**12**
2	1. Recap of Language Skills – Speech, Grammar, Vocabulary, Phrase, Punctuation. 2. Fluency building What is fluency – Why is fluency important – Types of fluency – Oral fluency – Reading fluency – Writing fluency – Barriers of fluency – How to develop fluency. Speaking Skills Formal and InformalConversation Mapping of COs: 1,2	**12**
3	1. Interpersonal Communication: Interpersonal relations; communication models, developing interpersonal relationships through effective communication; Seeking Win-Win Solution, essential Email writing skills; Email Etiquettes; Resume Building, Leave applications and Simple letterWriting. 2. Public Speaking: Skills, Methods, Strategies and Essential tips for effective publicspeaking.	**12**

	3. Group Discussion: Importance, Planning, Elements, Skills assessed; Effectively disagreeing, Initiating, Summarizing and Attaining the Objective. 4. Non-Verbal Communication: Importance and Elements; Body Language. 5. Teamwork and Leadership Skills: Concept of Teams; Building effective teams; Concept of Leadership and Sharpening Leadership skills. Mapping of COs:3	
4	1. Interview Skills: Interviewer and Interviewee – in-depth perspectives. Before, During and After the Interview. Tips for Success, MockInterview 2. Presentation Skills: Types, Content, Audience Analysis, Essential Tips – Before, During and After, Overcoming Nervousness. 3. Time Management – Concept, Essentials,Tips. 4. Ethics and Values- Management Lessons from Bhagavad Geeta, Business and Social Ethics, ManagingStress. Mapping of COs:4	**12**
5	**Numerical Ability** 1. Numbers Property 2. Simplification 3. HCM & LCM of Numbers 4. Square roots, Cube roots 5. Average •Time and work 6. Problems on Ages 7. Ratio and Proportion 8. Profit and Loss 9. Percentage Mapping of COs:4	**12**
	Text Books: 1. Soft skills Training – A workbook to develop skills foremployment by Fredrick H. Wentz 2. Personality Development and Soft skills , Oxford UniversityPress by BarunK.Mitra 3. The Time Trap : the Classic book on Time Management by R. Alec Mackenzie	
	Reference Books: 1. Managing Soft Skills for Personality Development – edited by B.N.Ghosh, McGraw Hill India,2012. **2.** English and Soft Skills – S.P.Dhanavel, Orient Blackswan India,2010.	

Semester II

Course Code	**20MCA201**	**Programme Code**	**MCA2020**
Course Name	**Operating System Concept**		
Credits	**04**	**Course Type:** Core Course	
Course Objectives (CO)	1. To understand the role of operating systems. 2. To understand the fundamental principles of operating system design and kernel implementation. 3. To understand key features of operating systems of practical importance, including Linux and Windows. 4. To understand principles of and gain hands-on experience with memory and virtual memory management. 5. To understand file systems design principles.		
Mapping of Programme Outcome (PO/PSO)	1. An ability to identify, critically analyze, formulate and develop computer applications. 2. An ability to select modern computing tools and techniques and use them with dexterity.		
Prerequisites	Knowledge of architecture of computer system including processor, memory, I/O channels etc.		
Course Outcomes	1. Students can distinguish between the different types of operating system Structure and services. 2. Understanding of the concepts of Threads and process scheduling. 3. Understanding of the various memory management techniques and Storage Management. 4. Comfortably use Linux and Windows Operating System.		

Unit No	Contents	Total Hrs
1	**Basics of Operating Systems:** Operating System Structure, Operations and Services; System Calls, Operating-System Design and Implementation; System Boot. **Process Management:** Process Scheduling and Operations; Inter-process Communication, Communication in Client–Server Systems, Process Synchronization, Critical-Section Problem, Peterson's Solution, Semaphores, Synchronization. Mapping of COs: 1	10
2	**Threads:** Multicore Programming, Multithreading Models, Thread Libraries, Implicit Threading, Threading Issues. **CPU Scheduling:** Scheduling Criteria and Algorithms; Thread Scheduling, Multiple-Processor Scheduling, Real-Time CPU Scheduling. **Deadlocks:** Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Avoidance and Detection; Recovery from Deadlock. Mapping of COs: 2	12
3	**Memory Management:** Contiguous Memory Allocation, Swapping, Paging, Segmentation, Demand Paging, Page Replacement algorithms, Allocation of Frames, Thrashing, Memory-Mapped Files. **Storage Management:** Mass-Storage Structure, Disk Structure, Scheduling and Management, RAID Structure. Mapping of COs:3	12
4	**Virtual Machines:** Types of Virtual Machines and Implementations; Virtualization. **Linux Operating Systems:** Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, File Systems, Input and Output; Inter-process Communication, Network Structure. Mapping of COs:4	12

5	**Windows Operating Systems:** Design Principles, System Components, Terminal Services and Fast User Switching; File System, Networking. **Distributed Systems:** Types of Network based operating Systems, Network Structure, Communication Structure and Protocols; Robustness, Design Issues and Distributed File Systems. Mapping of COs:4	12
	Text Books: 1.A. Silberschatz, P. B. Galvin, "Operating system Concepts", Wiley publication. 2.D.M. Dhamdhere, "System software and operating system". 3.Alfred V. Aho, Jeffery Ullman, "Principle of compiler design". 4.H.M. Dietel, "Operating system" 5.Maurice J. Bech, "The Design of UNIX Operating System".	
	Reference Books: 1. Maurice J Bach, "The Design of the UNIX Operating system", PHI 2. Milan Milenkovic, "Operating systems concept and design", TMH 3. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, "Operating System Principles" 4. AchyutGodbole, "Operating systems with case studies in UNIX NetWare Windows NT", TMH 5. William Stallings, "Operating systems", PHI 6. "Introduction to Operating System",PHI	

Course Code	**20MCA202**	**Programme Code**	**MCA2020**
Course Name	Web Programming		
Credits	4	Course Type: Core Course	
Course Objectives (CO)	1. To learn basics of Website 2. To develop simple web pages. 3. To learn and understand the CSS and create Styles for web pages. 4. To learn and understand scripting and to write simple javascripts. 5. To learn and understand basics of PHP and to write simple PHP scripts.		
Mapping of Programme Outcome (PO/PSO)	1. An ability to select modern computing tools and techniques and use them with dexterity. 2. An ability to design a computing system to meet desired needs within realistic constraints such as safety, security and applicability. 3. An ability to understand the impact of system solutions in a contemporary, global, economical, environmental, and societal context for sustainable development.		
Prerequisites	Basics knowledge of Computer system, Internet and editing tools.		
Course Outcomes	1. To be able to develop simple web pages. 2. Knowledge and skill of Website designing and scripting. 3. Comfortably use CSS, JavaScript and PHP for developing advanced web sites		

Unit No	**Contents**	**Total Hrs**
1	Web basics, Multitier Application Architecture, Client-Side Scripting versusServer-Side Scripting, World-Wide-Web Consortium (W3C).**HTML5**: Features,Editing, HTML5 structure, Headings, Linking, Images, Lists, Tables, Forms. **HTML5 New Elements**: **Form input type element**: colors, date, time, e-mailaddresses, numbers, range, search, telephone numbers, URLs, **Data listElements**. Mapping of COs:1	12
2	**HTML 5 Page-Structure Elements**: header, nav, figure, fig caption, article,summary, details, section, aside, meter, footer.Audio & Video elements. **CSS**: Introduction, **basic properties**: text, list, border font, **Selectors**:universal, type, id, class.**CSS types**: Inline, Internal and External Style Sheets.	10

	Mapping of COs: 1, 2	
3	Java Script Looping structures: for, do-while, while. Break /Continue statements. JavaScript functions: Declaration, Definition, and Referencing. Identifiers scope rules, Recursion. Arrays; declaration, allocation and accessing.JavaScript objects: Math, String, Date, Number and Boolean.	12
	Mapping of COs: 2, 3	
4	**Introduction:**Features, PHP HTMLembedding tags and syntax, simple script examples, PHP variables, operators,data types.**Control Statement in PHP:** If Else, Switch Statements. **Looping Statements:** For, While, Do-While, Break statements. **PHP Array:** Array Types: Indexed Array, Associative Array, Multidimensional Array.	12
	Mapping of COs: 3	
5	**PHP Functions:** Introductionto functions, declaring functions, function scope, passing arguments to function,using include files and require statements. **Database operations:**Operations with PHP, connecting to Mysql with PHP,selecting a database, building and sending query, SELECT, INSERT, DELETE, UPDATE	12
	Mapping of COs: 3	
	Text Books: 1. Paul Deitel, Harvey Deitel and Abbey Deitel, "Internet & World Wide Web:How to program", Fifth Edition Pearson ISBN 978-0-13-215100-9 2. Thomas A. Powell, "HTML & CSS: The Complete Reference" , Fifth Edition,McGraw-Hill, ISBN: 978-0-07-174170-5	
	Reference Books: 1. Michael K. Glass, Yann Le Scouarnec, Elizabeth Naramore, Gary Mailer, Jeremy Stolz, Jason Gerner, Beginning PHP, Apache,MySQL Web development, Wrox Publication. 2. Lynn Beighley, Michael Morrison,Head first PHP and Mysql,SecondEdition,Oreilly publication.	

Course Code	**20MCA203**	**Programme Code**	**MCA2020**
Course Name	Advanced Java		
Credits	4	Course Type: Core Course	
Course Objectives (CO)	1. To learn basic features of JAVA and working of JVM 2. To learn concepts of OOP and develop OO applications. 3. To learn concept of network programingand client server applications 4. To learn JDBC architecture and database connectivity. 5. To learn server side applications and enterprise web applications using servlet and JSP.		
Mapping of Programme Outcome (PO/PSO)	1. An ability to select modern computing tools and techniques and use them with dexterity. 2. An ability to design a computing system to meet desired needs within realistic constraints such as safety, security and applicability. 3. An ability to understand the impact of system solutions in a contemporary, global, economical, environmental, and societal context for sustainable development.		
Prerequisites	Knowledge of programming languages, object-oriented programming and web applications.		
Course Outcomes	After Completing this course the student 1. Understand basic features of JAVA and working of JVM 2. Understand the concept of OOP and develop OO applications 3. Understand the concept of network programing and will be able to develop client server applications 4. Understand JDBC architecture and will be able to create applications to communicate with SQL databases like oracle, mysql, etc. 5. Can develop server side applications and enterprise web applications using servlet. 6. Can develop server side applications and enterprise web applications using		

	JSP.	
Unit No	**Contents**	**Total Hrs**
1	Featuresof Java, JVM architecture and its working, Data Types, Variables and Naming Convention, Unicode System, Operators, Expressions, Statements and Control Structures **OOPS Conecpts:** Characteristics of OOPs, Defining a Class, Creating Objects, Constructors, Method Overloading, static variable, method and block, Inheritance (IS-A relationship), Aggregation and Composition(HAS-A relationship), the use of this, super and final keywords, Package and Access Modifiers.	12
	Mapping of COs: 1, 2	
2	Abstract class and Interface, Method overriding, static and dynamic binding, Downcasting with instanceof operator, the use of new and delete operators, Encapsulation, Call By Value and Call By Reference, strictfp keyword, creating API document.**Exception Handling:**Introduction, pre-defined Exceptions, Try-Catch-Finally, throws, throw, User Defined Exceptions	10
	Mapping of COs: 2	
3	Socket and ServerSocket classes, URL class, displaying data of a web page, InetAddress class, DatagramSocket and DatagramPacket, Two way communication, Creating client server chat application using TCP Sockets, Creating client server chat application using UDP Sockets, Java Telephone API, JAVA mail APi.	12
	Mapping of COs: 3	
4	JDBC Drivers, Steps to connect to the database, Connectivity with Oracle, Connectivity with MySQL, Connectivity with Access without DSN, DriverManager, Connection interface, Statement interface, ResultSet interface, PreparedStatement, ResultSetMetaData, DatabaseMetaData, Storing image, Retrieving image, Storing file, Retrieving file, Stored procedures and functions, Transaction Management, Batch Processing, scrollable and updatable resultset.	12
	Mapping of COs: 4	
5	**Servlets**: Introduction, Web application Architecture, HTTP Protocol & HTTP Methods, Web Server & Web Container, Servlet Interface, HTTPServlet, GenericServlet, Servlet Life Cycle, Servlet Config, Servlet Context, Servlet Communication:**Servlet-Browser Communication-** sendError, setHeader, sendRedirect, **Web-Component Communication-** Forward, Include, **Servlet-Applet Communication,Session Tracking Mechanisms:**Session Object, Cookies, URL-Rewriting, Hidden-Form Fields, **JSP:**Introduction, LifeCycle, **JSP Scripting Elements:**declaratives, scriptlets, expressions,**Implicit Objects**, **JSP Directives**: page, include, taglib,**JSPStandard Actions**: useBean tag, setProperty tag, getProperty tag	14
	Mapping of COs: 5, 6	
	Text Books: 1. Java: The Complete Reference, Seventh Edition - by Herbert Schildt , McGraw Hill Education; 9th edition 2. **J2EE: The C**omplete Reference**,** 1st edition - by Jim Keogh**,** McGraw Hill Education JDBC **API Tutorial and Reference (Java Series) -by Maydene Fisher , Jon Ellis, Jonathan Bruce, Addison Wesley; 3rd edition**	
	Reference Books: 1. Programming with Java, 6th Edition**,** by E Balagurusamy , McGraw-Hill 2. Java: How to Program, 9th Edition**,** by Paul Deitel, Harvey M. Deitel, Pearson College Division **Core Java: Fundamentals 10th Edition**, **by Cay S. Horstmann, Pearson P T R**	

Course Code	**20MCA204**	**Programme Code**	**MCA2020**
Course Name	**Database Administration**		
Credits	**4**	**Course Type:** Elective	
Course Objectives (CO)	5. To understand, basic concept of Data Base administration and DBMS 6. To understand concept of modeling data in organization. 7. To understand concept of database storage management. 8. To understand concepts of backup and recovery. 9. To understand concepts of Database performance tuning.		
Mapping of Programme Outcome (PO/PSO)	1. An ability to select modern computing tools and techniques and use them with dexterity 2. An ability to design a computing system to meet desired needs within realistic constraints such as safety, security and applicability 3. An ability to function professionally with ethical responsibility as an individual as well as in multidisciplinary teams with positive attitude.		
Prerequisites	Knowledge of Database management system		
Course Outcomes	1. Ability to apply, basic concept of Database administration and DBMS. 2. Ability to model data in organization. 3. Understanding and skill of database storage management. 4. Understanding and skill of backup and recovery. 5. Knowledge of Database performance tuning.		

Unit No	**Contents**	**Total Hrs**
1	Database, Data, and System Administration, DBA Tasks, The types of DBAs, The impact of newer technology on DBA, Defining the organization's DBMS strategy, Installing the DBMS, Upgrading DBMS and Versions and Releases, Database standards and Procedures. Mapping of COs:1	10
2	Data Modeling Concepts, Components of a data model, Discovering Entities, Attributes, and Relationships, Conceptual, Logical, and Physical Data models, Normalization, Normal forms, From Logical Model to Physical Database. Views, Database Application Development and SQL, Defining Transaction, Locking Mapping of COs:2	12
3	Database performance Design, Denormalization, Storage Management basics, File and Data Sets, Space Management,Fragmentation and storage,Storage Options, Planning for the future, Loading and Unloading Data ,Export and Import, Bulk data Movement, Distributed Databases Mapping of COs:2, 3	10
4	Types of Integrity, Database Structure Integrity, Semantic Data integrity, Data Breaches, Database Security Basics, Granting and Revoking Authority, Authorization Roles and Groups,Other security mechanisms, Encryption, SQL Injection, Backup and Recovery and Its Importance. Mapping of COs:4	13
5	Defining Performance, Monitoring versus Management, Service-Level Management, Types of Performance Tuning, Performance Tuning Tools, DBMS performance Basics ,The Larger Environment, DBMS Installation and Configuration Issues, System Monitoring,Techniques for optimizing Databases, Database Reorganization, Designing application for relational Access, Relational optimization, Additional optimization considerations, Reviewing Access paths , SQL coding and tuning for efficiency, DBA Tools :Types and Benefits of DBA tools. Mapping of COs:5	15

	Text Books: 1. Database Administration, Guide to DBA Practice and Procedure.2nd Edition, Craig S. Mullins, Addison-Wesley.	
	Reference Books: 1.Database System Concepts, Abraham Silberschatz , Henry F. Korth S. Sudarshan, Tata Macgraw Hill. 2.Database Management Systems,RaghuRamakrishnan,JohannesGehrke Tata Macgraw Hill. 2. Oracle DBA Survival Guide, Greene, Techmedia.	

Course Code	**20MCA204**	**Programme Code**	**MCA2020**
Course Name	**Computer Network Design and Administration**		
Credits	**4**	**Course Type:** Elective	
Course Objectives	1. To study the topological and routing strategies for an IP based networking infrastructure. 2. To study the networking components. 3. To study workstation and server management. 4. To study network services.		
Mapping of Programme Outcome (PO/PSO)	An ability to design a computing system to meet desired needs within realistic constraints such as safety, security and applicability.		
Prerequisites	1. Basic Knowledge Computer Network 2. Network Operating system 3. Network Protocols and network services.		
Course Outcomes (CO)	1. Ability to analyze, specify and design the topological and routing strategies for an IP based networking infrastructure. 2. To be able to analyze the requirements for an organization and design the most appropriate networking solution. 3. Knowledge of the client and server infrastructure and system design. 4. To be able to analyzenetwork services.		

Unit No	**Contents**	**Total Hrs**
1	Network:- Distributed Processing, Network Criteria, Physical Structure, Network Model, Categories of Network , The OSI Model and the TCP/IPProtocol Suite, Types of communication, communication Media, Addressing:-Introduction to Addressing, IPv4 Addresses, Subneting,IPv6 Addressing. Mapping of COs:1	12
2	**Communication Devices:-** Introduction to Network Interface Card, HUB, Switch, Router, Getaway, Configuration Devices with Microsoft Windows and Linux. Mapping of COs: 1,2	10
3	**Workstation Fleet Management :** Workstation Architecture, Workstation Hardware Strategies, Workstation Software Life Cycle, OS Installation Strategies **Servers:** Server Hardware Strategies, Server Hardware Features, Server Hardware Specifications Mapping of COs:1,2,3	10
4	**Services:** Service Requirements, Service Planning and Engineering, Service Resiliency and Performance Patterns **Service Launch**: Fundamentals of services and DevOps.	10

	Mapping of COs:4	
5	**Service Recommendations: Service** Monitoring, Namespaces, Nameservices,Email Service, Print Service, Data Storage, Backup and Restore, Software Repositories, Web Services. Mapping of COs: 3,4	12
	Text Books: 1. Data Communications and Networking (McGraw-Hill Forouzan Networking) By Behrouz A. Forouzan, 4th edition. 2. The Practice of System and Network Administration: Volume 1: DevOps and other Best Practices for Enterprise IT (3rd Edition) by Thomas A. Limoncelli Christina J. Hogan Strata R. Chalup publication Addison-Wesley. **3.** Principles of Network and System Administration, 2nd Edition by Mark Burgesswiley publication.	
	Reference Books: The Practice of System and Network Administration: Volume 1: DevOps and other Best Practices for Enterprise IT (2nd Edition) by Thomas A. Limoncelli Christina J. Hogan Strata R. Chalup publication Addison-Wesley	

Course Code	**20MCA204**	**Programme Code**	**MCA2020**
Course Name	**AI & Robotics Programming**		
Credits	**4**	**Course Type:** Elective	
Course Objectives (CO)	a. To study the fundamentals of AI. b. To study the knowledge representation and searching techniques. c. To learn the Python Programming for implementation of AI. d. To learn Expert system architecture and ROBOTS. e. To get acquaint with robot programming languages.		
Mapping of Programme Outcome (PO/PSO)	i. An ability to apply knowledge of mathematics, computer science and management in practice. ii. An ability to design a computing system to meet desired needs within realistic constraints such as safety, security and applicability.		
Prerequisites	Basic Knowledge of search techniques, logic & reasoning.		
Course Outcomes	1. Knowledge of AI and expert system. 2. Know the concept of List Processing. 3. Acquaint with Knowledge representation techniques. 4. Learn Applications of AI for designing the expert system. 5. UnderstoodRobots, and languages for programming robots.		

Unit No	**Contents**	**Total Hrs**
1	**Overview of AI:** Importance of AI, AI and related fields, Application of AI knowledge:- Introduction, Definition and importance of knowledge, representation of knowledge, Knowledge organization, knowledge manipulation, Acquisition of knowledge. **Dealing with Inconsistencies and Uncertainties:** TMS, default reasoning, modal & temporal logics, non monotonic reasoning system, circumscription. **Expert system Architecture:** Rule based system architecture, non production system architecture & validation, Expert System Architecture, Expert System Shells Mapping of COs: 1,3	8
2	**Knowledge Representation:** Logic, Prepositional, predicate, syntax &	8

	semantics, inference rule, principle of resolution, representation using rules, procedural Vs declarative representation, semantic network, frames, scripts, conceptual dependency. **Heuristic Search Technique:** Hill Climbing, Branch and Bound Technique, Best First Search and A* algorithm. Learning: Definitions, types of learning, general learning model, Classification of learning strategies. Mapping of COs: 2	
3	**AI Programming With Python**: Introduction to Python, installing python, running python, ML, most common ML algorithms, pre-processing data, techniques for data pre-processing, labelling data, building classifier in python, logistic regression, decision tree classifier, clustering, algorithms for clustering the data, finding nearest neighbours, k nearest neighbour classifier, NLTK, tokenization, stemming, Lemmatization. Mapping of COs: 3	8
4	**Robotics:** Definitions of Robot & Robotics, Objectives, Aspects of robotics, difference in robot systems & other AI Programs, robot locomotion, Components of robots, Role of Computer vision In AI, Task of Computer Vision, application domains of computer vision, applications of robotics.Types of robots, Types of Robot sensors. Mapping of COs: 4,5	10
5	**Python Robot Programming Methods**, Functions, Libraries, Robotic Process Automation, ROS, open source tools for robot programming, Arduino: overview, features, board types, board description , installation , Arduino program structure, Arduino data types, Arduino variables and constants, operators, control statements, functions, Arduino I/O functions, character functions, interrupts, communication, interfaces , introduction to Raspberry pi. Mapping of COs: 5	10
	Text Books: 1. "Introduction to AI and Expert Systems": Dan W. Patterson. 2. "Foundations of AI Expert Systems":V.S. Jankiraman	
	Reference Books: 1.AI & Intelligent systems: N.P. Padhy 2.AI a Practical Approach: Rajiv Chopra 3.Principles of AI: Nils J. Nilsson **Reference Sites :** Javapoint.com, tutorialspoint.com	

Semester III

Course Code	**20MCA301**	**Programme Code**	**MCA2020**
Course Name	**Software Design and Project Management**		
Credits	**4**	**Course Type:** Core Course	
Course Objectives (CO)	• To introduce the fundamental concepts of software engineering. • To build an understanding on various phases of software development. • To introduce various software process models. • To study software project management approaches.		
Mapping of Programme Outcome (PO/PSO)	1. An ability to identify, critically analyze, formulate and develop computer applications 2. An ability to design a computing system to meet desired needs within realistic constraints such as safety, security andapplicability		
Prerequisites	Knowledge of System Analysis and Design is desirable.		
Course Outcomes	The students will be able to i. Identify suitable life cycle models to be used. ii. Analyze a problem and identify and define the computing requirements to the problem. iii. Translate a requirement specification to a design using an appropriate software engineering methodology.		

	iv. Formulate appropriate testing strategy for the given software system. v. Develop software projects based on current technology, by managing resources economically and keeping ethical values.	
Unit No	**Contents**	**Total Hrs.**
1	Introduction to software engineering- scope of software engineering – historical aspects, economic aspects, maintenance aspects, specification and design aspects, team programming aspects. Software engineering a layered technology – processes, methods and tools. Software process models – prototyping models, incremental models, spiral model, waterfall model. (Introduction to Agile) Mapping of COs: i	12
2	Process Framework Models: Capability maturity model (CMM), ISO 9000. Phases in Software development – requirement analysis- requirements elicitation for software, analysis principles, software prototyping, specification. Planning phase – project planning objective, software scope, empirical estimation models-COCOMO, single variable model, staffing and personal planning. Mapping of COs: ii, iii	12
3	Design phase – design process, principles, concepts, effective modular design, top down, bottom up strategies, stepwise refinement. Coding – programming practice, verification, size measures, complexity analysis, coding standards. Mapping of COs: ii, iii	10
4	Testing – fundamentals, white box testing, control structure testing, black box testing, basis path testing, code walk-throughs and inspection, testing strategies-Issues, Unit testing, integration testing, Validation testing, System testing. Maintenance-Overview of maintenance process, types of maintenance. Risk management: software risks - risk identification-risk monitoring and management. Mapping of COs: iv	10
5	Project Management concept: People – Product-Process-Project. Project scheduling and tracking: Basic concepts-relation between people and effort-defining task set for the software project-selecting software engineering task. Software configuration management: Basics and standards User interface design - rules. Computer aided software engineering tools - CASE building blocks, taxonomy of CASE tools, integrated CASE environment. Mapping of COs: v	10
	Text Books: • Ian Sommerville, Software Engineering, University of Lancaster, Pearson Education, Seventh edition, 2004. • Roger S. Pressman, Software Engineering : A practitioner's approach, McGraw Hill publication, Eighth edition, 2014	
	Reference Books: 1. K. K.Aggarwal and Yogesh Singh, Software Engineering, New age International Publishers, Second edition, 2005. 2. S.A. Kelkar, Software Project Management: A concise study, PHI, Third edition, 2012. 3. Walker Royce, Software Project Management : A unified frame work, Pearson Education, 1998	

Course Code	**20MCA302**	**Programme Code**	**MCA2020**
Course Name	**Data Science**		
Credits	**4**	**Course Type:** Core Course	
Course Objectives (CO)	1. Apply Data preprocessing methods on open access data 2. Apply and Analysis **:-**Data Literacy, Data acquisition, Data examination, Data transformation, Data exploration and data analysis tools and Techniques 3. implement analytical methods using Python and R language 4. Apply Different Data Visualization technique. 5. Analyze the data using suitable method. knowledge about graphical analysis using gnuplot tool		

Mapping of Programme Outcome (PO/PSO)	3. An ability to identify, critically analyze, formulate and develop computer applications 4. An ability to design a computing system to meet desired needs within realistic constraints such as safety, security andapplicability	
Prerequisites	Knowledge of System Analysis and Design is desirable.	
Course Outcomes	1. Introductory Data analytics methods 2. Data analytics techniques & tools 3. Data Representation and Visualization 4. Learn graphical analysis by using gnuplot tool.	
Unit No	**Contents**	**Total Hrs.**
1	**Introduction to Data Analytics** : Definition and example. Data Analysis Process: Data Requirement Specifications, Data Collection, Data Processing, Data Analysis, Infer and Interpret Results. **Data Analysis Methods**: Qualitative Analysis, Quantitative Analysis, Text analysis, Statistical analysis, Diagnostic analysis, Predictive analysis. **CO: 1**	10
2	**Working with Data :-**Data Literacy, Data acquisition, Data examination, Data transformation, Data exploration. **Data Analysis Techniques and Tools** : Techniques based on Mathematics and Statistics, Techniques based on Artificial Intelligence and Machine Learning, Techniques based on Visualization and Graphs **CO: 2**	12
3	**Introduction to Data Analysis Tools**: Excel, Tableau, Power BI, Fine Report, R & Python, SAS. **Introduction to Data Visualization and Data Representation :**Basics of data visualization, Principles of good visualization design, Data visualization design workflow, Introduction to visual encoding, Chart types, Chart families, Categorical, Hierarchical, Relational, Temporal and Spatial **CO: 3,4**	12
4	Interactivity Features of Interactivity, Data adjustments, View adjustments, Features of Annotation, Project Annotation, Chart Annotation, Features of colours, Data legibility, Features of Composition, Project Composition, Chart Composition. **CO: 4**	13
5	**Graphical analysis with gnu plot :**What is gnuplot and its limitation, Data analysis and visualization concepts, Simple plot, saving and exporting with gnuplot ,Fundamental graphical methods, Relationships, Counting statistics, Ranked data, Multivariate data, Core principle of graphical analysis, A case study in iteration: car data. **CO: 4**	13
	Text Books: 1. Andy Kirk, Data Visualization A Handbook for Data Driven Design, Sage Publications, 2016 2. Philipp K. Janert, Gnuplot in Action, Understanding Data with Graphs, Manning Publications, 2010	
	Reference Books: **1.** Andy Kirk, Data Visualization A Handbook for Data Driven Design, Sage Publications, 2016 Philipp K. Janert, Gnuplot in Action, Understanding Data with Graphs, Manning Publications, 2010	

Course Code	**20MCA303**	**Programme Code MCA2020**
Course Name	**Data Warehouse And Data Cloud**	
Credits	**4**	**Course Type:** Elective Theory 2
Course Objectives (CO)	1. To understand the concepts of Data Warehouse. 2. To study the OLAP and OLTP. 3. To build a data warehouse. 4. To understand the concept of Databases in cloud and data cloud. 5. To learn how to use Data Cloud	
Mapping of Programme Outcome (PO/PSO)	1. An ability to apply knowledge of mathematics, computer science and management in practice. 2. An ability to design a computing system to meet desired needs within realistic constraints such as safety, security and applicability.	
Prerequisites	Basic Knowledge of Data bases, search techniques.	
Course Outcomes	1. Knowledge of Data warehouse and associated techniques. 2. Know the OLAP & OLTP tools. 3. Acquaint with Architectures of DW. 4. To gain knowledge concept of Data cloud 5. To understand application of Data Cloud	
Unit No	**Contents**	
1	Introduction to Data Warehouse: Characteristics of data warehouse, data marts, Types of data marts, meta data for data mart, data model for data mart, software components of data mart, tables in data mart, external data, reference data, performance issues, monitoring requirements for a data mart, security in a data mart.	
	Mapping of COs: 1	
2	Online analytical Processing: Introduction, OLTP & OLAP systems, Star schema, snow flake schema, OLAP tools, Managed Query Environment (MQE), state of the market, OLAP tools and internet, OLAP tools in open source domain.	
	Mapping of COs: 2	
3	Developing a data warehouse: How to build a data warehouse?, Architectural strategies and organizational issues, design considerations, data content, metadata, distribution of data, tools for data warehousing, performance considerations, applications of data warehousing, from data warehousing to data mining, case studies.	
	Mapping of COs: 3	
4	Database Options in the Cloud, Moving Your Databases to the Cloud, Introduction to Data Cloud: Understanding What You Can Do in the Data Cloud, Identifying the Data Cloud's Unique Attributes, Collaborating in the Data Cloud ,Deploying the Data Cloud Across Industries.	
	Mapping of COs: 4	
5	Introduction Snowflake's Platform : Establishing One Multi-Region, Multi-Cloud Service, Enforcing Strong Security and Governance. Executing Workloads in the Data Cloud, Sharing Data Without Limits, Six Steps to Getting Started with the Data Cloud.	
	Mapping of COs: 5	
	Text Books: 1. Data Warehousing Concepts, Techniques, Products and Applications C.S.R Prabhu , PHI Publication, Third Edition.** 2. An Introduction to Cloud Databases A Guide for Administrators,WendyNeu, VladVlasceanu, Andy Oram,and Sam Alapati,Published by O'Reilly Media, Inc. 3. The Data Cloud For Dummies ® , Snowflake Special Edition Published by John Wiley & Sons, Inc.	
	Reference Books: 1. 2. 3. **Reference Sites :** Javapoint.com, tutorialspoint.com	

Course Name	**INTERNET OF THE THINGS**	
Credits	04	**Course Type:** Elective Theory 2
Course Objectives (CO)	1. Aware students about new technology "Internet of Things". 2. As IoT is advancement in traditional computer network, Objective is to study how such small, handheld electronic control systems can be connected to our computer network. 3. To study different sensors and Actuators. 4. To study protocols and gateway 5. To study wireless technology and mobile network. 6. To be familiar with Security threads, Access control, Security Model.	
Mapping with Program Outcomes (PO)		
Prerequisites	Basic knowledge about computers system, computer network and at least one of the programming languages is required.	
Course Outcomes	. IoT is presently hot technology worldwide. Government, Academia, and Industry are involved in different aspects of research, implementation and business with IoT. .Compare and contrast the deployment of smart objects and the technologies to connect them to network	

Unit	Contents	Hrs
1	**Introduction:** What is Internet of Things: History of IoT, About IoT, Overview, Applications. Definitions and Frameworks : IoT Definitions, IoT Architecture, General Observations, ITU-T Views, Working Definition, IoT Frameworks, Basic Nodal Capabilities	12
	Mapping of COs: 1, 2	
2	**Fundamentals of IOT mechanism & key technologies:** Identification of IoT Objects and Services, Structural aspects of IoT, Environment Characteristics, Traffic Characteristics, Scalability, Interoperability, Security and Privacy, Open Architecture, Key IoT Technologies, Device Intelligence, Communication Capabilities, Mobility Support, Device Power, Sensor Technology, RFID Technology, Satellite Technology.	10
	Mapping of COs: 2, 3	
3	**Evolving IOT standard :** Overview and Approaches, MQTT Protocol, Representational State Transfer (REST), ETSI M2M, IP in Smart Objects (IPSO). **Signal Conditioning Units:** Sensors(Temperature Sensor, Pressure Sensor, Motion Control Sensor, Soil Moisture Sensor, Ultrasonic Range Sensor), Gateway (Raspberry PI, Arduino, Its Difference), Actuators.	10
	Mapping of COs: 4	
4	**Wireless Technologies for IOT : WPAN Technologies for IoT/M2M**: Zigbee/IEEE 802.15.4, Radio Frequency for Consumer Electronics (RF4CE), Bluetooth and its Low-Energy Profile, Comparison of WPAN Technology. **Cellular and Mobile Network Technologies for IoT/M2M:** Overview and Motivations, Universal Mobile Telecommunications System, LTE	10
	Mapping of COs: 4	
5	**IOT Privacy, Security & Governance :** Vulnerabilities of IoT, Security requirements, Threat analysis, Use cases and misuse cases, IoT security tomography and layered attacker model, Identity establishment, Access control, Message integrity, Non-repudiation and availability, Security model for IoT.	10
	Mapping of COs: 5,6	

	Text Book : 1. " The Internet Of Things: Enabling Technologies, Platform and Use Cases", By Pethuru Raj and and Anupama C. Raman (CRC Press)	
	Reference Book : 1. "Internet of Things : A Hands on Approach", by Harshadeep Bahga and Vijay Madishetti (Universities Press) 2. Research Press.	

Course Code	**20MCA304**	**Programme Code**	**MCA2020**
Course Name	**Software Testing**		
Credits	**4**	**Course Type:** Elective Theory 3	
Course Objectives	• To understand the role of Software Testing in enterprise performance management. • To study the applications of Software Testing. • To study Various Type of Testing, Organization Structure for software testing. • To learn various tools, technologies and standards for Software Testing and Quality Control.		
Mapping of Programme Outcome (PO/PSO)	5. An ability to select modern computing tools and techniques and use themwith dexterity. 6. An ability to design a computing system to meet desired needs within realistic constraints such as safety, security andapplicability.		
	7.		
Prerequisites	Knowledge of Software engineering. Knowledge of Software Development Life Cycle.		
Course Outcomes (CO)	□□□Understanding about the software testing terminology. □□□Knowledge about software testing technologies, models and software metrics.		

Unit No	**Contents**	**Total Hrs**
1	**Introduction to Software Testing:** Why Testing?, Need of s/w Testing, Principle,Goalsof Software Testing, Effective Software Testing vs. Exhaustive Software Testing, **Software Testing Life Cycle (STLC), Debugging Life Cycle.** Mapping of COs: 1	
2	**Testing Techniques:**Unit Testing, Integration Testing, System Testing, Acceptance Testing, Regression Testing. Quality Assurance and Quality Control, Quality Management, QM &Project Management, Quality Factor, Methods Of Quality Management, Software Quality Metrics. Mapping of COs: 1	
3	**Verification & Validation , V-Model,Software Testing Methodology,** Black Box Testing:-Boundary Value Analysis, Equivalence Partioning, Finite State Testing. **White Box Testing**:-Statement Coverage, Decision Coverage, Cyclomatic Complexity Mapping of COs: 1, 2	
4	Static Testing and their Techniques Dynamic Testing, Functional Testing:-Volume Testing, Stress Testing, Compatibility Testing, Load Testing, Configuration Testing, Performance Testing, Usability testing, Interoperability Testing, Security Testing, Retesting. Mapping of COs: 1, 2	
5	Test Case Writing:- How to Write Test Cases, Test Design&Specification, Debugging Life Cycle, **Software Metrics:** Need of Software Measurement, Definition of Software Metrics, Classification of Software Metrics, Entities to be Measured, Size Metrics, Testing Metrics for Monitoring & Controlling the Testing Process, Efficient Test Suit Management. Mapping of COs: 2	
	Text Books: 1. NareshChauhan, "Software Testing Principals and Practices", Oxford Higher Education.	

	Reference Books: 1. SrinivasanDesikan And Gopalswamy Ramesh, "Software Testing Principals and Practices", Pearson Publications. 2. Daniel Galin, "Software Quality Assurance from Theory to Implementation" Pearson/Addison Wesley, 2004	

Course Code	**20MCA304**	**Programme Code**	**20MCA2YR**
Course Name	**Full Stack Developement**		
Credits	4	Course Type: Elective Theory 3	
Course Objectives (CO)	6. To be able to develop responsive web pages 7. To be able to develop dynamic web sites.		
Mapping of Programme Outcome (PO/PSO)	Apply knowledge of computing to various real life applications for given requirements. Design and develop simple websites.		
Prerequisites	Basics of Internet and basic knowledge of editing tools.		
Course Outcomes	• Ability to develop responsive web pages • Acquire knowledge about the designing and scripting. • Able to use Bootstrap, Jscript and angularJS for developing advanced web sites		

Unit No	Contents	Total Hrs
1	**Introduction** to Internet, WWW, Websites, **HTML5:** HTML5 structure, Headings, Linking, Images, Lists, Tables, Forms, HTML5 New Elements, Data listElements**. CSS**: Introduction, basic properties: text, list, border font, Selectors: universal, type, id, class. CSS types: Inline, Internal and External Style Sheets.	10
	Mapping of COs:To be able to use advanced features of HTML5, and develop styles for web page.	
2	**JavaScript** HTML DOM, Java Script Looping structures: for, do-while, while. Break /Continue statements. JavaScript functions: Declaration, Definition, and Referencing. Identifiers scope rules, Recursion. Arrays; declaration, allocation and accessing. JavaScript objects: Math, String, Date, Number and Boolean.	10
	Mapping of COs: To be able to understand scripting and write client side scripts for web page.	
3	**Bootstrap**: Introduction to Bootstrap, Bootstrap Basics, Bootstrap Grids, Bootstrap Themes, Bootstrap CSS, Bootstrap JS	12
	Mapping of COs: To be able to understand Bootstrap and use templates of bootstrap	
4	**jQuery :** Introduction to jQuery, jQuery Syntax , jQuery Selectors , jQuery Events, jQuery Effects, jQuery HTML , jQuery Traversing	12
	Mapping of COs: To be able to understand and use JQuery	
5	**Angular JS :** Introduction to AngularJS, AngularJS Expressions, AngularJS Modules, AngularJS Data Binding, AngularJS Scopes, AngularJS Directives & Events, AngularJS Controllers, AngularJS Filters, AngularJS Services, AngularJS HTTP, AngularJS Tables, AngularJS Select, Fetching Data from MySQL, AngularJS Validation, AngularJS API, AngularJS Animations	12
	Mapping of COs: To be able to useAngularJS, Modules and fetch data from SQL tables.	
	Text/e- Books: --	
	Reference Books: 3. –WEB DEVELOPMENT WITH JQUERY, By Richard York, Wrox Publ., available on www.it-ebooks.info 4. –Learning Bootstrap, by AravindShenoy& Ulrich Sossou, PACKT Publ, available on www.allitebooks.com 5. -Learning AngularJS, Free E-Book 6. - Learning Web Development with Bootstrap and AngularJS, by Stephen Radford, PACKT Publ., available on www.allitebooks.com	

Course Code	**20MCA304**	**Programme Code**	**MCA2020**
Course Name	**Mobile Application Development**		
Course Short Name	**MAD**		
Total Lectures	**60**		
Total Credits	**04**	**Course Type:** Elective	
Prerequisites:	**1.Knowledge of Object oriented concept, Java and XML.**		
Mapping of Programme Outcome (PO/PSO)	1. An ability to apply knowledge of SDK, Activity and Intents, Services, Location based. 2. An ability to design mobileapplication with functionality.		

Course Objectives:	6. To learn the characteristics of mobile applications. 7. To understand the intricacies of UI required by mobile applications. 8. To study about the design aspects of mobile application. 9. To learn Mobile application development and working of mobile applications.
Course Outcomes:	1. Basic knowledge Mobile Application development. 2. Knowledge to use Android studio for developing mobile applications. 3. Students are able to design and develop android application user interface 4. Students are able to design the Database, Location base services.

Units	**Contents**	**Total Lectures**
1	**Introduction**: Mobile Application, Mobile Application development, Types of Mobile Application: Native, Hybrid and Web application, Mobile Applications – Characteristics and Benefits, Tools for Mobile apps development.	10
	Mapping of COs: 1	
2	**Application development with Android:** Introduction, Versions, Features, Architecture, Difference of android with other mobile application development platform. **Android Required Tools introduction**: Android Studio, Android SDK, Android SDK manager, Android Development tools (ADT), Android virtual device (AVD), Android NDK.	12
	Mapping of COs: 2	
3	**Android Studio Project Structure**: Introduction, User Interface, Tools Window, Version Control Basics, Gradle Build System, Creating First Android Application, Introduction Kotlin on Android. **Activities and Intent**: Introduction, Life cycle of Activity, Applying style and themes to an activity, displaying a Dialog window, linking activities using intent, Passing data using an intent object, Displaying Notification.	12
	Mapping of COs: 2,3	
4	**User Interface**: Components of a Screen: Linear Layout, Relative Layout, Table Layout, Screen orientation, Detecting and controlling the orientation of Activity, Listening for UI notification. **User interface with Views**: Text View, Button, Image Button, Edit Text, Checkbox, List View, Spinner view, Date and Time Picker view, Image view, Menus with types.	13
	Mapping of COs: 2,3	
5	**Data Persistence**: Persisting data to files, saving internal and external storage, Creating and using Database, Content provider. Introduction about Sqlite database. **Messaging:** sending and receiving SMS messages, sending E-mail, **Location based services:** Displaying the map, displaying the zoom control.	13
	Mapping of COs: 4	
	Text Book : 1. Wei-Meng Lee," Beginning Android 4 Application development", Wrox publication. 2 Reto Meier "Professional Android 4 Application Development", Wrox Publication.	

	Reference Books: 1. Mastering Android WebTech Solution Inc. Khanna Book Publication. 2. https://developer.android.com/guide/	

Semester IV

Course Code	20MCA401	**Programme Code**	**MCA2020**
Course Name	Industry Project/ Internship/Startup		
Credits	**18**	**Course Type:** Skill Course	
Course Objectives	• To understand SDLC, SE and software development processes. • To understand Software Testing. • To acquire professional experience of IT and ITES.		
Mapping of Programme Outcome (PO/PSO)	1. An ability to select modern computing tools and techniques and use themwith dexterity. 2. An ability to design a computing system to meet desired needs within realistic constraints such as safety, security andapplicability.		
Prerequisites	Knowledge of Software engineering. Knowledge of Software Development Life Cycle.		
Course Outcomes (CO)	1. Students will get professional experience in the field of IT and ITES.		

Students may opt either Industrial Project or Internship or Start-up. Following are the Guidelines for this course are given as under…

Industrial Project: It is a software development project assigned by any registered industry/ organization to the student. Student may complete the project at industry/ organization or at other location permitted by the industry. Student shall submit the completion/ implementation certificate issued by the Industry/ organization. Students should take prior approval from the institute in this regard.

Internship: In the internship, students shall apply direct/through institute to theIndustry/Organization forinternship or take use of 'Intershala', an initiative of AICTE. The internship is placement of students in theindustry/organization for which they are entitled to receive stipend. Students shall submit the appointment letter atthe start of the internship and completion certificate at the end of the session well before the final examination.

Start-up: Students may undertake startup activity, which is recognized by the Institute. Institute shall incubatethe start-up using the system available at institute level and assign a mentor/guide to the student. The necessarysupport may be extended to the students for this activity. Students shall submit their proposal well in advanced to the
institute and Institute should grant its approval through available mechanism at Institute level. The registration ofstart-up and business proposal shall be the essential documents for this activity. Activity shall be evaluated on thebasis of its profit ratio.

In all the three above activities, students need to submit complete Project Report to the Institute well before thefinal examination.

Mapping of COs: 1

Course Code	20MCA402	**Programme Code**	**MCA2020**
Course Name	Seminar/ Presentation		
Credits	**6**	**Course Type:** Skill Course	
Course Objectives	• To learn cutting-edge-technologies. • To practice presentation skill.		
Mapping of Programme Outcome (PO/PSO)	1. An ability to select modern computing tools and techniques and use themwith dexterity.		
Prerequisites	Knowledge of Power Point or other presentation tools.		
Course Outcomes (CO)	1. Students will be able to learn new technologies and skill of presentation of their work.		

The Guidelines for this course are given as under…

1. Institute shall assign mentor/guide to each student.

2. Student shall prepare synopsis with the help of guide, thensubmit synopsis approved by the mentor/guide in the institute.

3. Institute shall approve the seminar topic.

4. Students shall prepare seminar report and presentation with the help of guide and submit seminar report andpresentation approved by the guide well in advance to conduct finalpresentation/examination.

5. Students may take seminar topic based on new technology, case study, success story of start-up he/she hasundertaken in the ‘Industrial Project/Internship/Start-up activity.

Mapping of COs: 1