NOIDA INSTITUTE OF ENGG. & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR
(AN AUTONOMOUS INSTITUTE)

Affiliated to

DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY, LUCKNOW

Evaluation Scheme & Syllabus

For

Master of Computer Applications

MCA

First Year

(Effective from the Session: 2022-2023)

NOIDA INSTITUTE OF ENGG. & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR
(AN AUTONOMOUS INSTITUTE)

Master of Computer Applications
MCA
EVALUATION SCHEME
SEMESTER- I

S.No	Subject Codes	Subjects	Periods			Evaluation Schemes				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	AMCA0101	Fundamentals of Computer And Programming in C	3	1	0	30	20	50		100		150	4
2	AMCA0102	Operating System	3	0	0	30	20	50		100		150	3
3	AMCA0103N	Professional Communication And Management Principles	2	0	0	30	20	50		100		150	2
4	AMCA0104Z	Computer System Organization	3	0	0	30	20	50		100		150	3
5	AMCA0105	Discrete Mathematics	3	0	0	30	20	50		100		150	3
6	AMCA0151	C Programming Lab	0	0	4				50		50	100	2
7	AMCA0152	Operating System Lab	0	0	4				50		50	100	2
8	AMCA0153N	Professional Communication Lab	0	0	4				50		50	100	2
9	AMCA0154	Computer Organization Lab	0	0	4				50		50	100	2
		MOOCs											
		TOTAL						250	200	500	200	1150	23

List of MOOCs (Coursera) Based Recommended Courses for First Year (Semester-I) MCA Students

S. No.	Subject Code	Course Name	University/ Industry Partner Name	No. of Hours
1	**AMC0049**	**Speak English Professionally: Inperson, Online and on phone**	**Georgia Technical University**	**16**

Abbreviation Used: -

L: Lecture, T: Tutorial, P: Practical, CT: Class Test, TA: Teacher Assessment, PS: Practical Sessional,
TE: Theory End Semester Exam., PE: Practical End Semester Exam.

NOIDA INSTITUTE OF ENGG. & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR
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Master of Computer Applications
MCA
EVALUATION SCHEME
SEMESTER-II

S. No	Subject Codes	Subjects	Periods			Evaluation Schemes				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	AMCA0201N	Object Oriented Programming with JAVA	**3**	**1**	**0**	**30**	**20**	**50**		**100**		**150**	**4**
2	AMCA0202	Database Management System	**3**	**0**	**0**	**30**	**20**	**50**		**100**		**150**	**3**
3	AMCA0203N	Data Structures and Analysis of Algorithm	**3**	**1**	**0**	**30**	**20**	**50**		**100**		**150**	**4**
4	AMCA0205	Design Thinking	**3**	**0**	**0**	**30**	**20**	**50**		**100**		**150**	**3**
5		Departmental Elective-I	**2**	**0**	**0**	**30**	**20**	**50**		**50**		**100**	**2**
6	AMCA0251N	Object Oriented Programming with JAVA Lab	**0**	**0**	**4**				**50**		**50**	**100**	**2**
7	AMCA0252	Database Lab	**0**	**0**	**4**				**50**		**50**	**100**	**2**
8	AMCA0253N	Data Structures Lab	**0**	**0**	**4**				**50**		**50**	**100**	**2**
9		Departmental Elective-I Lab	**0**	**0**	**2**				**50**			**50**	**1**
10	AMCANC0201	Cyber Security	**2**	**0**	**0**	**30**	**20**	**50**		**50**		**100**	
		MOOCs											
		TOTAL						250	200	450	150	**1050**	**23**

List of MOOCs (Coursera) Based Recommended Courses for First Year (Semester-II) MCA Students

S. No.	Subject Code	Course Name	University/ Industry Partner Name	No. of Hours
1	AMC0050	Foundation: Data Everywhere	Offered by Google	20
2	AMC0051	Ask question to make Data Driven Decision	Offered by Google	18
3	AMC0052	Prepare Data for Exploration	Offered by Google	22
4	AMC0053	Facebook, Instagram and Snapchat Marketing	Digital Marketing Institute	12
5	AMC0054	Social Media and digital Marketing Fundamental	University Colorado Boulder	10
6	AMC0055	Twitter Linked In and You Tube Marketing	Digital Marketing Institute	13

PLEASE NOTE:-

Compulsory Audit Courses (Non Credit -AMCANC0201**)**

- All Compulsory Audit Courses (a qualifying exam) has no Credit.
- Total and obtained marks are not added in the Grand Total.

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List of Departmental Electives-:-

S. No.	Subject Code	Subject Name
Departmental Elective-I		
1	AMCA0214Z	Fundamentals of Digital Marketing and Analytics
2	AMCA0215Z	Fundamentals of Digital Marketing and Optimization
3	AMCA0216Z	CRM Administration
4	AMCA0218	Software Testing

S. No.	**Subject Code**	**Subject Name**
Departmental Elective-I Lab		
1	AMCA0214P	Fundamentals of Digital Marketing and Analytics Lab
2	AMCA0215P	Fundamentals of Digital Marketing and Optimization Lab
3	AMCA0216P	CRM Administration Lab
4	AMCA0218P	Software Testing Lab

MCA - FIRST YEAR FIRST SEMESTER					
Course Code	AMCA0101	**L**	**T**	**P**	**Credit**
Course Title	Fundamentals of Computer and Programming in C	3	1	0	**4**

Course objective: To understand basic concepts of C-programming language. Implement C programs to solve complex problems. Enhance debugging, analyzing and problem-solving skills. Create diversified solutions for real world applications using C language Acquire the knowledge of variable allocation and binding, conditional statement, control flow, types, function, pointer, parameter passing, array, structure and file handling to solve real world problems.

Pre-requisites: Students are expected to be able to open command prompt window or terminal window, edit a text file, download and install software, and understand basic programming concepts.

Course Contents / Syllabus

UNIT-I	**Basic Programming concepts**	**8 hours**

Approaches to Problem Solving: Concept of Algorithms and Flow Chart. Programming Languages Classification, Translator and their types.

Programming using C: Structure of C program, Overview of compilation and execution process in an IDE, transition from algorithm to program, Errors and their types, object and executable code, Tokens of C language: Keywords, identifiers, constant.

UNIT-II	**Data types and Conditional Statements**	**8 hours**

Data type, Operators and their types, Arithmetic expressions and precedence: Operators, operator precedence and associativity, type conversion, mixed operands.

Conditional Branching: if, else-if, nested if - else, switch statements, use of break, and default with switch. Iteration and loops: Concept of loops, for, while and do-while, multiple loop variables, use of break and continue statements, nested loop.

Arrays: Array notation and representation (one and two dimensional), manipulating array elements, 2-D arrays used in matrix computation.

UNIT-III	**Functions and Pointers**	**8 hours**

Functions: Concept of Sub-programming, function, types of functions, passing parameters to functions: call by value, recursive functions, Storage: scope of variable, local and global variables, Nesting of Scope, Storage classes: Auto, Register, Static and Extern

Pointers: defining and declaring pointer, pointer arithmetic and scaling, Pointer Aliasing, call by reference.

UNIT-IV	**Strings and Structure**	**8 hours**

Strings: Introduction, initializing strings, accessing string elements, Array of strings, Passing strings to functions, String functions.

Structure, Introduction, Initializing, defining and declaring structure, Accessing members, Operations on individual members, Operations on structures, Structure within structure, Array of structure Union, Introduction, Initializing, defining and declaring structure, Accessing members, Operations on individual members, Operations on Union.

UNIT-V	**File handling and dynamic memory allocation**	**8 hours**

Dynamic Memory Allocation: Introduction, Library functions –malloc, calloc, realloc and free.

Pre-processor directives: defining and calling macros, File inclusion, conditional compilation

File Handling: Basics, File types, File operations, File pointer, File opening modes, File handling functions, File handling through command line argument, Record I/O in files.

Course outcome: At the end of course, the student will be able to

CO 1	Develop simple algorithms for arithmetic and logical problems.	K_2
CO 2	Implement and trace the execution of programs written in C language.	K_1,K_2,K_4
CO 3	Implement conditional branching and iteration	K_3
CO 4	Use function, and pointers to develop algorithms and programs.	K_2, K_6
CO 5	Use searching and sorting algorithm to arrange data and use file handling for developing real life projects	K_2, K_4

Text books :

(1) Herbert Schildt, "C: The Complete Reference", Osbourne McGraw Hill, 4th Edition, 2002.

(2) Computer Concepts and Programming in C, E Balaguruswami, McGraw Hill

(3) Let Us C by Yashwant P. Kanetkar. BPB publication

(4) K.R Venugopal, "Mastering C", TMH

(5) Yashwant P. Kanetkar, "Working with C", BPB publication

Link: NPTEL/ YouTube/ Faculty Video Link:

Unit 1	https://nptel.ac.in/courses/106/104/106104128/
Unit 2	https://nptel.ac.in/courses/106/104/106104074/
Unit 3	https://nptel.ac.in/courses/106/102/106102066/
Unit 4	https://nptel.ac.in/courses/106/105/106105171/
Unit 5	https://www.youtube.com/watch?v=IdXrCPzNnkU&list=PLJ5C_6qdAvBFzL9su5J-FX8x80BMhkPy1&index=4

MCA - FIRST YEAR FIRST SEMESTER					
Course Code	AMCA0102	**L**	**T**	**P**	**Credit**
Course Title	Operating System	3	0	0	**3**

Course objective: To learn the fundamentals of Operating Systems, the Process management and CPU scheduling algorithm, understand the various issues in process synchronization and different strategies for handling the Deadlock, understand the concepts of memory management policies and virtual memory, learn the file system implementation and mass storage management functions of operating systems.

Pre-requisites: Students are expected to be familiar with Computer Organization

Course Contents / Syllabus

UNIT-I	**Fundamental Concepts of Operating System**	**8 hours**

Introduction: Operating System Structure- Layered structure, System Components, Operating system functions, Classification of Operating systems- Batch, Interactive, Time sharing, Real Time System, Multiprocessor Systems, Multiuser Systems, Multi process Systems, Multithreaded Systems, Operating System services, Reentrant Kernels, Monolithic and Microkernel Systems. issues in operating system design. Application of OS in different domain

UNIT-II	**Concurrent Processes**	**8 hours**

Concurrent Processes: Process Concept, Principle of Concurrency, Producer / Consumer Problem, Mutual Exclusion, Critical Section Problem, Dekker's solution, Peterson's solution, Semaphores, Test and Set operation, Classical Problem in Concurrency- Dining Philosopher Problem, Sleeping Barber Problem, Producer Consumer problem, Readers/Writers problem. Inter Process Communication models and Schemes, Process generation.

UNIT-III	**CPU Scheduling and Deadlock**	**8 hours**

CPU Scheduling: Scheduling Concepts, Performance Criteria, Process States, Process Transition Diagram, Schedulers, Process Control Block (PCB), Process address space, Process identification information, Threads and their management, Scheduling Algorithms, Multiprocessor Scheduling.
Real-Time Scheduling. Deadlock: System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from deadlock.

UNIT-IV	**Memory Management**	**8 hours**

Memory Management: Basic bare machine, Resident monitor, Multiprogramming with fixed partitions, Multiprogramming with variable partitions, Memory Allocation: Allocation Strategies (First Fit, Best Fit, and Worst Fit), Fragmentation, Protection schemes, Paging, Segmentation, Paged segmentation, Virtual memory concepts, Demand paging, Performance of demand paging, Page replacement algorithms, Thrashing, Cache memory organization, Locality of reference.

UNIT-V	**Input/Output and File System**	**8 hours**

I/O Management and Disk Scheduling: I/O devices, and I/O subsystems, I/O buffering, Disk storage and disk scheduling, RAID. File System: File concept, File organization and access mechanism, File directories, and File sharing, File system implementation issues, File system protection and security. Features of different OS[Windows, Linux, Android],Comparative Study of Different OS, Case Study

Course outcome: At the end of course, the student will be able to

CO 1	Explain main components, services, types and structure of Operating Systems.	K2
CO 2	Apply the algorithms and techniques to handle the various concurrency control issues.	K3
CO 3	Compare and apply CPU scheduling algorithms for process execution.	K2

CO 4	Identify occurrence of deadlock and describe ways to handle it.	K3
CO 5	Explain and apply memory, I/O and disk management techniques.	K5

Text books :

(1) Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Operating System Concepts, 8th Ed., John Wiley, 2008.

(2) William Stallings, Operating Systems: Internals and Design Principles. Prentice-Hall, 6th Ed., 2008.

(3) AS Tanenbaum, Modern Operating Systems, 3rd Ed., Pearson, 2009.

Link: NPTEL/ YouTube/ Faculty Video Link:

Unit 1	https://nptel.ac.in/courses/106106144
Unit 2	https://archive.nptel.ac.in/courses/106/105/106105214/
Unit 3	https://www.youtube.com/playlist?list=PLsylUObW5M3CAGT6OdubyH6FztKfJCcFB
Unit 4	https://www.youtube.com/playlist?list=PL3-wYxbt4yCjpcfUDz-TgD_ainZ2K3MUZ
Unit 5	https://www.youtube.com/playlist?list=PLyqSpQzTE6M9SYI5RqwFYtFYab94gJpWk

MCA - FIRST YEAR FIRST SEMESTER					
Course Code	AMCA0103N	**L**	**T**	**P**	**Credit**
Course Title	Professional Communication and Management Principles	2	0	0	**2**

Course objective: The objective of the course is to ensure that the students can understand the basic features of professional communication, communicate effectively in a professional environment, equipped to appear for the International Business English Certification, explain functions of management in terms of planning and organizing

Pre-requisites: The student should be able to communicate in basic English.

Course Contents / Syllabus

UNIT-I	**Introduction to Professional Communication**	**5 hours**

Communication – definition, process, levels, flow, types, and barriers, Technical Communication and its importance.

UNIT-II	**Reading and Listening Skills**	**5 hours**

Reading basics: Skimming, scanning, churning, assimilation, Reading texts for note making, paraphrasing, diagrams, charts, picture reading, Process and types of listening , Overcoming barriers to effective listening

UNIT-III	**Written Communication**	**10 hours**

Vocabulary building - word formation; etymology; root words, prefixes & suffixes; synonyms; antonyms; homophones; abbreviations; one-word substitutes ,Requisites of a good sentence ,Common errors - subject-verb agreement and concord, tenses, articles, preposition; punctuation , Paragraph writing ,Basics of letter & email writing ,Resume & Job application letter

UNIT-IV	**Effective speaking Skills**	**10 hours**

Components of effective speaking, Applied phonetics – phoneme, syllable, word accent, stress, rhythm & intonation , Public Speaking – Kinesics, Chronemics, Proxemics , Voice dynamics ,Presentation Skills Facing an Interview , Do's & Don'ts of a GD

UNIT-V	**Management & Management Practices**	**10 hours**

Meaning, Definition and Scope of Management, The process of Management, Development of Management thought, Contribution of F.W. Taylor and Henry Fayol, Hawthorne Studies, Qualities of an Efficient Management, TQM , Importance of Planning, Steps in Planning, Organizational Structures, Meaning and Methods of Recruitment and Selection Process, Motivation—Meaning and Theories of Motivation, Leadership styles. Controlling Process.

Course outcome: At the end of course, the student will be able to

CO 1	Understand the fundamentals of communication	K1
CO 2	Understand and apply reading and listening tasks for better professional competence.	K1, K4
CO 3	Write professionally in simple and correct English.	K2
CO 4	Apply speaking skills in various professional situations.	K4
CO 5	Understand and apply the concepts of planning and organizing.	K2,K4

Text books :

(1) Technical Communication – Principles and Practices by Meenakshi Raman &Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi.

(2) Cambridge English Business Benchmark (Pre-intermediate to Intermediate), 2nd edition, Norman Whitby, Cambridge University Press, 2006, UK.	
(3) Technical Communication – Principles and Practices by Meenakshi Raman &Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi	
(4) Koontz Harold &Weihrich Heinz – Essentials of Management (Tata McGraw Hill, 5thEdition,2008)	
Link: NPTEL/ YouTube/ Faculty Video Link:	
Unit 1	https://www.youtube.com/watch?v=TtbImDfUt4c&list=PLLy_2iUCG87DH0iQSVWZ8iamVl5SaLlXQ&index=2
Unit 2	https://www.youtube.com/watch?v=yWF4tT6o2mM&list=PLLy_2iUCG87DH0iQSVWZ8iamVl5SaLlXQ&index=6
Unit 3	https://www.youtube.com/watch?v=KWy_m6QfFhw&list=PLLy_2iUCG87DH0iQSVWZ8iamVl5SaLlXQ&index=10
Unit 4	https://www.youtube.com/watch?v=ybVX_lu1u8E&list=PLLy_2iUCG87DH0iQSVWZ8iamVl5SaLlXQ&index=15
Unit 5	https://www.youtube.com/watch?v=Ug0ORs3R4WQ&list=PLLy_2iUCG87DH0iQSVWZ8iamVl5SaLlXQ&index=19

MCA - FIRST YEAR FIRST SEMESTER					
Course Code	AMCA0104Z	**L**	**T**	**P**	**Credit**
Course Title	Computer System Organization	3	0	0	**3**

Course objective: The basic concepts and components of digital logic design, The different methods of data representation in computers, The different micro operations and data transfer methods, Design, functionality and taxonomy of CPU, Memory types and functionality with data transfer methods.

Pre-requisites: Students are familiar with the computer system and its basic operations.

Course Contents / Syllabus

UNIT-I	**Introduction**	**8 hours**

Introduction: Digital Computers and Number System, Logic Gates, Boolean Algebra, Map Simplification upto five variables, Combinational Circuits, Sequential Circuits, Look ahead carry adders, Data types, Complements, Fixed point representation, Fixed Point Addition & Subtraction, floating point Representation, Booth's Multiplication, IEEE754 Floating point standards.

UNIT-II	**Register Transfer & Micro operations**	**8 hours**

Register Transfer Language, Register Transfer, Bus and Memory Transfers, Common Bus System, Two Bus Organization, Three Bus Organization, Arithmetic Micro operations, Logic Micro operations, Shift Micro operations, Arithmetic &Logic unit design.

UNIT-III	**Central Processing Unit**	**8 hours**

Micro programmed Control Unit, Hardwired Control Unit, General register Organization, Stack Organization, Instruction types, formats, instruction cycles and sub cycles (Fetch, decode, execute etc.), execution of a complete instruction, Addressing Modes, Reduced Instruction set computer, Complex Instruction set Computer

UNIT-IV	**Memory Management**	**8 hours**

Memory Hierarchy, Main Memory (RAM and ROM chips), Auxiliary Memory, and Associative memory, Cache Memory, Memory Mapping: Associative mapping, Direct mapping, Set associative mapping. 2D and 2.5D memory organization

UNIT-V	**Input/output**	**8 hours**

I/O interface, I/O ports, Interrupts, Modes of data Transfer**:** Programmed I/O, Interrupt Initiated I/O, and Direct memory access (DMA), I/O channels and processors, Serial Communication, Standard communication interfaces. Case Study : Multi core processing, Multithreading architecture

Course outcome: At the end of course, the student will be able to

CO 1	To explain the number systems including computer arithmetic, logic gates, Boolean algebra, Minimization techniques etc.	K_1, K_2
CO 2	To discuss about the different binary codes and arithmetic operations.	K_1, K_4
CO 3	To elaborate about the register transfer operations and construction of buses by using different digital components.	K_3

CO 4	To analyze the functional units of the processor such as register file, arithmetic-logical unit and control unit.	K_2
CO 5	To demonstrate cache subsystem, memory mapping techniques and Input-Output subsystem and protocols for data communication.	K_2, K_4

Text books :
(1) Computer System Architecture, M.Mano (PHI).
(2) Computer Organization, Vravice, Zaky&Hamacher (TMH Publication).
(3) Logic and Digital Design, Morris Mano and Kimi Charles 4th Edition, Prentice Hall.

Link: NPTEL/ YouTube/ Faculty Video Link:

Unit 1	https://www.youtube.com/watch?v=leWKvuZVUE8&list=PL1A5A6AE8AFC187B7
Unit 2	https://www.youtube.com/watch?v=4TzMyXmzL8M&list=PL59E5B57A04EAE09C
Unit 3	https://www.youtube.com/watch?v=msqxkEKFg8I&list=PLgHucKw979AvcnTpPNZMZyORdL5HvTr9m
Unit 4	https://www.youtube.com/watch?v=leWKvuZVUE8&list=PL08A7B4AC6FD34016
Unit 5	https://www.youtube.com/watch?v=IZ5dicfkIP4&list=PLEAYkSg4uSQ0eDa24iKd7qJlsrvr8XcvF

MCA - FIRST YEAR FIRST SEMESTER					
Course Code	AMCA0105	**L**	**T**	**P**	**Credit**
Course Title	Discrete Mathematics	3	0	0	**3**

Course objective: To develop mathematical ability in understanding mathematical reasoning, ability to perform combinatorial analysis and knowledge about discrete structures, Perform operations on discrete mathematics such as sets, functions and relations, Verify the correctness of an argument using symbolic logic and truth tables, Solve problems using counting techniques and combinatorics , to improve formal reasoning skills acquisition and mathematical knowledge

Pre-requisites: Students must be aware of basic set operations.

Course Contents / Syllabus

UNIT-I	**Set Theory, Relations & Functions**	**8 hours**

Set Theory: Introduction, Size of sets and cardinals, Venn diagrams, Combination of sets, Multisets, Ordered pairs, Set identities and **Proofs of some general identities on sets**.
Relations & Functions: Definition, Operations on relations, Composite relations, Properties of relations, Equality of relations, Partial order relation and **Recursive definition of relation**.
Functions - Definition, Classification of functions, Operations on functions, Recursively defined functions and **Growth of Functions**.
Natural Numbers: Introduction, Piano's axioms, Mathematical Induction, Strong Induction and Induction with Nonzero Base cases.

UNIT-II	**Posets, Hasse Diagram, Lattices and Graph**	**8 hours**

Posets, Hasse Diagram and Lattices: Introduction, Partial order sets, Combination of partial order sets, Hasse diagram, Introduction of lattices, Properties of lattices – Bounded, Complemented, Modular and Complete lattice.
Graphs: Definition and terminology, Representation of graphs, Multigraphs, Bipartite graphs, Planar graphs, Isomorphism and Homeomorphism of graphs, Euler and Hamiltonian paths, Graph coloring
Trees: Definition, Binary tree, Binary tree traversal (BFS and DFS), Binary search tree.

UNIT-III	**Algebraic Structures, Rings and Fields**	**8 hours**

Algebraic Structures: Introduction to algebraic Structures and properties. Types of algebraic structures: Semi group, Monoid, Group, Abelian group and Properties of group. Subgroup, Cyclic group, Cosets, Permutation and **Symmetric groups**, Homomorphism and Isomorphism of groups.
Rings and Fields: Definition and elementary properties of Rings and Fields.

UNIT-IV	**Propositional & Predicate Logic**	**8 hours**

Propositional & Predicate Logic: Propositions well formed formula, Truth tables, Tautology, Contradiction, Algebra of propositions, Theory of Inference and Natural Deduction.
Predicate Logic: Theory of predicates, First order predicate, Predicate formulas, quantifiers, Inference theory of predicate logic.

UNIT-V	**Recurrence Relations &Combinatorics**	**8 hours**

Recurrence Relations and Generating Function: Introduction and properties of Generating Function, Growth of functions, **Recurrences** from algorithms, Simple Recurrence relation with constant coefficients and Linear recurrence relation without constant coefficients. Methods of solving recurrences
Combinatorics: Introduction, Counting Techniques, Pigeonhole Principle, Pólya's Counting Theory.

Course outcome: At the end of course, the student will be able to

CO 1	Use mathematical and logical notation to define and formally reason about basic discrete structures such as Sets, Relations, Functions and Induction.	K1, K2
CO 2	Apply mathematical arguments using logical connectives and quantifiers to check the validity of an argument through truth tables and propositional and predicate logic.	K1, K4
CO 3	Identify and prove properties of Algebraic Structures like Groups, Rings and Fields	K3
CO 4	Apply the concept of combinatorics to solve basic problems in discrete mathematics	K2
CO 5	Formulate and solve recurrences and recursive functions	K2, K4

Text books :

(1) Discrete Mathematics and Its Applications, Kenneth H. Rosen, McGraw-Hill, 2006.

(2) Discrete Mathematical Structures, B. Kolman, R. C. Busby, and S. C. Ross, Prentice Hall, 2004

Link: NPTEL/ YouTube/ Faculty Video Link:

Unit 1	https://www.youtube.com/watch?v=xlUFkMKSB3Y&list=PL0862D1A947252D20&index=1
Unit 2	https://www.youtube.com/watch?v=DmCltf8ypks&list=PL0862D1A947252D20&index=3
Unit 3	https://www.youtube.com/watch?v=kZ6UqFm8lnw&list=PL0862D1A947252D20&index=5
Unit 4	https://www.youtube.com/watch?v=ruwZxR2YRpE&list=PL0862D1A947252D20&index=6
Unit 5	https://www.youtube.com/watch?v=9AUCdsmBGmA&list=PL0862D1A947252D20&index=10

MCA - FIRST YEAR FIRST SEMESTER					
Course Code	AMCA0151	**L**	**T**	**P**	**Credit**
Course Title	C Programming Lab	**0**	**0**	**4**	**2**

Course objective: At the end of course, the students will be able to do the following:

1	To introduce students to the basic knowledge of programming fundamentals of C language.
2	To impart writing skill of C programming to the students and solving problems.
3	To impart the concepts like looping, array, functions, pointers, file, structure.

Pre-requisites: Students are expected to be able to open command prompt window or Terminal window, edit a text file, download and install software, and understand basic programming concepts.

Course Contents / Syllabus

Introduction Programs

1. Program to explain the basic I/O Statement
2. Program to Explain the use and implementation of Data Types

Operators

1. Program to understand the use of Logical Operators
2. Program to implement Arithmetic and other Operators

Conditional Statement

1. Program to implement If..else statement
2. Program to implement nested if … else statement

Switch Statement

1. Implementation and use of Switch Statement

Basic Loop operations

1. Program to implement loops (for,while,do..while)
2. Programs to print characters(screen printing)

Arrays

1. Program for manipulation of Single Dimension Array
2. Program for illustration use and application of Multi-dimensional Array like addition, multiplication of Matrix
3. Program to implement Searching and Sorting.

Exercise 7: Functions

1. Program to illustrate the use of Functions

2. Program to implement Call by Value
3. Program to implement Call by function

Structure & Union

1. Program to show use of structure
2. Programs to show use of Union

Dynamic Memory Allocation

1. Program to make use of DMA function

File operations using command line arguments

1. Program to write and read from file
2. Program to illustrate use of File Operations
3. Program to implement Command line Arguments

Course outcome:	**At the end of course, the student will be able**
CO 1	Write the algorithm and draw a flow chart of a given problem.
CO 2	Recognize and understand the syntax and construction of C programming code.
CO 3	Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.

Text books

(1) Problem Solving and Program Design in C, 4th edition, by jeri R. Hanly and Elli B.Koffman.

(2) Programming in C by PradipDey, Manas Ghosh 2nd edition Oxford University Press.

(3) E.Balaguruswamy, Programming in ANSI C 5th Edition McGraw-Hill

Reference Books

(1) Brain W.Kernighan& Dennis Ritchie, C Programming Language, 2nd edition, PHI

MCA - FIRST YEAR FIRST SEMESTER			
Course Code	AMCA0152	**LTP**	**Credit**
Course Title	Operating System Lab	**00 4**	**2**

Course Objective:

Students will gain practical experience with designing and implementing concepts of operating systems such as CPU scheduling, memory management and deadlock handling using C language.

Suggested list of Experiment

Sr. No.	**Name of Experiment**
Introduction to Linux/Android/Windows Operating System: Directory commands, File Commands, Admin Commands, Introduction to Editor, Introduction to shell scripts.	
CPU scheduling	
1	Program to simulate different scheduling algorithms to find average turnaround time and waiting time
Memory Allocation	
2	Program to simulate the contiguous memory allocation techniques like a) Worst-fit b) Best-fit c) First-fit
Page Replacement	
3	Program to simulate the **Page Replacement Algorithms**
Deadlock	
4	Program to simulate algorithm for the purpose of deadlock avoidance

Lab Course Outcome: Upon the completion of Operating Systems practical course, the student will be able to:

CO 1	Analyze and simulate CPU Scheduling Algorithms like FCFS, Round Robin, SJF, and Priority.
CO 2	Implement page replacement schemes.
CO 3	Understand the concepts of deadlock in operating systems

MCA - FIRST YEAR FIRST SEMESTER			
Course Code	AMCA0153N	**L T P**	**Credit**
Course Title	Professional Communication Lab	**0 0 4**	**2**

Course Objective:

Students can converse effectively in English , can face a job interview

Suggested list of Activities		
	Activities	**Time**
1. Interactions Level 1:	• Greet and take leave of people • Introducing oneself and others • Conversations in different situations - * **role play** • Telephone conversations	4 hours
2. The Sounds of English – Pronunciation practice through Oral Drill	• Relationship between letters and sounds • Practice difficult consonant sounds • Practice difficult vowels and diphthongs • Learn and practice consonant clusters	6hours
3. Interactions Level 2: (Introducing the vocabulary & sentence structures of polite conversation)	• Getting someone's attention • Seeking clarifications politely • Expressing opinions, apologizing • Listening effectively	4hours
4. Stress and Tone - Pronunciation practice through Oral Drill	• Syllables and word stress • Sentence stress • Strong and weak forms of words	6 hours
5. Interactions level 3:	Handling basic interview questions	8 hours
6. *One-to-one Interview	• Emphasis on body language and voice dynamics	20 hours
[Note: *To be video recorded and graded]		

	Course outcome: At the end of the course the students will be able to	Levels
CO 1	Understand the basic nuances of interpersonal and organizational communication	K2
CO 2	Enunciate individual speech sounds clearly	K3
CO 3	Express themselves effectively using appropriate vocabulary	K3
CO 4	Apply the knowledge of basic phonetics to speak more effectively and fluently	K3
CO 5	Learn interview skills with effective body language	K3

MCA - FIRST YEAR FIRST SEMESTER					
Course Code	AMCA0154	**L**	**T**	**P**	**Credit**
Course Title	Computer Organization Lab	**0**	**0**	**4**	**2**

Course objective: At the end of course, the students will be able to do the following:

1	Students will gain practical experience with designing and implementing concepts of gates , Multiplexer, Implement a simple instruction set computer

Pre-requisites: Students are expected to be able understand the basic concepts of computer.

Course Contents / Syllabus

1. Verification of the functionality of all logic gates.
2. Implementing HALF ADDER, FULL ADDER using basic logic gates.
3. Implementing Binary -to -Gray, Gray -to -Binary code conversions.
4. Implementing 3-8 line DECODER.
5. Implementing 4x1 and 8x1 MULTIPLEXERS.
6. Verify the excitation tables of various FLIP-FLOPS.

Perform the following experiments using Simulation:

7. Design of an 8-bit Input/ Output system with four 8-bit Internal Registers.
8. Design of an 8-bit ARITHMETIC LOGIC UNIT using simulator.
9. Design the data path of a computer from its register transfer language description.
10. Implement a simple instruction set computer with a control unit and a data path

Note: Experiment may vary or be changed as per the requirement.

Course outcome: At the end of course , the student will be able to

CO 1	Design and verify combinational circuits (adder, code converter, decoder, multiplexer) using basic gates. K1,K2
CO 2	Design and verify various flip-flops. K2,K3
CO 3	Demonstrate combinational circuit using simulator K1,K3

Text books

1. Computer System Architecture, M.Mano (PHI)

3. Logic and Digital Design, Morris Mano and Kimi Charles 4th Edition, Prentice Hall.

Reference Books

1. Structured Computer Organization, Tannenbaum (PHI)

2. Computer Organization, Stallings (PHI)

MCA - FIRST YEAR SECOND SEMESTER					
Course Code	AMCA0201N	**L**	**T**	**P**	**Credit**
Course Title	Object Oriented Programming with JAVA	3	1	0	**4**

Course objective: The basic and advance concepts of OOPs programming, Student will be able to implement Core Java programming , will be able to implement Packages, Exception Handling and String Handling and its implementation , able to understand Concurrency in Java and I/O Stream and its implementation , able to understand GUI Programming, Generics, Collections and JDBC and their use.

Pre-requisites: Students must know at least the basics of how to use a computer, and should be able to start a command line shell. Knowledge of basic programming concepts, as covered in 'Programming Basic" course is necessary

Course Contents / Syllabus

UNIT-I	**Introduction**	**8 hours**

Object Oriented Programming: Introduction and Features: Abstraction, Encapsulation, Polymorphism, and Inheritance concepts, Need of OOP's paradigm.
Modeling Concepts: Introduction, Class Diagram and Object Diagram.
Control Statements: Decision Making, Looping and Branching, Argument Passing Mechanism: Command Line Argument.

UNIT-II	**Basics of Java Programming**	**8 hours**

Class and Object: Object Reference, Constructor, Abstract Class,Interface and its uses, Defining Methods, Use of "this", "super", static and final keyword, Access control, modifiers, Nested class, Inner class, Anonymous inner class. Garbage Collection and finalize () Method.
Inheritance: Introduction and Types of Inheritance in Java, Constructors in Inheritance.
Polymorphism: Introduction and Types, Overloading and Overriding.
Lambda expression: Introduction and Working with Lambda Variables
Arrays: Introduction, single and multidimensional arrays

UNIT-III	**Packages, Exception Handling and String Handling**	**8 hours**

Packages: Introduction and Types, Access Protection in Packages, Import and Execution of Packages.
Exception Handling, Assertions and Localizations: Introduction and Types, Exceptions vs. Errors, Handling of Exception. Finally, Throws and Throw keyword, Multiple Catch Block, Nested Try and Finally Block. Assertions and Localizations Concepts and it's working, Tokenizer.
String Handling: Introduction and Types, Operations, Immutable String, Method of String class, String Buffer and String Builder class, Reading/Writing from console and files, Simple I/O using System. Out and the Scanner class.

UNIT-IV	**Concurrency in Java and I/O Stream**	**8 hours**

Threads: Introduction and Types, Creating Threads, Thread Life-Cycle, Thread Priorities, Daemon Thread, Runnable Class, Synchronizing Threads.
I/O Stream: Introduction and Types, Common I/O Stream Operations, Interaction with Console I/O and File I/O.
Annotations: Introduction, Custom Annotations and Applying Annotations with its types.

UNIT-V	**GUI Programming, Generics ,Collections and JDBC**	**8 hours**

GUI Programming: Introduction and Types of Swings, Abstract Window Toolkit, Components and Containers, Layout Managers and User-Defined Layout and Event Handling.
Generics and Collections: Introduction, Using Method References, Using Wrapper Class, Using Lists, Sets, Maps and Queues, Working with Generics.
Database Connectivity using JDBC: Introduction, JDBC Drivers, Select, Insert, Delete and Update Statements and Prepared Statement Interface

Course outcome: At the end of course, the student will be able to

CO 1	Identify the concepts of object oriented programming and relationships among them needed inmodeling.	K2
CO 2	Demonstrate the Java programs using OOP principles with various types of classes and also implement the concepts of lambda expressions	K3
CO 3	Implement packages with different protection level resolving namespace collision and evaluate the error handling concepts for uninterrupted execution of Java program.	K3,K5
CO 4	Implement Concurrency control, I/O Streams and Annotations concepts and its types by using Java program.	K3
CO 5	Design and develop the GUI based application, Generics, Collections and JDBC applications in Java programming language to solve the real world problem.	K6

Text books :

(1) Herbert Schildt," Java - The Complete Reference", McGraw Hill Education 12th edition

(2) Herbert Schildt," Java: A Beginner's Guide", McGraw-Hill Education 2nd edition

(3) James Rumbaugh et. al, "Object Oriented Modeling and Design", PHI 2nd Edition

Link: NPTEL/ YouTube/ Faculty Video Link:

Unit 1	https://www.youtube.com/watch?v=r59xYe3Vyks&list=PLS1QulWo1RIbfTjQvTdj8Y6yyq4R7g-Al
Unit 2	https://www.youtube.com/watch?v=ZHLdVRXIuC8&list=PLS1QulWo1RIbfTjQvTdj8Y6yyq4R7g-Al&index=18
Unit 3	https://www.youtube.com/watch?v=hBh_CC5y8-s
Unit 4	https://www.youtube.com/watch?v=qQVqfvs3p48
Unit 5	https://www.youtube.com/watch?v=2qWPpgALJyw

MCA - FIRST YEAR SECOND SEMESTER					
Course Code	AMCA0202	**L**	**T**	**P**	**Credit**
Course Title	Database Management System	3	0	0	**3**

Course objective: Features of a database system and its application and compare various types of data models , Construction an ER Model for a given problem and transform it into a relation database schema , Formulate solution to a query problem using SQL Commands, relational algebra, tuple calculus and domain calculus , need of normalization and normalize a given relation to the desired normal form , Different approaches of transaction processing and concurrency control

Pre-requisites: Students are expected to be familiar with Data structure

Course Contents / Syllabus

UNIT-I	**Introduction**	**8 hours**

Introduction: Overview, Database System vs File System, Database System Concept and Architecture, Data Model Schema and Instances, Data Independence and Database Language and Interfaces, Data Definitions Language, DML, Overall Database Structure. Data Modeling Using the Entity Relationship Model: ER Model Concepts, Notation for ER Diagram, Mapping Constraints, Candidate Key, Primary Key, Specialization**,** Generalization, Aggregation, Reduction of an ER Diagrams to Tables, Extended ER Model, Relationship of Higher Degree.

UNIT-II	**Relational data Model and Language**	**8 hours**

Relational Data Model Concepts, Integrity Constraints, Entity Integrity, Referential Integrity, Keys Constraints, Domain Constraints, Relational Algebra, Relational Calculus, Tuple and Domain Calculus. Introduction to SQL: Characteristics of SQL, Advantage of SQL. SQL Data Type and Literals. Types of SQL Commands. SQL Operators and their Procedure. Tables, Views and Indexes. Queries and Sub Queries Nested sub queries. Aggregate Functions. Group by, having clause ,Insert, Update and Delete Operations, Joins, Unions, Intersection, Minus, Cursors, Triggers, Procedures in SQL/PL SQL

UNIT-III	**Data Base Design & Normalization**	**8 hours**

Functional dependencies, Armstrong's inference rules, canonical cover ,Equivalence of Sets of Functional Dependencies normal forms, first, second, third normal forms, BCNF, inclusion dependence, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design

UNIT-IV	**Transaction Processing Concept**	**8 hours**

Transaction System, Transition Diagram, ACID Properties, Schedule, Testing of Serializability, Serializability of Schedules, Conflict & View Serializable Schedule, Recoverability, Recovery from Transaction Failures, Log Based Recovery, Checkpoints, Deadlock Handling. Distributed Database: Distributed Data Storage, Directory System, Failures and their classification, recovery and atomicity

UNIT-V	**Concurrency Control Techniques**	**8 hours**

Concurrency Control, Locking Techniques for Concurrency Control, Time Stamping Protocols for Concurrency Control, Validation Based Protocol, Multiple Granularity, Multi Version Schemes, Recovery with Concurrent Transaction, Concurrency Control in distributed database.
Advance Concepts: Case Study , Introduction to NOSQL

Course outcome: At the end of course, the student will be able to

CO 1	Describe the features of a database system and its application and compare various types of data models.	K2
CO 2	Construct an ER Model for a given problem and transform it into a relation database schema.	K5, K6
CO 3	Formulate solution to a query problem using SQL Commands, relational algebra, tuple calculus and domain calculus.	K5, K6

CO 4	Explain the need of normalization and normalize a given relation to the desired normal form.	K2, K3
CO 5	Explain different approaches of transaction processing and concurrency control, NOSQL	K2

Text books :

(1) Silberschatz, H. Korth and Sudarshan S., "Database System Concepts", 6th Edition, McGraw-Hill International, 2010

(2) Elmasri R. and ShamakantB.Navathe, "Fundamentals of Database Systems", 6th Edition,AddisionWesley , 2011

(3) Date C J, "An Introduction To Database System", Addision Wesley

Link: NPTEL/ YouTube/ Faculty Video Link:

Unit 1	https://www.youtube.com/channel/UCpgnQKuPmFsZyksHc1IMceg
Unit 2	https://www.youtube.com/watch?v=DRSog3SA4-Y&list=PLIwC9bZ0rmjSkm1VRJROX4vP2YMIf4Ebh&index=5
Unit 3	https://www.youtube.com/channel/UCpgnQKuPmFsZyksHc1IMceg
Unit 4	https://www.youtube.com/watch?v=B9tS_JNbW00&list=PLIwC9bZ0rmjSkm1VRJROX4vP2YMIf4Ebh&index=10
Unit 5	https://www.youtube.com/watch?v=K5jqNjnE-pE&list=PLIwC9bZ0rmjSkm1VRJROX4vP2YMIf4Ebh&index=16

MCA - FIRST YEAR SECOND SEMESTER					
Course Code	AMCA0203N	**L**	**T**	**P**	**Credit**
Course Title	Data Structures & Analysis of Algorithms	3	1	0	**4**

Course objective: Analyze the asymptotic performance of algorithms, write rigorous correctness proofs for algorithms, demonstrate a familiarity with major algorithms and data structures, apply important algorithmic design paradigms and methods of analysis.

Pre-requisites: Basic knowledge of programming and mathematics

Course Contents / Syllabus

UNIT-I	**Introduction To Data Structure**	**8 hours**

Introduction to data structure: Data, Entity, Information, Difference between Data and Information, Data type , Build in data type, Abstract data type, Definition of data structures, Types of Data Structures: Linear and Non-Linear Data Structure, Introduction to Algorithms: Definition of Algorithms, Difference between algorithm and programs, properties of algorithm, Algorithm Design Techniques, Performance Analysis of Algorithms, Complexity of various code structures, Order of Growth, Asymptotic Notations.

Arrays: Definition, Single and Multidimensional Arrays, Representation of Arrays: Row Major Order, and Column Major Order, Derivation of Index Formulae for 1-D,2-D Array Application of arrays, Sparse Matrices and their representations.

Linked lists: Array Implementation and Pointer Implementation of Singly Linked Lists, Doubly Linked List, Circularly Linked List, Operations on a Linked List. Insertion, Deletion, Traversal, Polynomial Representation and Addition Subtraction & Multiplications of Single variable.

UNIT-II	**Stacks & Queue**	**8 hours**

Stacks: Abstract Data Type, Primitive Stack operations: Push & Pop, Array and Linked Implementation of Stack in C, Application of stack: Prefix and Postfix Expressions, Evaluation of postfix expression, Iteration and Recursion- Principles of recursion, Tail recursion, Removal of recursion Problem solving using iteration and recursion with examples such as binary search, Fibonacci numbers, and Hanoi towers.

Queues: Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, Array and linked implementation of queues in C, Dequeue and PriorityQueue.

Searching: Concept of Searching, Sequential search, Index Sequential Search, Binary Search. Concept of Hashing & Collision resolution Techniques used in Hashing.

UNIT-III	**Sorting & Graph**	**8 hours**

Sorting: Insertion Sort, Selection Sort, Bubble Sort, Heap Sort, Comparison of Sorting Algorithms, Sorting in Linear Time: Counting Sort and Bucket Sort.

Graphs: Terminology used with Graph, Data Structure for Graph Representations: Adjacency Matrices, Adjacency List, Adjacency. Graph Traversal: Depth First Search and Breadth First Search, Connected Component.

UNIT-IV	**Tree**	**8 hours**

Trees: Basic terminology used with Tree, Binary Trees, Binary Tree Representation: Array Representation and Pointer (Linked List) Representation, Binary Search Tree, Complete Binary Tree, An Extended Binary Trees, Tree Traversal algorithms: Inorder, Preorder and Post order, Constructing Binary Tree from given Tree Traversal, Operation of Insertion, Deletion, Searching & Modification of data in Binary Search Tree, Threaded Binary trees, Huffman coding using Binary Tree, AVL Tree and B Tree.

UNIT-V	**Dynamic Programming**	**8 hours**

Divide and Conquer with Examples Such as Merge Sort, Quick Sort, Matrix Multiplication: Strassen's Algorithm

Dynamic Programming: Dijikstra Algorithm, Bellman Ford Algorithm, All- pair Shortest Path: Warshal Algorithm, Longest Common Sub-sequence, Greedy Programming: Prims and Kruskal algorithm

Course outcome: At the end of course, the student will be able to

CO 1	Explain the concept of data structure, abstract data types, algorithms, analysis of algorithms and basic data organization schemes such as arrays and linked lists.	K_2
CO 2	Describe the applications of stacks and queues and implement various operations on them using arrays and linked lists.	K_3
CO 3	Describe the properties of graphs and trees and implement various operations such as searching and traversal on them.	K_3
CO 4	Compare incremental and divide-and-conquer approaches of designing algorithms for problems such as sorting and searching.	K_4
CO 5	Apply and analyze various design approaches such as Divide-and-Conquer, greedy and dynamic for problem solving.	K_4

Text books :

(1) Cormen T. H., Leiserson C. E., RivestR. L., and Stein C., "Introduction to Algorithms", PHI, Third Edition August 2009.

(2) Horowitz Ellis, SahniSartaj and Rajasekharan S., "Fundamentals of Computer Algorithms", 2nd Edition, Universities Press, Third Edition 2010.

(3) DaveP.H.,H.B.Dave,"DesignandAnalysisofAlgorithms",2ND Edition 2012,PearsonEducation.

Link: NPTEL/ YouTube/ Faculty Video Link:

Unit 1	https://www.youtube.com/watch?v=oZgbwa8lvDE&list=PLxR_6l4pE6quoVjSj_ShLfIftUpd_e5yo&index=1
Unit 2	https://www.youtube.com/watch?v=-Lw8isQCi4g&list=PLxR_6l4pE6quoVjSj_ShLfIftUpd_e5yo&index=4
Unit 3	https://www.youtube.com/watch?v=_VV9v41FIq0&list=PLxR_6l4pE6quoVjSj_ShLfIftUpd_e5yo&index=7
Unit 4	https://www.youtube.com/watch?v=HSokTdyd5BE&list=PLxR_6l4pE6quoVjSj_ShLfIftUpd_e5yo&index=10
Unit 5	https://www.youtube.com/playlist?list=PLxR_6l4pE6quoVjSj_ShLfIftUpd_e5yo

MCA - FIRST YEAR SECOND SEMESTER					
Course Code	AMCA0205	**L**	**T**	**P**	**Credit**
Course Title	Design Thinking	3	0	0	**3**

Course objective: To introduce students with the design process as a tool for breakthrough innovation , help students develop into professionals with good interpersonal and presentation skills , help students becoming efficient team players with potent leadership skills , participate and lead teams in order to collaborate and create innovative ideas and solutions , apply design thinking skills for understanding the assumptions and claims that frame the idea.

Pre-requisites: None

Course Contents / Syllabus

UNIT-I	**Introduction**	**8 hours**

Introduction to design thinking, traditional problem solving versus design thinking, history of design thinking, wicked problems. Innovation and creativity, the role of innovation and creativity in organizations, creativity in teams and their environments, creativity to innovation, design mindset. Introduction to elements and principles of design. Arcturus IV case study, individual activity on identifying an opportunity in different scenarios.

UNIT-II	**Ethical Values and Empathy**	**8 hours**

Understanding humans as a combination of I (self) and body, basic physical needs up to actualization, prosperity, the gap between desires and actualization. Understanding culture in family, society, institution, startup, socialization process. Ethical behavior: effects on self, society, understanding core values and feelings, negative sentiments and how to overcome them, definite human conduct: universal human goal, developing human consciousness in values, policy, and character. Understand stakeholders, techniques to empathize, identify key user problems. Empathy tools- Interviews, empathy maps, emotional mapping, immersion and observations, customer journey maps, and brainstorming. Individual activity- 'Moccasin walk', scenario-based role-play activities using empathy mapping.

UNIT-III	**Problem Statement and Ideation**	**8 hours**

Defining the problem statement, synthesis frameworks, creating personas, Point of View (POV) statements. Research- identifying drivers, information gathering, target groups, samples, and feedbacks. Idea Generation-basic design directions, Themes of Thinking, inspirations and references, brainstorming, value, inclusion, sketching and presenting ideas, idea evaluation, double diamond approach, analyze – four W's, 5 why's, "How Might We", Conflict of Interest and Six Thinking Hats. Case study /Group activities - making right personas and defining the key problem, ideation activity games - six thinking hats, million-dollar idea

UNIT-IV	**Critical Thinking**	**8 hours**

Fundamental concepts of critical thinking, the difference between critical and ordinary thinking, characteristics of critical thinkers, critical thinking skills- linking ideas, structuring arguments, recognizing in congruences, five pillars of critical thinking, argumentation versus rhetoric, cognitive bias, tribalism, and politics. Case study on applying critical thinking on different scenarios.

UNIT-V	**Logic and Argumentation**	**8 hours**

The argument, claim, and statement, identifying premises and conclusion, truth and logic conditions, valid/invalid arguments, strong/weak arguments, deductive argument, argument diagrams, logical reasoning, scientific reasoning, logical fallacies, propositional logic, probability, and judgment, obstacles to critical thinking. Group activity/role plays on evaluating arguments

Course outcome: After completion of this course, students will be able to

CO 1	Develop a strong understanding of the design process and how it can be applied in a variety of business settings	K1
CO 2	Understand and analyze self, culture and exhibit ethical behavior	K1,K2

CO 3	Use empathy tools for target segment from different cultures by understanding their unique needs	K2
CO 4	Generate innovative ideas and define specific problem statement to lead nurturing	K1,K2
CO 5	Demonstrate an enhanced ability to apply design thinking skills for evaluation of claims and arguments	K2,K3

Text books :

(1) 101 Design Methods: A Structured Approach for Driving Innovation in Your Organization by Vijay Kumar

(2) This is Service Design Thinking: Basics, Tools, Cases by Marc Stickdorn and Jakob Schneider

(3) Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation by Tim Brown

(4) R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.

(5) BP Banerjee, 2005, Foundations of Ethics and Management, Excel Books.

Link: NPTEL/ YouTube/ Faculty Video Link:

Unit 1	https://www.youtube.com/watch?v=dt9IQCeGkfQ&list=PLnLoSz9w9WhreRPe5jBsKBJETOr22cGs0&index=2
Unit 2	https://www.youtube.com/watch?v=AXAC-d7ihtY&list=PLnLoSz9w9WhreRPe5jBsKBJETOr22cGs0&index=4
Unit 3	https://www.youtube.com/watch?v=rMK8NMTDqfA&list=PLnLoSz9w9WhreRPe5jBsKBJETOr22cGs0&index=7
Unit 4	https://www.youtube.com/watch?v=EECXvh6UC9I&list=PLnLoSz9w9WhreRPe5jBsKBJETOr22cGs0&index=12
Unit 5	https://www.youtube.com/playlist?list=PLnLoSz9w9WhreRPe5jBsKBJETOr22cGs0

MCA - FIRST YEAR SECOND SEMESTER					
Course Code	AMCA0214Z	**L**	**T**	**P**	**Credit**
Course Title	Fundamentals of Digital Marketing and Analytics	2	0	0	**2**

Course objective: To help students understand digital marketing practices, inclination of digital consumers and role of content marketing , provide understanding of the concept of E-commerce and developing marketing strategies in the virtual world , impart learning on various digital channels and how to acquire and engage consumers online , provide insights on building organizational competency by way of digital marketing practices and cost considerations , develop understanding of the latest digital practices for marketing and promotion.

Pre-requisites: Creative thinking and which is being used by the creative talent in your business areas.

Course Contents / Syllabus

UNIT-I	**Foundation Data Everywhere**	**8 hours**

Introducing data analytics and thinking - use data analytics and the tools of their trade to inform those decisions. All about analytical thinking- these roles and the key skills used by analysts. The wonderful world of data- how the data life cycle and data analysts' work both relate to your progress through this program.

UNIT-II	**Make Data Driven Decision**	**9 hours**

Make Data Driven Decision Set up your toolbox: - spreadsheets, query languages, and data visualization tools. Endless career possibilities - data analysts, data analyst certificate. Effective questions- common analysis challenges and how analysts address them, guide your analysis

UNIT-III	**Data-driven decisions and spreadsheets**	**8 hours**

Data-driven decisions and spreadsheets - data of all kinds and its impact on real-life choices and strategies, reports and dashboards. Spreadsheet basics- data analysts use, spreadsheets work, structured thinking, analysts understand problems, problems solutions.

UNIT-IV	**Prepare Data for Exploration and Stakeholder**	**8 hours**

Prepare Data for Exploration and Stakeholder - data analysts, balance needs and expectations, managing stakeholder expectations, communication with your team. Data types and structures- generate data, Collection of data, analysis for data, Bias, credibility, privacy, ethics, and access- data analysts work, data is unbiased and credible, different types of bias in data, importance of data ethics and data privacy.

UNIT-V	**Organizing and protecting your data**	**8 hours**

Organizing and protecting your data Databases: Where data lives-databases, access them and extract, filter, and sort the data, metadata and its different types and how analysts use them. Organizing and protecting your data- organizing data and keeping it secure, analysts use file naming conventions. Engaging in the data community- how to manage your online presence, benefits of networking with other data analytics professionals

Course outcome: At the end of course, the student will be able

CO 1	It will develop proficiency in interpreting marketing strategies in the digital age and provide fundamental knowledge for working in an online team.	K1, K2
CO 2	It will enable them to develop various online marketing strategies for various marketing-mix measures.	K1, K4
CO 3	It will guide them to use various digital marketing channels for consumer acquisition and engagement.	K3
CO 4	It will help in evaluating the productivity of digital marketing channels for business success.	K2
CO 5	It will prepare candidates for global exposure of digital marketing practices to make them employable in a high growth industry	K2, K4

Text books :

(1) Vandana, Ahuja; Digital Marketing, Oxford University Press India (November, 2015)

(2) Eric Greenberg, and Kates, Alexander; Strategic Digital Marketing: Top Digital Experts Share the

Formula for Tangible Returns on Your Marketing Investment; McGraw-Hill Professional (October, 2013).	
(3) David Whiteley; E-Commerce: Strategy, Technologies and Applications, McGraw Hill Education	
Link: NPTEL/ YouTube/ Faculty Video Link:	
Unit 1	https://www.youtube.com/watch?v=68B3N0x3cPI&list=PLbRMhDVUMnge625uLkVoqfS-uK-KJTBgp&index=1
Unit 2	https://www.youtube.com/watch?v=3iSKFCKLUsI&list=PLbRMhDVUMnge625uLkVoqfS-uK-KJTBgp&index=2
Unit 3	https://www.youtube.com/watch?v=67lO4HtJitg&list=PLbRMhDVUMnge625uLkVoqfS-uK-KJTBgp&index=8
Unit 4	https://www.youtube.com/watch?v=fYSvrZD4G38&list=PLbRMhDVUMnge625uLkVoqfS-uK-KJTBgp&index=14
Unit 5	https://www.youtube.com/watch?v=GauClv1HsZA&list=PLbRMhDVUMnge625uLkVoqfS-uK-KJTBgp&index=19

MCA - FIRST YEAR SECOND SEMESTER					
Course Code	AMCA0215Z	**L**	**T**	**P**	**Credit**
Course Title	Fundamentals of Digital Marketing and Optimization	2	0	0	**2**

Course objective: To introduce students to Understand how digital and social media have disrupted the way businesses sell to consumers , help students to Recognize how marketers use the customer journey model to influence purchase decisions on digital platforms using digital content and tools , identify the benefits and advantages to a business of using social media to engage an audience , Build, manage, and sustain an active social media community.

Pre-requisites: Basic Marketing Concepts, Basic Knowledge of Computers

Course Contents / Syllabus

UNIT-I	**Social Media and Digital Marketing Fundamental**	**8 hours**

Digital Marketing Landscape: Digital Consumer Behavior, The Digital Customer Journey, The Digital Opportunity, Digital and Your Organization, Business Growth and Digital.

Digital Marketing Principles: Key Digital Marketing Concepts, Traditional and Digital Marketing, 3i Principles, Integrating Traditional and Digital Marketing, Tools for Digital Marketing.

UNIT-II	**Social Media and Social Content Strategy**	**8 hours**

Content Marketing for Social: Content Marketing, Content Types, Social Media Platforms, Content Creation Tools, Influencer Marketing, eBook and Whitepapers

Social Media and Business Strategy: Social Media Platforms, Key Concepts of Social Media, Types and Primary Uses of Social Media Platforms, Benefits of Social Media to Business, Role of Social Media ,Social Media Platforms for Business: Social Media Marketing Concepts, Key Social Media Platforms, Setting up Social on Key Platforms, The Value of Building a Social Media Community

UNIT-III	**Social Content Strategy and Promotion**	**8 hours**

Social Content Strategy: Content Seeding, Social Media Formats, Content Promotion, Content Optimization, Influencer Marketing, Word of Mouth Marketing, Measurement and Tracking, Content Promotion Strategy, Audience Segmentation

Facebook Marketing Fundamentals: Introduction to Facebook, The Value to Marketers, Page Management, Facebook Live, Messenger

Facebook Ads and Marketing: Facebook Ads, Ads Manager, Strategy Process, Buying Channels and Ad Auctions

UNIT-IV	**Instagram and Snapchat Marketing**	**8 hours**

Instagram and Snapchat - Social Apps: Introduction to Social Apps, Differentiating Social Apps, Basic Features, Instagram: Video, stories, live, Instagram Posts, Snapchat Meanings, Snapchat Story, Basic Features

Instagram and Snapchat Marketing: Instagram Account Overview, Audience Development, Advertising Overview, 3V Advertising, Ads Manager, SnapAds, Instagram Analysis, Snapchat Analysis, Campaign Setup, Snapchat Geofilters

UNIT-V	**Twitter LinkedIn and YouTube Marketing**	**8 hours**

Twitter Marketing: Twitter Concepts, Platform Features, Profile Promotion and management, Hashtags, Analysis and Reporting.

LinkedIn and Social Selling: Social Selling and Personal Branding, The Benefits of Personal Branding, LinkedIn Concepts, Features and Functions, LinkedIn Social Plugins, LinkedIn Analytics.

YouTube and Social Video Marketing: Misconceptions and Benefits, Platform Features, Channel Setup, Channel Promotion, Channel Management, YouTube Native Formats.

Course outcome: After completion of this course, students will be able to

CO 1	Understand important concepts of digital and social media.	K1

CO 2	Understand to Recognize how marketers use the customer journey model to influence purchase decisions on digital platforms.	K1
CO 3	Understand the benefits of integrating traditional and digital marketing.	K1,K2
CO 4	Understand the benefits and advantages to a business of using social media to engage an audience.	K2
CO 5	Understand the use of an active social media community.	K2

Text books :

(1) Digital Marketing for Dummies, Author: Ryan Deiss& Russ Henneberry, Publisher: John Wiley & Sons, Inc

(2) Youtility, Author: Jay Baer, Publisher: Gildan Media, LLC

(3) Epic Content Marketing, Author: Joe Pulizzi, Publication: McGraw Hill Education

Link: NPTEL/ YouTube/ Faculty Video Link:

Unit 1	https://www.youtube.com/watch?v=bAgp3mGk_0w&list=PLLSovFY-eK2_1isRMtrNS_me4zDrs2CuS&index=4
Unit 2	https://www.youtube.com/watch?v=fQ9RTyzc18I&list=PLLSovFY-eK2_1isRMtrNS_me4zDrs2CuS&index=5
Unit 3	https://www.youtube.com/watch?v=Z6RGDeXgcLc&list=PLLSovFY-eK2_1isRMtrNS_me4zDrs2CuS&index=11
Unit 4	https://www.youtube.com/watch?v=vGqRotPyF1U&list=PLLSovFY-eK2_1isRMtrNS_me4zDrs2CuS&index=16
Unit 5	https://www.youtube.com/watch?v=dlJrENoDhjc&list=PLLSovFY-eK2_1isRMtrNS_me4zDrs2CuS&index=21

MCA - FIRST YEAR SECOND SEMESTER					
Course Code	AMCA0216Z	**L**	**T**	**P**	**Credit**
Course Title	CRM ADMINISTRATION	2	0	0	**2**

Course objective: Understand the concepts of Sales force App. Understand the concepts of Lightning Experience. Familiarize with concepts administration. Learn Admin Essentials in Lightning Experience

Pre-requisites: Creative thinking and which is being used by the creative talent in your business areas.

Course Contents / Syllabus

UNIT-I	**Introduction**	**8 hours**

Sales force Platform Basics, User Management, Data Modeling ,Data Management, Identity Basic , Data Security ,Lightning Experience Customization, Lightning APP Builder Sales force Mobile App Customization, User Engagement , Formulas and Validation, Data Security, Pick list Administration

UNIT-II	**Lightning & Sales force App Experience Customization**	**8 hours**

Formula and Validation, Accounts and Contacts for Lightning Experience, Lead and Opportunity for Lightning Experience, Product Quotes and Contracts, Campaign Basic

UNIT-III	**Sales force Administration**	**8 hours**

Service Cloud for lightning Experience, Sales force mobile app customization, App Exchange basic Duplicate ManagementLightning Experience for Sales force Classic Users, Chatter Administration for Lightning Experience, Reports and Dashboards for lightning experience, Lightning experience customization, Lightning experience rollout , Sales force flow, Lightning experience report dashboard Specialist

UNIT-IV	**Lightning Experience**	**8 hours**

Prepare Your Sales force Org for Users, Customize an Org to Support a New Business Unit, Protect Your Data in Sales force, Customize a Sales Path for Your Team, Customize a Sales force Object, Import and Export with Data Management Tools

UNIT-V	**Learn Admin Essentials in Lightning Experience**	**8 hours**

Prepare Your Sales force Org for Users, Customize an Org to Support a New Business Unit, Protect Your Data in Sales force, Customize a Sales Path for Your Team, Customize a Sales force Object, Import and Export with Data Management Tools

Course outcome: At the end of course , the student will be able to

CO 1	Understand the basic working environment of Sales force	K1,K2
CO 2	Understand the concepts of Lightning & Sales force App Experience Customization	K1,K2
CO 3	Familiarize with concepts reports chatter administration	K3
CO 4	Understand the concepts of Lightning Experience	K1,K2
CO 5	Learn Admin Essentials in Lightning Experience	K1,K3

Text books :

(1) Digital Marketing for Dummies, Author: Ryan Deiss& Russ Henneberry, Publisher: John Wiley & Sons, Inc

(2) Youtility, Author: Jay Baer, Publisher: Gildan Media, LLC

(3) Epic Content Marketing, Author: Joe Pulizzi, Publication: McGraw Hill Education

Link: NPTEL/ YouTube/ Faculty Video Link:

Unit 1	https://www.youtube.com/watch?v=bxtqhfyoTjY&list=PLaGX-30v1lh1BaUKgXa05gqrOP0vUg_6i&index=1
Unit 2	https://www.youtube.com/watch?v=ZkQwm-6lsIw&list=PLaGX-30v1lh1BaUKgXa05gqrOP0vUg_6i&index=3
Unit 3	https://www.youtube.com/watch?v=iWbVm_o9Z0Q&list=PLaGX-30v1lh1BaUKgXa05gqrOP0vUg_6i&index=8
Unit 4	https://www.youtube.com/watch?v=oG5y-ynaREY&list=PLaGX-30v1lh1BaUKgXa05gqrOP0vUg_6i&index=11
Unit 5	https://www.youtube.com/watch?v=hKQTJ3L3opg&list=PLaGX-30v1lh1BaUKgXa05gqrOP0vUg_6i&index=12

MCA - FIRST YEAR SECOND SEMESTER					
Course Code	AMCA0218	**L**	**T**	**P**	**Credit**
Course Title	Software Testing	2	0	0	**2**

Course objective: Give examples of why testing is necessary. Identify typical objectives of testing. Distinguish between error, defect, and failure. Explain the impact of context on the test process.

Pre-requisites: Basic knowledge about software and its types. Basic knowledge of any programming language.

Course Contents / Syllabus

UNIT-I	**Introduction**	**8 hours**

Fundamentals of Testing: What is Testing, Typical Objectives of Testing, Testing and Debugging, Why is Testing Necessary? Quality Assurance and Testing, Errors, Defects, and Failures, Defects, Root Causes and Effects, Seven Testing Principles, Test Process, Traceability between the Test Basis and Test Work Products, The Psychology of Testing -Human Psychology and Testing, Tester's and Developer's Mindsets

UNIT-II	**Testing Throughout the Software Development Lifecycle**	**8 hours**

Software Development Lifecycle Models, Software Development and Software Testing, Software Development Lifecycle Models in Context, Test Levels—Component Testing, Integration Testing, System Testing, Acceptance Testing, Test Types--Functional Testing, Non-functional Testing, White-box Testing, Change-related Testing,

UNIT-III	**Static Testing**	**8 hours**

Static Testing Basics--Work Products that Can Be Examined by Static Testing, Benefits of Static Testing, Differences between Static and Dynamic Testing, Review Process--Work Product Review Process, Roles and responsibilities in a formal review, Review Types, Applying Review Techniques, Success Factors for Reviews

UNIT-IV	**Test Techniques**	**8 hours**

Categories of Test Techniques-Categories of Test Techniques and Their Characteristics, Black-box Test Techniques, Equivalence Partitioning, Boundary Value Analysis, Decision Table Testing, State Transition Testing, Use Case Testing, White-box Test Techniques, Statement Testing and Coverage, Decision Testing and Coverage, The Value of Statement and Decision Testing, Checklist-based Testing.

UNIT-V	**Test Management**	**8 hours**

Test Organization, Independent Testing, Tasks of a Test Manager and Tester, Test Planning and Estimation, Purpose and Content of a Test Plan, Test Strategy and Test Approach , Test Execution Schedule, Factors Influencing the Test Effort, Test Estimation Techniques, Test Monitoring and Control, Metrics Used in Testing, Configuration Management, Risks and Testing, Defect Management, Tool Support for Testing.

Course outcome: After completion of this course students will be able to

CO 1	Understand fundamental concepts of software testing	K1, K2
CO 2	Demonstrate understanding of how different development and testing practices, and different constraints on testing, may apply in optimizing testing to different contexts	K1, K2
CO 3	Understand test management principles for resources, strategies, planning, project control, and risk management	K2, K3

CO 4	Understand the project factors that drive the test priorities and test approach	K3
CO 5	Appreciate how testing activities and work products align with project objectives, measures, and targets	K5

Text books :

(1) Lessons Learned in Software Testing, by Bret Pettichord, CemKaner, and James Marcus Bach

(2) Foundations of Software Testing: ISTQB Certification, by Dorothy Graham and Erik P.W.M. Veenendaal

(3) Software Testing: A Craftsman's Approach, Fourth Edition, by Paul C. Jorgensen

Link: NPTEL/ YouTube/ Faculty Video Link:

Unit 1	https://www.youtube.com/watch?v=KMj49syT8JM&list=PLyqSpQzTE6M-sBjDcT21Gpnj8grR2fDgc
Unit 2	https://www.youtube.com/watch?v=Ln_LP7c23WM&list=PL9gSnSOLPFTAoJPbLSSdeXQE5cjP44Pki
Unit 3	https://www.youtube.com/watch?v=Ln_LP7c23WM&list=PLbRMhDVUMngf8oZR3DpKMvYhZKga90JVt
Unit 4	https://www.youtube.com/watch?v=TSoLUKgnG_8&list=PLJ5C_6qdAvBHiqw9Yc7-_vyfbBG1Bmfg_&index=15
Unit 5	https://www.youtube.com/watch?v=PIz7ust0bWE&list=PLJ5C_6qdAvBHiqw9Yc7-_vyfbBG1Bmfg_&index=31

MCA - FIRST YEAR SECOND SEMESTER			
Course Code	AMCA0251N	**L T P**	**Credit**
Course Title	Object Oriented Programming with JAVA Lab	**0 0 4**	**2**

Course objectives:	The course enable the students to:	
1	To familiarize with Java IDE and basic programs.	K1
2	To introduce the Operator, arrays programs and oops concepts.	K2
3	Able to know packages, exception handling and string handling program of java.	K3
4	To understand the concurrency in Java and I/O Stream.	K4
5	To familiar with the concept of Swings, Generics, Collections and JDBC.	K5

Pre-requisites: Students are expected to be able to open command prompt window or terminal window, edit a text file, download and install software, and understand basic programming concepts.

List of Experiments

S.No.	**Name of Experiment**
1.	Write a JAVA program to display default value of all primitive data type of JAVA
2.	Write a JAVA program to implement class mechanism. – Create a class, methods and invoke them inside main method.
3.	Write a JAVA program to implement constructor and constructor overloading.
4.	Write a JAVA program implement method overloading and method overriding.
5.	Write a JAVA program to implement Single Inheritance and multi-level inheritance.
6.	Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?
7.	Write a JAVA program that describes exception handling mechanism.
8.	Write a JAVA program Illustrating Multiple catch clauses.
9.	Write a Java program for handling mouse & key events.
10.	Program a program in Java (a) that prints prime numbers between 1 to n. Number n should be accepted as command line input, (b) for getting address and name of the computer.
11.	Write a JDBC program to select the all record in the table.
12.	Write a Java program to insert the multiple records in a table by using Prepared Statement.
13.	Write a Java program using thread.
14.	Program for calling a method using class instance, and create a class fruit with the following attributes: • Name of the fruit • Single fruit or bunch fruit

	• Price Define a suitable constructor and display Fruit () method that displays values of all the attributes. Write a program that creates 2 objects of fruit class and display their attributes.	
15.	Program to sort the elements of an array in ascending order.	
Course outcomes: After completing this course student will be able to:		
CO 1	To understand how to design, implement, test, debug, and document programs that use basic data types and computation, simple I/O, conditional and control structures, string handling and functions.	K1, K5
CO 2	To identify classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem	K2, K5
CO 3	To demonstrate how to achieve reusability using inheritance, interfaces and packages and describes faster application development can be achieved.	K3, K4
CO4	To demonstrate understanding and use of different exception handling mechanisms and concept of multithreading for robust faster and efficient application development.	K4
CO5	To Demonstrate the event handling process in GUI and JDBC based application in Java Programming language.	K5
Text books:		
(1.) Java; the complete reference, 7th edition, Herbert Scheldt, TMH.		
(2.) Understanding OOP with Java, updated edition, T. Budd, Pearson education.		
(3.) An Introduction to programming and OO design using Java, J.Nino and F.A. Hosch, John Wiley & sons.		
References:		
1. An Introduction to OOP, third edition, T. Budd, Pearson education		
2. Introduction to Java programming, Y. Daniel Liang, Pearson education.		
3. An introduction to Java programming and object-oriented application development, R.A. Johnson-Thomson.		

MCA - FIRST YEAR SECOND SEMESTER			
Course Code	AMCA0252	**L T P**	**Credit**
Course Title	Database Lab	**0 0 4**	**2**

Course Objectives:

The student should be made to:

- Learn to create and use a database
- Be familiarized with a query language
- Have hands on experience on DDL Commands
- Have a good understanding of DML Commands and DCL commands
- Familiarize advanced SQL queries and PL/SQL

Suggested list of Experiment

Sr. No.	**Name of Experiment**
SQL Commands:	
1	Creation of a database and writing SQL queries to retrieve information from the database.
2	Performing Insertion, Deletion, Modifying, Altering, Updating and Viewing records based on conditions.
3	Creating an Employee database to set various constraints.
4	Creating relationship between the databases.
5	Creation of Views, Synonyms, Sequence, Indexes, save point
PL/SQL :	
6	Write a PL/SQL block to satisfy some conditions by accepting input from the user.
7	Creation of Procedures.
8	Creation of database triggers and functions
Basics of NoSQL:	
9	Introduction to NoSQL
10	Connectivity with Database

Lab Course Outcome: Upon the completion course, the student will be able to:

CO 1	Design and implement a database schema for a given problem-domain	K1, K5
CO 2	Implement the database connectivity with application	K2
CO 3	Create and maintain tables using PL/SQL and Design the model of given problem using NoSQL	K3 , K4

Text Book/ References

1. Ivan Bayross,"SQL, PL/SQL the Programming Language of Oracle" 4th Edition, , BPB publication

2. Silberschatz, H. Korth and Sudarshan S., "Database System Concepts", 6th Edition, McGraw-Hill International, 2010

3. Elmasri R. and ShamakantB.Navathe, "Fundamentals of Database Systems", 6th Edition,AddisionWesley , 2011

4. Date C J, "An Introduction To Database System", Addision Wesley

MCA - FIRST YEAR SECOND SEMESTER			
Course Code	AMCA0253N	**L T P**	**Credit**
Course Title	Data Structure Lab	**0 0 4**	**2**

Course objectives: The course enables the students:

1	To familiarize with Turbo C editor, simple programs and array processing programs.
2	To introduce the like stacks, queue, linked lists, trees, sparse matrices, graphs using various strategies involving use of arrays in programs.
3	To familiar with the various states of data structures.
4	To understand the time taken &draw graphs of performance and critically comment on the observations.
5	To know efficient sorting and searching programs.

Pre-requisites: Students are expected to be able to open command prompt window or terminal window, edit a text file, download and install software, and understand basic programming concepts.

List of Experiments

Sorting

1. Sorting Algorithms-Non-Recursive.
2. Sorting Algorithms-Recursive.

Searching

3. Searching Algorithm.

Stacks implementation

4. Implementation of Stack using Array.

Queue Implementation

5. Implementation of Queue using Array.
6. Implementation of Circular Queue using Array.
7. Implementation of Stack and Queues using Linked List.

Tree and Binary Tree

8. Implementation of Tree Structures, Binary Tree, Tree Traversal, Binary Search Tree, Insertion and Deletion inBST.

Graph Implementation

9. Graph Implementation, BFS, DFS, Minimum cost spanning tree, shortest path algorithm

File Handling

10. File Handling using Structure and File handling concepts

Note: Experiment may vary or be changed as per the requirement.

Course outcomes: After completing this course student will be able to:

CO 1	Implement C programs for solving mathematical problems, array processing problems, taking care of all input, output possibilities and error conditions.	K4
CO 2	Implement various data structures like stacks, queue, linked lists, trees, sparse matrices, graphs using various strategies involving use of arrays, and DMA	K2, K5
CO 3	Draw visual representations of various states of data structures.	K1
CO 4	Measure the time taken by a program practically, draw graphs of performance and critically comment on the observations.	K3
CO 5	Write efficient sorting and searching programs.	K4

Text books / References:

(1.)Y. Langsam, M. Augenstin and A. Tannenbaum, Data Structures using C and C++, Pearson Education Asia, 2nd Edition,2002.

(2.) Ellis Horowitz, S. Sahni, D. Mehta Fundamentals of Data Structures in C++, Galgotia Book Source, New Delhi.

(3.) Timothy A. Budd, ―Exploring Python¦, Mc-Graw Hill Education (India) Private Ltd.,2015.

(4.) S. Lipschutz, Data Structures Mc-Graw Hill International Editions,1986.

(5.) Jean-Paul Tremblay, Paul. G. Soresan, An introduction to data structures with Applications, Tata Mc-Graw Hill International Editions, 2nd edition1984.

(6.) A. Michael Berman, Data structures via C++, Oxford University Press,2002

(7.)M.Weiss,DataStructuresandAlgorithmAnalysisinC++,PearsonEducation,2002,2nd editio n

MCA - FIRST YEAR SECOND SEMESTER			
Course Code	AMCA0214P	**L T P**	**Credit**
Course Title	Fundamentals of Digital Marketing and Analytics Lab	**0 0 2**	**1**

Course objectives:

Review key trends within the Digital Marketing landscape. Explain the holistic impact of all Digital Marketing channels. Examine an example of each Digital Marketing channel.

Pre-requisites: Students are expected to be able to open command prompt window or terminal window, edit a text file, download and install software, and understand basic programming concepts.

The programs in Digital Marketing and Analytics Lab will cover the following concepts:

1. Create a Chart with a spreadsheet
2. Create and edit a Google Sheet
3. Share the Google Sheet
4. Create Custom Data Table and Sort It.
5. Use COUNTIF, MIN, MAX, AVERAGE, SUM functions
6. Handling FORMULAS in Spreadsheet
7. Find Errors in functions
8. Clean data by Sorting and Filtering
9. Create your custom table with BigQuery
10. Query Your Dataset using BigQuery

Course outcomes: After completing this course student will be able to :

CO 1	Gain experience in developing a 'Digital marketing plan'	K6
CO 2	Gain experience with time management around meeting project deadlines	K2, K6
CO 3	Develop their own presentation/speaking styles and learn effective methods of doing so through feedback on their own presentation as well as observation of other students' presentations	K6

Text books:

1. Vandana, Ahuja; Digital Marketing, Oxford University Press India (November, 2015).

2. Eric Greenberg, and Kates, Alexander; Strategic Digital Marketing: Top Digital Experts Share the Formula for Tangible Returns on Your Marketing Investment; McGraw-Hill Professional (October, 2013).

Reference book:

1. Menon, Arpita; Media Planning and Buying; McGraw Hill (1st Edition, 2010)

2. Arnold, George; Media Writer's Handbook: A Guide to Common Writing and Editing Problems; McGraw-Hill Education; (5thedition, 2008)

MCA - FIRST YEAR SECOND SEMESTER			
Course Code	AMCA0215P	**L T P**	**Credit**
Course Title	Fundamentals of Digital Marketing and Optimization Lab	**0 0 2**	**1**

Course objectives:

Fundamentals of Digital Marketing and Optimization. Develop a basic display campaign and allocate ad dollars for success. Examine the pricing models for display and evaluate the best possible choice for your campaign.

Pre-requisites: Students are expected to be able to open command prompt window or terminal window, edit a text file, download and install software, and understand basic programming concepts.

The programs in Digital Marketing and Optimization Lab will cover the following concepts :

1. Basic Explanation and Setups:
   a. Name servers, theme & plugins setup
   b. Basic SEO, How Search Engine Works?
   c. Crawling, Indexing, Ranking
   d. GSC, Google Analytics, GTM, Google Alerts
2. Content Frameworks:
   a. Keyword (Explanation, Research, Ranking factor)
   b. Keyword Classification, Finding Right Keyword
   c. Competitive Keyword Research Content framework
3. On Page:
   a. Element Explanation
   b. Title Tag, Header Tags
   c. Meta Description, The Body
   d. URL Structure, Images
4. Technical SEO Part – I
   a. Elements Explanation
   b. Site Architecture, Website Structure
   c. Understand Google Crawlability
   d. Robots.txt, Sitemaps, Mobile SEO, AMP
5. Technical SEO Part –II
   a. WordPress Speed Optimization
   b. CDN
   c. Structured Data
   d. Security

Course outcomes: After completing this course student will be able to :

CO 1	Analyze the role that social marketing plays in the digital landscape and	K6

	marketing mix.	
CO 2	Explain the differences between, and the convergence of, paid, earned, and owned media.	K2, K6
CO 3	Identify and incorporate individual social and mobile platforms into a digital marketing strategy.	K6
Text books:		
1) Digital Marketing for Dummies, Author: Ryan Deiss& Russ Henneberry, Publisher: John Wiley & Sons, Inc.		
2) Youtility, Author: Jay Baer, Publisher: Gildan Media, LLC		
3) Epic Content Marketing, Author: Joe Pulizzi, Publication: McGraw Hill Education		
Reference book:		
1) New Rules of Marketing and PR, Author: David Meerman Scott, Latest Edition: 6th Edition, Publication: John Wiley & Sons		
2) Social Media Marketing All-in-one Dummies, Author: Jan Zimmerman, Deborah Ng, and Latest Edition: 4th Edition, Publication: John Wiley & Sons Inc.,		

MCA - FIRST YEAR SECOND SEMESTER			
Course Code	AMCA0216P	**L TP**	**Credit**
Course Title	CRM Administration Lab	**0 02**	**1**

Course objectives:

To make the students understand the organizational need, benefits and process of creating long-term value for individual customers. To disseminate knowledge regarding the concept of e-CRM and e-CRM technologies.To enable the students, understand the technological and human issues relating to implementation of Customer Relationship Management in the organizations.

Pre-requisites: Creative thinking and which is being used by the creative talent in your business areas.

The programs in lab will cover the following concepts:

1. Quick Start: Lightning App Builder
2. Prepare Your Salesforce Org for Users
3. Customize an Org to Support a New Business Unit
4. Protect Your Data in Salesforce
5. Customize a Sales Path for Your Team
6. Setup the service Console
7. Build a discount approval process
8. Quick start process builder
9. Build a simple flow
10. Build a battle station App
11. Customize a Salesforce Object
12. Create Reports and Dashboards for Sales and Marketing Managers
13. Improve Data Quality for Your Sales and Support Teams
14. Create a Process for Managing Support Cases

Course outcomes: After completing this course student will be able to:

CO 1	Understand the basic concepts of Customer relationship management.	K6
CO 2	To understand marketing aspects of Customer relationship management.	K2, K6
CO 3	Understand basics of operational Customer relationship management.	K6

Text books:

1. Alok Kumar Rai : Customer Relationship Management : Concepts and Cases(Second Edition),

PHI Learning, 2018

2. Bhasin- Customer Relationship Management (Wiley Dreamtech) ,2019
3. Salesforce for beginners by ShaarifSahaalane book by Amazon (Online edition)

Reference book:

1. Salesforce Essentials for Administrators , By ShrivasthavaMohith, Edition Ist ,2018
2. Salesforce : A quick Study laminated Reference Guide by Christopher Mathew Spencer eBook by Amazon (Online)
3. Mastering Salesforce CRM Administration By Gupta Rakesh Edition IInd 2018

ReferenceLinks:

1.	www. Trailhead.salesforce.com
2.	www.mindmajix.com/salesforce-tutorial
3.	www,youtube.com/watch?v=7K42geizQCI

MCA - FIRST YEAR SECOND SEMESTER			
Course Code	**AMCA0218P**	**L T P**	**Credit**
Course Title	**Software Testing Lab**	**0 0 2**	**1**

Course objectives:

Understand UML and how to create class diagram. Understanding how to create use case diagram, sequence diagram, collaboration diagram. Understand how to create Activity diagram, Component diagram, and deployment diagram

Pre-requisites: Basic knowledge about software and its types.

The programs in Software Testing lab will cover the following concepts:

1. Introduction to UML
2. Class Diagram for ATM.
3. Use Case Diagram for ATM
4. Sequence Diagram for ATM
5. Collaboration Diagram for ATM
6. State chart Diagram for ATM.
7. Activity Diagram for ATM.
8. Component Diagram for ATM
9. Deployment Diagram for ATM
10. Write a program in C language in demonstration the working of the following constructs i) do. While ii) while.do iii) if…else iv) switch v) for
11. A program for written in C language for Matrix Multiplication fails‖ introspect the causes for its failure and write down the possible reasons for its failure
12. Take ATM system and study its system specifications and report various bugs.
13. Write the test cases for banking application.

Course outcomes: After completing this course student will be able to:

CO 1	Understand UML and how to create class diagram	K6
CO 2	Understanding how to create use case diagram, sequence diagram, collaboration diagram.	K2, K6
CO 3	Understand how to create Activity diagram, Component diagram, and deployment diagram.	K6

Text books:

1. Lessons Learned in Software Testing, by Bret Pettichord, CemKaner, and James Marcus Bach1

2. Foundations of Software Testing: ISTQB Certification, by Dorothy Graham and Erik P.W.M. Veenendaa2
3. Software Testing: A Craftsman's Approach, Fourth Edition, by Paul C. Jorgensen

Reference book:

1. The Art of Software Testing, by Glenford Myers
2. Software Test Automation, by Dorothy Graham and Mark Fewster
3. Software Testing and Quality Assurance: Theory and Practice, by Kshirasagar Naik and Priyadarshi Tripathy

ReferenceLinks:

1. https://www.youtube.com/watch?v=_jb0cyGbdbk
2. https://www.youtube.com/watch?v=7wo9PHfkyik
3. https://www.youtube.com/watch?v=UI6lqHOVHic
4. https://www.youtube.com/watch?v=gUEizau0UQ&list=PLWPirh4EWFpF9Gbnu4_DdF4ITHSN6MSsk

MCA - FIRST YEAR SECOND SEMESTER					
Course Code	AMCANC0201	**L**	**P**	**T**	**Credit**
Course Title	Cyber Security	**2**	**0**	**0**	**0**

Course objective:

1	Achieve knowledge about Security of Information system and Risk factors.
2	Able to examine security threats and vulnerability in various scenarios.
3	Incorporate the design methodology for system security and web security.
4	Understand concept of cryptography and encryption technique to protect the data from cyber attack
5	Able to design policy and strategy which diminish crimes in this domain and provide protection for software and hardware.

Pre-requisites: Basics recognition in the domain of Computer Science, Concept of network and operating system

Course Contents / Syllabus

UNIT-I	**INTRODUCTION**	**8 hours**

Introduction to Information Systems: Types of Information Systems, Development of Information Systems, Need for Information Security, Threats to Information Systems, Information Assurance, Guidelines for secure password and wi-fi security and social media and Windows security Cyber Security, and Security Risk Analysis, Risk Management

UNIT-II	**APPLICATION LAYER SECURITY**	**8 hours**

Data Security Considerations-Backups, Archival Storage and Disposal of Data, Security Technology-Firewall and VPNs, Intrusion Detection, Access Control, Security Threats -Viruses, Worms, Trojan Horse, Bombs, Trapdoors, Spoofs, E-mail Viruses, Macro Viruses, Malicious Software, Network and Denial of Services Attack, Security ,Threats to E-Commerce: Electronic Payment System, e-Cash, Issues with Credit/Debit Cards.

UNIT-III	**SECURE SYSTEM DEVELOPMENT**	**8 hours**

Application Development Security, Architecture &Design ,Security Issues in Hardware: Data Storage & Downloadable Devices,mobile protection ,Security threats involving in Social Media, Physical Security of IT Assets, Access Control, CCTV and Intrusion Detection Systems, Backup Security Measures

UNIT-IV	**CRYPTOGRAPHY**	**8 hours**

Public key Cryptography, Digital signature, Public key distribution ,Real world protocols: Basic terminologies, Email security certificates, Transport Layer security, IP security, DNS security

UNIT-V	**SECURITY POLICY**	**8 hours**

Policy design Task, WWW Policies, Email based Policies, Policy Revaluation Process-Corporate Policies-Sample Security Policies, Publishing and Notification Requirement of the updated and new Policies. Evolving Technology Security – Mobile, Cloud, and Security in supply chain management

Course outcome: At the end of course, the student will be able to

CO 1	Analyze and evaluate the cyber security needs of an organization.	K_1, K_2
CO 2	Determine and analyze software vulnerabilities and security solutions.	K_3

CO 3	Comprehend IT Assets security (hardware and Software) and performance indicators	K_2
CO 4	Measure the performance and encoding strategies of security systems.	K_3
CO 5	Design operational a cyber security methods and policies to enhance current scenario security.	K_3, K_6
Text books		
Charles P. Pfleeger, Shari LawerancePfleeger, “Analysing Computer Security”, Pearson Education India		
V.K.Pachghare, “Cryptography and information Security”, PHI Learning Private Limited, Delhi India		
Sarika Gupta & Gaurav Gupta, Information Security and Cyber Laws, Khanna Publishing House		
Michael E.Whitman and Herbert J Mattord "Principle of Information Security" Cengage		
Reference Books		
Schou, Shoemaker, “Information Assurance for the Enterprise”, Tata McGraw Hill.		
Chander, Harish,” Cyber Laws And It Protection ” , PHI Learning Private Limited ,Delhi		
V.K. Jain, Cryptography and Network Security, Khanna Publishing House, Delhi		
William Stallings, Network Security Essentials: Applications and Standards, Prentice Hall, 4th edition, 2010		
E-books& E-Contents:		
https://prutor.ai/welcome/		
https://crypto.stanford.edu/cs155old/cs155-spring11/lectures/03-ctrl-hijack.pdf		
https://cybermap.kaspersky.com/stats		
https://www.fireeye.com/cyber-map/threat-map.html		
Reference Links		
https://crypto.stanford.edu/cs155old/cs155-spring11/lectures/03-ctrl-hijack.pdf		
https://cs155.stanford.edu/lectures/03-isolation.pdf		
http://uru.ac.in/uruonlinelibrary/Cyber_Security/Cryptography_and_Network_Security.pdf		
https://www.youtube.com/watch?v=_9QayISruzo		