NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(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: 2020-21)

NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute)

MCA

Evaluation Scheme

SEMESTER- I

Sl. No	Subject Codes	Subjects	Periods			Evaluation Schemes				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	AMCA0101	Fundamental of Computers & 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	AMCA0103	Principles of Communication and Management	3	0	0	30	20	50		100		150	3
4	AMCA0104	Computer System Organization	3	1	0	30	20	50		100		150	4
5	AMCA0105	Discrete Mathematics	3	0	0	30	20	50		100		150	3
6	AMCA0151	C Programming Lab	0	0	4	30	20		50		50	100	2
7	AMCA0152	Operating system Lab	0	0	4	30	20		50		50	100	2
8	AMCA0153	Professional Communication Lab	0	0	2	30	20		50		50	100	1
9	AMCA0154	Computer Organization Lab	0	0	4	30	20		50		50	100	2
		TOTAL										1150	24

NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute)

MCA

Evaluation Scheme

SEMESTER- II

Sl. No	Subject Codes	Subjects	Periods			Evaluation Schemes				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	AMCA0201	Object Oriented Programming	3	1	0	30	20	50		100		150	4
2	AMCA0202	Database Management System	3	0	0	30	20	50		100		150	3
3	AMCA0203	Data Structures	3	1	0	30	20	50		100		150	4
4	AMCA0204	Theory of Automata and Formal Languages	3	0	0	30	20	50		100		150	3
5		Elective-I*	3	0	0	30	20	50		100		150	3
6	AMCA0251	Object Oriented Programming Lab	0	0	4	30	20		50		50	100	2
7	AMCA0252	Database Lab	0	0	4	30	20		50		50	100	2
8	AMCA0253	Data Structures Lab	0	0	4	30	20		50		50	100	2
9	AMCA0254	Mini Project	0	0	2	30	20		50		50	100	1
10	AMCANC0201	Cyber Security*	2	0	0	30	20	50		50		100	0
		TOTAL										1250	24

Electives I *

Program Electives	Code	Subject name
Elective-I	AMCA0211	RPA Design & Development
Elective-I	AMCA0212	CRM using Salesforce
Elective-I	AMCA0213	Computer Networks

MCA - FIRST YEAR					
Course Code:AMCA0101			L	T	P	Credit
Course Title: Fundamental of Computers & Programming in C			3	1	0	4
Course objective:						
1	To understand basic concepts of C-programming language					
2	Implement C programs to solve complex problems					
3	Enhance debugging, analyzing and problem-solving skills					
4	Create diversified solutions for real world applications using C language					
5	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 concepts**	**8 hours**				
Generations of Computer, Classification of Computers, Software: Application and System Software, Memory Hierarchy, Primary and Auxiliary memory. Approaches to Problem Solving: Concept of Algorithms and Flow Chart. Programming Languages: Generation of Languages Attributes of a Good Language, Machine Language, Assembly Language and High Level Languages, Concept of Assembler, Compiler, Interpreter, Loader and Linker.						
UNIT-II	**Introduction to Programming**	**8 hours**				
Programming using C: Applications of C programming, Structure of C program, Overview of compilation and execution process in an IDE, transition from algorithm to program, Syntax, logical errors and Run time errors, object and executable code, Tokens of C language: Keywords, identifiers, constant , data types. Operators and their types, Arithmetic expressions and precedence: Operators, operator precedence and associativity, type conversion, mixed operands.						
UNIT-III	**Decision Control Statements and Functions**	**8 hours**				
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. 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						
UNIT-IV	**Arrays and Pointers**	**8 hours**				
Pointers: defining and declaring pointer, pointer arithmetic and scaling, Pointer Aliasing. call by reference Arrays: Array notation and representation (one and two dimensional), array using pointers, manipulating array elements, 2-D arrays used in matrix computation. 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 structureUnion, 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, arrays and structures 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

Reference Books:

(1) The C programming by Kernighan Brain W. and Ritchie Dennis M., Pearson Education.

(2) Computer Science- A Structured Programming Approach Using C, by Behrouz A. Forouzan, Richard F. Gilberg, Thomson, Third Edition, Cengage Learning - 2007.

(3) Computer Basics and C Programming by V. Rajaraman, PHI Learning pvt. Limited, 2015.

(4) Schrum's Outline of Programming with C by Byron Gottfried, McGraw-Hill

(5) Computer Fundamentals and Programming in C. Reema Thareja, Oxford Publication

(6) Problem Solving and Programming in C, R.S. Salaria, Khanna Publishing House

E-Book Links:

(1) https://en.wikibooks.org/wiki/C_Programming

(2) https://en.wikibooks.org/wiki/A_Little_C_Primer

(3) https://www.goodreads.com/book/show/6968572-ansi-c-programming

(4)https://www.pdffiller.com/347652461-projects-in-c-by-yashwant-kanetkar-pdfpdf-c-projects-yashwant-kanetkar-pdf-form-
(5)http://www.freebookcentre.net/programming-books-download/Lecture-Notes-On-C-Programming-by-L.-V.-Narasimha-Prasad-and-E.-Krishnarao-Patro.html
Reference Links:
(1) https://nptel.ac.in/courses/106/104/106104128/
(2) https://nptel.ac.in/courses/106/104/106104074/
(3) https://nptel.ac.in/courses/106/102/106102066/
(4) https://nptel.ac.in/courses/106/105/106105171/
(5)https://www.youtube.com/watch?v=IdXrCPzNnkU&list=PLJ5C_6qdAvBFzL9su5J-FX8x80BMhkPy1&index=4
(6)https://www.youtube.com/watch?v=L2oataK7F10&list=PLJ5C_6qdAvBFzL9su5J-FX8x80BMhkPy1&index=11

MCA - FIRST YEAR					
Course Code	**AMCA0102**	**L**	**T**	**P**	**Credit**
Course Title	**Operating System**	**3**	**0**	**0**	**3**
Course objective:					
1	To learn the fundamentals of Operating Systems.				
2	To learn about the Process management and CPU scheduling algorithm				
3	To understand the various issues in process synchronization and different strategies for handling the Deadlock				
4	To understand the concepts of memory management policies and virtual memory.				
5	To 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

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.

Reference Books

1. Harvey M Dietel, " An Introduction to Operating System", Pearson Education
2. Flynn, "Understanding Operating System" , Cengage.
3. AS Tanenbaum, AS Woodhull, Operating Systems Design and Implementation, 3rd Ed., Prentice Hall, 2006.

MCA - FIRST YEAR			
Course Code	**AMCA0103**	**L T P**	**Credit**
Course Title	**Principles of Communication and Management**	**3 0 0**	**3**

Course Objective : At the end of this course Student will be able to understand

Course objective:	
1	The objective of the course is to ensure that the students can communicate effectively
2	That they can describe the primary features
3	Explain functions of management in terms of planning

Pre-requisites:

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

Course Contents / Syllabus

UNIT-I	Principles of Communication	8 Hours

- Communication – definition, process, levels, flow, types, principles and barriers
- Technical Communication and its importance
- Reading comprehension
- Tips for effective listening

UNIT-II	Written Communication	12 Hours

- Vocabulary building - word formation; 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- III	Effective speaking Skills	12 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 IV	Management	8 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.

UNIT V	Management Practices	8 Hours

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 the course students will be able to

CO 1	Understand the fundamentals of communication	K1
CO 2	Write professionally in simple and correct English.	K1,K2
CO 3	Interpret listening tasks for better professional competence.	K1,K2
CO4	Develop understanding of managerial practices and their perspectives.	K1,K2
CO5	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. Koontz Harold &Weihrich Heinz – Essentials of management (Tata McGraw Hill, 5th Edition,2008)
3. T.N.Chhabra, "Business Communication", Sun India Publication.

Reference Books

1. Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, 2001, New Delhi.
2. Leech Geoffery.*Communicative Grammar ofEnglish.*PearsonEducationHarlow,

United Kingdom, 1994.
3. Sethi. J. Course In Phonetics And Spoken EnglishPrentice Hall India Learning Private Limited; 2 edition (1999)
4. Rebecca Corfield. *Preparing The Perfect CV*. Kogan Page Publishers, 2009.
5. Anderson, Paul V. *Technical communication*. 8th ed. Cengage Learning, 2011.
6. IELTS 11: General Training with answers. Cambridge English
7. L. M. Prasad- Principles and Practices of Management, Sultan Chand & Sons, 7th edition, 2007.
8. Principles of Management, George R. Terry & S.G. Franklin, AITBS, Delhi.

MCA - FIRST YEAR					
Course Code	**AMCA0104**	**L**	**T**	**P**	**Credit**
Course Title	**Computer System Organization**	**3**	**1**	**0**	**4**

Course objective: **At the end of course, the student will be able to understand**

1	The basic concepts and components of digital logic design
2	The different methods of data representation in computers
3	The different microoperations and data transfer methods
4	Design, functionality and taxonomy of CPU
5	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 & Microoperations**	**8 hours**

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

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

Microprogrammed 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 : Multicore processing, Multithreading architecture

Courseoutcome: At the end of course, the student will be able

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 andconstruction of buses by using differentdigital 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.

Reference Books

1. Structured Computer Organization, Tannenbaum (PHI)
2. Computer Organization, Stallings (PHI)
3. Computer Organization, John P. Hayes (McGraw Hill)

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

Course objective:

1	To develop mathematical ability in understanding mathematical reasoning, ability to perform combinatorial analysis and knowledge about discrete structures.
2	Perform operations on discrete mathematics such as sets, functions and relations.
3	Verify the correctness of an argument using symbolic logic and truth tables.
4	Solve problems using counting techniques and combinatorics.
5	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 ofGeneratingFunction, 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

CO1	Use mathematical and logical notation to define and formally reason about basic discrete structures such as Sets, Relations, Functions and Induction.	K1, K2
CO2	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
CO3	Identify and prove properties of Algebraic Structures like Groups, Rings and Fields	K3
CO4	Apply the concept of combinatorics to solve basic problems in discrete mathematics	K2
CO5	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

Reference Books

1. Discrete and Combinatorial Mathematics, R.P. Grimaldi, Addison Wesley, 2004.

2. Discrete Mathematical Structures, Y N Singh, Wiley-India, First Edition, 2010.

MCA - FIRST YEAR					
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 Pradip Dey, 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			
Course Code	**AMCA0152**	**L T P**	**Credit**
Course Title	**Operating System Lab**	**0 0 4**	**2**

CourseObjective:

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
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			
Course Code	**AMCA0153**	**L T P**	**Credit**
Course Title	**Professional Communication Lab**	**0 0 2**	**1**
Suggested list of Experiment			
Sr. No.	**Name of Experiment**		
1	Introducing oneself and conversing (4 hrs)		
2	Group Discussion (4 hrs)		
3	Individual Interviews(4 hrs)		
4	Listening Practice (2 hrs)		
5	Presentations (group) (4 hrs)		

Lab Course Outcome:

At the end of the course students will be able to -

CO 1	Use English language for communicating ideas.
CO 2	Develop interpersonal skills and leadership abilities.
CO 3	Confidently face an interview.
CO 4	Understand the importance of analytical listening during communication.
CO 5	Apply public speaking skills in making presentations.

MCA - FIRST YEAR					
Course Code	**AMCA0154**	**L**	**T**	**P**	**Credits**
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					
Course Code	**AMCA0201**	**L**	**T**	**P**	**Credits**
Course Title	**Object Oriented Programming**	**3**	**1**	**0**	**4**

Course objective:	**At the end of course, the student will be able to understand**
1	The basic and advance concepts of OOPs programming
2	Student will be able to implement Core Java programming
3	Student will be able to implement Array and Strings.
4	Able to understand Inheritance, Interface, Package and its implementation
5	Able to understand Multithreading, Exception Handling and Database Connectivity and their use.

***Pre-requisites**: Students are expected to have knowledge about Algorithm, Logic building. They are required to have awareness about programming concepts Must possess basic knowledge of OOP's with JAVA.*

Course Contents / Syllabus		
UNIT-I	**OOP's Fundamental**	**8 hours**

Principles of OOP: Software evolution, OOP paradigm, Basic Concepts of OOP, Benefits & applications of OOP. Need of OOP's paradigm, A way of viewing world -agents, responsibility, messages, methods, classes and instances, class hierarchies (Inheritance), method binding, overriding and exceptions, Summary of OOP's Concepts, Copy with complexity, abstraction mechanisms, message passing.

UNIT-II	**Core Java Fundamental**	**8 hours**

Introduction to Java Language, Java IDE, Simple Java Program, Constants, variables, data types. Declaration of variables, Scope of variables, arrays, Typecasting, Operators, Expressions, Control statements- Decision making & branching, Decision making & looping. Class, Object, Object reference, Constructor, Constructor Overloading, Method Overloading, Recursion, Passing and Returning object form Method, new operator, this and static keyword, finalize() method, Access control, modifiers, Nested class, Inner class, Anonymous inner class, Abstract class.

UNIT-III	**Arrays and Strings**	**8 hours**

Creating & Using Arrays (One Dimension and Multi-dimensional), Java Strings: The Java String class, Manipulating Strings, String Immutability & Equality, Passing Strings Methods, String Buffer Classes. Simple I/O using System. out and the Scanner class, Byte and Character streams, Reading/Writing from console and files, Handling String using Methods and derived class.

UNIT-IV	**Inheritance, Package and Interface**	**8 hours**

Inheritance, Single, Multiple, Multilevel, Hybrid, Constructors in derived class, Method overriding , Using Abstract classes, using final with inheritance, Packages, importing packages, Interfaces: Define, implement and extend. Default interface methods, Use static method in interface.

UNIT-V	**Multithreading, Exception Handling and Database Connectivity**	**8 hours**

Multithreading: Introduction, creating thread and extending thread class.

Exception handling: Introduction, Types of errors, Exception handling syntax, Multiple catch statements. Try and catch block. Console I/O and File I/O

Database Connectivity using JDBC. Case Study/Project

Course outcome: At the end of course, the student will beable

CO 1	Understand and Define OOPS Concepts and its terminology	K1,K2
CO 2	Develop and Generate basic programs of Java	K5, K6
CO 3	Understand the concepts of Array and Strings	K1
CO 4	Perform the use of inheritance, package and interface	K3,K6
CO 5	Apply the concept of multithreading and Database connectivity.	K1,K2

Text books

(1.) Java; the complete reference, 7th edition, Herbert schildt, TMH.

(2.) Understanding OOP with Java, updated edition, T. Budd, Pearsoneducation.

Reference Books

(1.) An Introduction to programming and OO design using Java, J.Nino and F.A. Hosch, John Wiley& sons.

(2.) An Introduction to OOP, third edition, T. Budd, Pearson education

(3.) Introduction to Java programming, Y. Daniel Liang, Pearson education.

(4.) An introduction to Java programming and object-oriented application development, R.A. Johnson- Thomson.

MCA - FIRST YEAR					
Course Code	**AMCA0202**	**L**	**T**	**P**	**Credits**
Course Title	**Database Management System**	**3**	**0**	**0**	**3**
Course objective:	Student will Learn the				
1	Features of a database system and its application and compare various types of data models.				
2	Construction an ER Model for a given problem and transform it into a relation database schema				
3	Formulate solution to a query problem using SQL Commands, relational algebra, tuple calculus and domain calculus.				
4	The need of normalization and normalize a given relation to the desired normal form.				
5	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

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

Reference Books

1. Bipin C. Desai, "An introduction to Database Systems", Galgotia Publication Pvt. Ltd. New Delhi.

2. Majumdar & Bhattacharya, "Database Management System", Tata Mcgraw-hill Education (India) Pvt. Ltd.

3. Ramakrishnan, Gehrke, "Database Management System", McGraw Hill (India) Pvt Ltd. New Delhi.

MCA - FIRST YEAR					
Course Code	**AMCA0203**	**L**	**T**	**P**	**Credits**
Course Title	**Data Structures**	**3**	**1**	**0**	**4**

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

1	Perform Searching and sorting operations
2	Implement Stacks and Queue
3	Implement Linked List
4	Understand Trees and its implementation
5	Understand Graphs and their use.

Pre-requisites: Students are expected to have knowledge about Algorithm, Logic building. They are required to have awareness about programming concepts and basic knowledge of C.

Course Contents / Syllabus

UNIT-I	**Computer Fundamental**	**8 hours**

Introduction: Basic Terminology, Elementary Data Organization, Data Structure operations, Algorithm Complexity and Time-Space trade-off. Introduction to array, Concepts of single and multidimensional array, Structures, Functions, Pointers**.**

Sorting: Insertion Sort, Selection Sort, Bubble Sort, Quick Sort, Two Way Merge Sort, Heap Sort, Sorting on Different Keys, Practical consideration for Internal Sorting.

UNIT-II	**Linked list**	**8 hours**

Linked list: Representation and Implementation of Singly Linked Lists, Header List, Traversal, Insertion, Deletion and Searching operations on linked lists. Doubly linked list, Circular linked list, Polynomial representation and addition of linked list, Generalized linked list, Garbage Collection and Compaction.

UNIT-III	**Stacks and Queues**	**8 hours**

Stacks: Array and linked representation and implementation of stack, Operations on Stacks: Push & Pop, Application of stacks: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression.

Queues: Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty. Circular queue, Deque, and Priority Queue.

UNIT-IV	**Tree and Binary Tree**	**8 hours**

Trees: Basic terminology, Binary Trees, Binary tree representation, algebraic Expressions, Complete Binary Tree. Extended Binary Trees, Array and Linked Representation of Binary trees, Traversing Binary trees, Threaded Binary trees. Traversing Threaded Binary trees.

Binary Search Trees: Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of Search Algorithm, Path Length, AVL Trees, B-trees.

UNIT-V	Graphs and File Structure	8 hours

Graphs: Terminology & Representations, Graphs & Multi-graphs, Directed Graphs, Sequential Representations of Graphs, Adjacency Matrices, Traversal, Connected Component and Spanning Trees, Minimum Cost Spanning Trees, Single source shortest Path Dijkstra's algorithm, All pair shortest path algorithm.

File Structures: Physical Storage Media File Organization, Organization of records into Blocks, Sequential Files, Indexing and Hashing, Primary indices, Secondary indices, B+ Tree index Files, B Tree index Files, Indexing and Hashing Comparisons. Case Study/Project

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

CO 1	Implement searching and sorting algorithms	K3
CO 2	Compare and Contrast between Stacks and Queues	K2, K3
CO 3	Perform Linked list operations	K3, K6
CO 4	Understand and Define Trees and Binary Trees	K1, K2
CO 5	Explain the concepts of Graphs and Files	K1, K2

Text books

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) Guido van Rossum and Fred L. Drake Jr, ―An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

Reference Books

1) S. Lipschutz, Data Structures Mc-Graw Hill International Editions,1986.
2) Jean-Paul Tremblay, Paul. G. Soresan, An introduction to data structures with Applications, Tata Mc-Graw Hill International Editions, 2nd edition1984.
3) A. Michael Berman, Data structures via C++, Oxford University Press,2002

MCA - FIRST YEAR					
Course Code	**AMCA0204**	**L**	**T**	**P**	**Credits**
Course Title	**Theory of Automata and Formal Languages**	**3**	**0**	**0**	**3**
Course objective:	To develop the understanding about				
1	The basic properties of finite automata with output and without output				
2	The regular expressions and regular languages				
3	The Context free languages, grammars, pushdown automata and also Normalizing CFG				
4	The basic properties of Turing machines and computing with Turing machines.				
5	The concepts of tractability and decidability, the concepts of NP-completeness and NP-hard problem				
Pre-requisites: Students are expected to be familiar with computer basics.					

Course Contents / Syllabus		
UNIT-I		**8 hours**
Basic concepts of Automata Theory: Alphabets, Strings and Languages, Deterministic Finite Automata (DFA) and Nondeterministic Finite Automata (NFA) – Definition, Representation using Transition Tables and State Diagrams, Language of DFA and NFA. NFA with ε-transitions, Language of NFA with ε-transitions, Minimization of Finite Automata, Finite Automata with output-Moore Machine, Mealy Machine, Equivalence of Moore and Mealy Machines,Myhill-Nerode Theorem		
UNIT-II		**8 hours**
Regular Grammar and Languages: Introduction, Definition of regular expression, Kleen's Theorem, Equivalence of regular expression and Finite Automata, Pumping Lemma for regular Languages, Closure properties of Regular Languages, Decidability- Decision properties, Finite Automata and Regular Languages, Regular Languages and Computers, Simulation of Transition Graph and Regular language.Pigeonhole Principle		
UNIT-III		**8 hours**
Non-Regular Grammars: Definition of Grammar, Classification of Grammars, Chomosky's Hierarchy. Context Free Grammars (CFG) and Context Free Languages (CFL) - Definition, Examples, Derivation trees, Ambiguous Grammars, Simplification of Grammars, Normal forms of CFGs: CNF and GNF, Closure properties of CFLs, Decision Properties of CFLs, Pumping lemma for CFLs. Push Down Automata (PDA): Definition and Description, Language of PDA and its applications		
UNIT-IV		**8 hours**
Turing Machines: Introduction, Basic Features of a Turing Machine, Language of a Turing Machine, Variants of Turing Machine: Multitapes, Nondeterministic Turing Machine, Universal Turing Machine. Turing Machine as Computer of Integer functions, Halting problem of Turing Machine, Church-Turing Thesis		

UNIT-V		**8 hours**	

Undecidability: Introduction, Undecidable problems about Turing Machines, Rice's Theorem, Post's Correspondence problem (PCP) and Modified PCP. Tractable and Intractable Problems: P and NP, NP Complete Problems, Introduction to recursive function theory

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

CO 1	**Apply the basic properties of finite automata without output**	K1, K2
CO 2	Apply the concepts of regular expression and finite automata with output.	K1, K4
CO 3	Understand and apply the concepts of Context free languages, grammars, pushdown automata and also Normalizing CFG	K3
CO 4	Apply the concepts of Turing machines for computing the problem.	K2
CO 5	Understand the concepts of tractability and decidability, the concepts of NP-completeness and NP-hard problem.	K2, K4

Text books

Theory of Computer Science: Automata, Languages and Computation ,K. L. P. Mishra, N. CHANDRASEKARAN, 3rd Edition, PHI Learning Pvt. Ltd

Introduction to languages and the theory of computation, J Martin, 3rd Edition, Tata McGraw Hill

Elements and Theory of Computation, C Papadimitrou and C. L. Lewis, PHI

Reference Books

Introduction to Automata theory, Languages and Computation, J.E.Hopcraft, R.Motwani, and Ullman. 2nd edition, Pearson Education Asia

Mathematical Foundation of Computer Science, Y.N.Singh, New Age International

An Introduction to Formal Languages and Automata, 3rd Edition ,***Publisher*** : Jones & Bartlett

MCA - FIRST YEAR			
Course Code	**AMCA0251**	**L T P**	**Credit**
Course Title	**Object Oriented Programming 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 and arrays programs.	K2
3	Able to know oops concepts in program of java.	K3
4	To understand the servlets for proxy server.	K4
5	To familiar with the concept of Java Applets.	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

Exercise 1: Basics Programs

1. Program to print sample strings like “hello world”, “Welcome to Java Programming” with different formats using escape sequences.
2. Program to initialize, assignment & printing variables of different data types.
3. To become familiar with classes that represent entities that can interact with the user.

Exercise 2: Operators

1. Program to demonstrate arithmetic operators. (+,-,*,/,%)
2. Program to read radius value from the keyboard and calculate the area of circle,simple interest etc.
3. To gain practice in the use of Boolean operators like && and ||.

Exercise 3: Decision Statements

1.Program to illustrate the use of if..else and nested if.. like

a) Program to calculate roots of quadratic equation (using if-else).
b) To successfully write simple programs that involve if statements.

Exercise 4: Switch operations

1 Program to perform arithmetic operations using switch case.

2. Program to display vowels and consonants using switch case.

Exercise 5: Basic Loop operations

Do the Following Programs Using for, while, do-while loops using classes.

1. Program to calculate sum of individual digits of a given number.
2. Program to check whether given number is palindrome or not.

3. Program to print prime numbers in the given range.

4. Program to print the Fibonacci series for given 'N' value.

5. Program to print the following formats:

```
1          *
1 2        * *
1 2 3      * * *
1 2 3 4    * * * *
```

Exercise 6: Arrays & Strings

Program to illustrate the use of Single and Multi-dimensional array

a. Program to store 10 elements in the 1-D array and print sum of the array.
b. Program to perform matrix addition and matrix subtraction.
c. Program to design a string class that performs String method (equal, reverse the string, change case).

Exercise 7: Inheritance, Package and Interface

Program to illustrate the use ofInheritance, Package and Interface

a. Program in Java for illustrating, overloading, over riding and various forms ofInheritance.
b. Programs to create packages and multiple threads in Java.
c. Program to create in Java interface to display the Application Program screen i.e. calculator and other.
d. Program that import the user define package and access the member variable of classes that contained by package.

Exercise 8: Multithreading, Exception Handling and Database Connectivity

Program to illustrate the use ofMultithreading, Exception Handling and Database Connectivity

a. Programs in Java for event handling Mouse and Keyboard events.
b. Program to create a class component that shows controls and event handling on controls (Math calc).
c. Program to illustrate JDBC connectivity. Program for maintaining database by sending queries.
d. Design and implement a simple shopping cart example with session tracking API.
e. Mini Project illustrating use of any module in Core Java.

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

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

CO 1	Design a responsive web site using Core JAVA.	K1, K5
CO 2	Understanding and implementing JAVA programming.	K2, K5
CO 3	Build Dynamic web site using Core Java Programming and Database connectivity.	K3, K4

Text books / References:

(1.) Java; the complete reference, 7th edition, Herbert schildt, 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.

(4.) An Introduction to OOP, third edition, T. Budd, Pearson education

(5.) Introduction to Java programming, Y. Daniel Liang, Pearson education.

(6.)An introduction to Java programming and object-oriented application development, R.A. Johnson- Thomson.

MCA - FIRST YEAR			
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			
Course Code	**AMCA0253**	**L T P**	**Credits**
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			
Course Code	**AMCANC0201**	**L P T**	**Credit**
Course Title	**Cyber Security**	**2 0 0**	**00**
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		

MCA - FIRST YEAR			
Course Code	**AMCA0211**	**L T P**	**Credits**
Course Title	**RPA Design and Development**	**3 0 0**	**3**

Course Objectives: The student will learn about:

1	Understand the basic concepts of Robotic Process Automation
2	Learn about the emerging Develop and Deploy basic robots using UiPath Community Edition
3	Study the method to do process mapping and optimization
4	Identify processes for automation
5	Calculate RoI on automation

Pre-requisites: basics of data structure and C

Course Contents / Syllabus

UNIT-I	**Introduction of RPA**	**8 Hours**

RPA Concepts: Basics & Advanced

Basics: Software Applications and their Types, What is Programming, Data & Data Structures, Algorithms, Sequence & Flows, Software Development Guidelines, Compiler & Execution, Scripting & Macro, Frameworks and Languages, Information Sharing Mechanism, Variable and Arguments, Files and File Types, Access Control

RPA: History of Automation, What is RPA, RPA vs Automation, Processes & Flowcharts, Programming Constructs in RPA, What Processes can be Automated, Types of Bots, Workloads which can be automated

UNIT-II	**Process of RPA**	**8 Hours**

Advanced: Standardization of processes, RPA Development methodologies, Difference from SDLC, Robotic control flow architecture, RPA business case, RPA Team, Process Design Document/Solution Design Document, Industries best suited for RPA, Risks & Challenges with RPA, RPA and emerging ecosystem.

UNIT-III	**Installation UiPath Studio**	**8 Hours**

UiPath Introduction & Basics: Installing UiPath Studio community edition, The User Interface, Keyboard Shortcuts, About Updating, About Automation Projects, Introduction to Automation Debugging, Managing Activities Packages, Reusing Automation Library, Installing the Chrome Extension, Installing the Firefox Extension, Connecting your project to a source control system, Activities Guide

UNIT-IV	**Variables in RPA**	**8 Hours**

Variables: Managing Variables, Naming Best Practices, The Variables Panel, Generic Value Variables, Text Variables, True or False Variables, Number Variables, Array Variables, Date and Time Variables, Data Table Variables, Managing Arguments, Naming Best Practices, The Arguments

Panel, Using Arguments, About Imported Namespaces, Importing New Namespaces.		
UNIT-V	**Control Flow in RPA**	**8 Hours**
Control Flow: Control Flow Introduction, If Else Statements, Loops, Advanced Control Flow, Sequences, Flowcharts, About Control Flow, Control Flow Activities, The Assign Activity, The Delay Activity, The Do While Activity, The If Activity, The Switch Activity, The While Activity, The For Each Activity, The Break Activity.		
Course Outcomes: After completion of this course students will be able to		
CO 1	Apply basic concepts and methods from design engineering to explore creative solutions of real world problems.	K_1, K_2
CO 2	To understand what Robotic Process Automation, and massive career opportunity in this field.	K_1, K_4
CO 3	Apply the knowledge of RPA tools, functions in various industries and Perform, control various tasks using RPA bots.	K_3
CO 4	Gain expertise in Desktop, Web & Citrix Automation and use Reframe work to build a structured business automation process.	K_2
CO 5	To organize a real-world workflow automation project and develop skills in debugging a workflow.	K_2, K_4
Text Books:		
1. **Vaibhav Jain,** "Crisper Learning: For Uipath", Latest Edition, Independently Published, 2018.		
2. **Alok Mani Tripathi,** "Learining Robotics Process Automation", Latest Edition, Packt Publishing ltd, Birmingham.		
Reference Books:		
1. Kelly Wibbenmeyer, "The Simple Implementation Guide to Robotic Process Automation(RPA)*",* Latest Edition, iUniverse Press.		
NPTEL/ You tube/ Faculty Video Link:		
Unit 1	https://www.youtube.com/watch?v=6QoCG6YIPVo&list=PL41Y-9S9wmyJarNN2KnB4XudpT1yE1kVd	
Unit 2	https://www.youtube.com/watch?v=YOHFgrOvPTM&list=PL41Y-9S9wmyLvF6Ou0oPhg6MrFWSw7sn4	
Unit 3	https://www.youtube.com/watch?v=QMBuyLMjOhM&list=PL41Y-9S9wmyIYX6kciM8DboVYymsv2y6K	
Unit 4	https://www.youtube.com/watch?v=KE9raKNTkfI&list=PL41Y-9S9wmyLeXL1DY9j-XepNb_vg9N8t	
Unit 5	https://www.youtube.com/watch?v=2rjr8QhD9oc&list=PL41Y-9S9wmyJi2zmWY77yPZrdVI7ab3Ja	

MCA - FIRST YEAR			
Course Code	**AMCA0212**	**L T P**	**Credits**
Course Title	**CRM using Salesforce**	**3 0 0**	**3**

Course objective:	**At the end of course, the students will be able to do the following:**
1	Understand the importance of CRM
2	Understand the importance of Salesforce
3	Get Knowledge about value of Governance and Security risk
4	Familiarize with the importance of Communication and Leadership
5	To have insights of the importance of Virtual Collaboration

Pre-requisites: Knowledge of Computers

Course Contents / Syllabus		
UNIT-I	**CRM Introduction**	**8 hours**

Customer Relationship Management: Evolution of Relationship Marketing, Purpose, stages Issues of Relationship A Paradigm Shift, Historical Perspective, CRM Definitions, Emergence of CRM Practice, CRM Cycle, Stake holders In CRM, Significance and Types of CRM, Success Factors in CRM.

Emerging Perspective: Employee-Organization Relationship, Factors effecting employee Customer Oriented Behavior, Service Recovery Management , Customer Relationship Management in Retail Industry

E-CRM in Business, Features, Technology, Advantages of E-CRM, Customer Relationship Portal, Important CRM Software

UNIT-II	**Salesforce Platform Basic**	**8 hours**

Sales force Platform Basic Get Started with the Sales force Platform, Discover Use Cases for the Platform, Understand the Sales force Architecture, Navigate Setup, Power Up with AppExchange**Trailhead Basic** Get Started with TrailheadFind Your Way Around TrailheadTroubleshoot and Find Answers to Common Questions**Sales force User Basic** Welcome to Sales force, Get Started with Sales force,Work With your Sales force Admin

UNIT-III	**Security & Governance**	**8 hours**

Governance Basic Understand the Value of GovernanceLearn Governance Roles and ResponsibilitiesUnderstand the Key Components of a Lean Governance Framework

Security Basic Understand Security RiskEducate Your Users to Help Protect Your OrgChoose the

Right Salesforce Security SettingsUse Health Check to Scan Your Security Configurations		
UNIT-IV	**Communication & Leadership**	**8 hours**
Storytelling & Communication Learn the Value of Stories in Business Learn the Basics of Storytelling Inspire Your Team with Stories Use Storytelling In Business CommunicationsUse Storytelling In Presentations **Empathetic Leadership** Bring Empathy to Your Leadership Practices Communicate Empathetically with Your Team Foster Connection and Build Camaraderie Have Empathy for Yourself		
UNIT-V	**Virtual Collaboration**	**8 hours**
UNIT 4 Virtual Collaboration Understand the Importance of Virtual CollaborationDevelop Your Virtual StrategyLearn Virtual Collaboration Skills for Managers Mortgage Mastery with Financial Services Cloud Say Hello to Mortgages for Financial Services Cloud Set Up Basic User Access to Mortgage Features Set Up Advanced User Access to Mortgage Features Set Up Borrower Access to Mortgage Applications in CommunitiesEnable Document Tracking and Approvals		
Course outcome:	**At the end of course, the student will be able**	
CO 1	Understand the concepts and Importance of CRM	K1,K2
CO 2	Describe the importance of Salesforce and its features	K1, K2
CO 3	Identify Security and Governance in industry using salesforce platform	K1, K2
CO 4	Gather the need of Communication and Leadership	K2,K3
CO 5	Apply Virtual Collaboration Concepts for skill development of manager	K1,K2
Reference		
Alok Kumar Rai : Customer Relationship Management : Concepts and Cases(Second Edition) – PHI Learning		
Bhasin-Customer Relationship Management (Wiley Dreamtech)		
Salesforce for beginners by ShaarifShaalanebook by Amazon		
Salesforce for Dummies by Liz Kao, Jon Paz ebook by Amazon		
Salesforce: a QuickStudy Laminated Reference Guide by Christopher Mathew Spencer ebook by Amazon		

Online Link
https://www.salesforcetutorial.com/categorysalesforce-tutorial/
https://mindmajix.com/salesforce-tutorial
https://www.youtube.com/watch?v=7K42geizQCI
https://www.youtube.com/watch?v=kdyyNtxp8zA

MCA - FIRST YEAR					
Course Code	**AMCA0213**	**L**	**T**	**P**	**Credits**
Course Title	**Computer Networks**	**3**	**0**	**0**	**3**

Course objective: Student will understand the

1	Configure switches and end devices to provide access to local and remote network resources.
2	The physical and data link layer protocols support the operation of Ethernet in a switched network.
3	Configure routers to enable end-to-end connectivity between remote devices.
4	IPv4 and IPv6 addressing schemes and verifies network connectivity between devices.
5	how the upper layers of the OSI model support network applications.Configure a small network with security best practices. Troubleshoot connectivity in a small network

Pre-requisites: Students are expected to be familiar with computer basics.

Course Contents / Syllabus		
UNIT-I	**Introduction**	**8 hours**

Introduction-Basic Concepts of Computer Network**,** Globally Connected LANs, WANs, and the Internet, The Network as a Platform, The Changing Network Environment. Configuring a Network Operating System - Introduction to Cisco IOS, IOS Bootcamp , Console Access Method , IOS Command Structure,

UNIT-II	**Network Protocols and Communications**	**8 hours**

Rules of Communication, Network Protocols and Standards, Moving Data in the Network, **Network Access-** Physical Layer Protocols, Network Media- Copper Cabling, UTP Cabling, Fiber Optic Cabling, Wireless Media, Data Link Layer Protocols, Media Access Control

UNIT-III	**Ethernet**	**8 hours**

Ethernet Protocol, Ethernet Frame Attributes, Ethernet MAC, Address Resolution Protocol-ARP, LAN Switches

Network Layer- Network Layer Protocols, Routing, Routers, Configuring a Cisco Router.

UNIT-IV	**Transportation Layer**	**8 hours**

Transport Layer Protocols, TCP and UDP IP

Addressing- IPv4 Network Addresses, Types of IPv4 Addresses, IPv4 Subnet Mask, IPv6 Network Addresses.

UNIT-V	Sub netting IP Networks	8 hours	
Subnetting an IPv4 Network, Addressing Schemes, Subnetting an IPv6 Network Application Layer- Application Layer Protocols, Application Layer Protocols and Services,Build a Small Network			
Course outcome: At the end of course, the student will be able			
CO 1	To configure switches and end devices to provide access to local and remote network resources.		K1, K2
CO 2	To explain how physical and data link layer protocols support the operation of Ethernet in a switched network.		K1, K4
CO 3	To configure routers to enable end-to-end connectivity between remote devices.		K3
CO 4	To create IPv4 and IPv6 addressing schemes and verifies network connectivity between devices.		K2
CO 5	To explain how the upper layers of the OSI model support network applications.Configure a small network with security best practices. Troubleshoot connectivity in a small network.		K2, K4
Reference Link: -			
https://www.netacad.com/			