AWADHESH PRATAP SINGH UNIVERSITY
REWA (MP) 486003

CBCS

CURRICULAM & SYLLABUS

(as per unified ordinance no. 14 of MP universities)

for

MASTER OF COMPUTER APPLICATION (MCA)

(AICTE Approved)

w.e.f. Session 2020-21

Course code : 060

www.apsurewa.ac.in

A. P. S. UNIVERSITY, REWA (MP)
MASTER OF COMPUTER APPLICATION (MCA)
SCHEME OF EXAMINATION(w.e.f. Session 2020-21)

Course code : 060

FIRST SEMESTER

Paper Code	Paper Name	Course Type	Credit	Theory Marks Max(Min)	CCE Marks Max(Min)	Total Marks (Min)
10601	Computer Organization	CC	4	60(21)	40(20)	100
10602	Mathematical Foundation of Computer Science	CC	4	60(21)	40(20)	100
10603	Operating System	CC	4	60(21)	40(20)	100
10604	DBMS	CC	4	60(21)	40(20)	100
10605	Problem Solving using C & C++	GE	4	60(21)	40(20)	100
10606	Lab I – DBMS	LAB	2			100(50)
10607	Lab II – Prog. in C& C++	LAB	2			100(50)
10608	Comprehensive Viva	Viva	4			100(50)
	TOTAL		28			800

SECOND SEMESTER

Paper Code	Paper Name	Course Type	Credit	Theory Marks Max(Min)	CCE Marks Max(Min)	Total Marks (Min)
20601	Data Structure and Analysis of Algorithms	CC	4	60(21)	40(20)	100
20602	Software Engineering	CC	4	60(21)	40(20)	100
20603	Computer Graphics & Visualization	CC	4	60(21)	40(20)	100
206041 206042	Elective I : (Any one from the following) • Artificial Intelligence • Cloud Computing	DCE	4	60(21)	40(20)	100
20605	Java Programming & Technologies	GE	4	60(21)	40(20)	100
20606	Lab I – Computer Graphics	LAB	2			100(50)
20607	Lab II – Java	LAB	2			100(50)
20608	Comprehensive Viva	Viva	4			100(50)
	TOTAL		28			800

THIRD SEMESTER

Paper Code	Paper Name	Course Type	Credit	Theory Marks Max(Min)	CCE Marks Max(Min)	Total Marks (Min)
30601	Compiler Design	CC	4	60(21)	40(20)	100
30602	Computer Networking & Internet	CC	4	60(21)	40(20)	100
306031 306032 306033 306034	Elective II : : (Any one from the following) • Cryptography & Network Security • Mobile Computing • Software Quality Assurance • Internet of Things	DCE	4	60(21)	40(20)	100
306041 306042 306043 306044	Elective III : : (Any one from the following) • Dot Net Technology • Python Programming • Data Warehousing &Mining • Big Data Analytics & Visualization	DCE	4	60(21)	40(20)	100
30605	Web Applications Development	GE	4	60(21)	40(20)	100
30606	Lab I – Based on Elective III	LAB	2			100(50)
30607	Lab II – Web Applications Development	LAB	2			100(50)
30608	Comprehensive Viva	Viva	4			100(50)
	TOTAL		28			800

FOURTH SEMESTER

Paper Code	Paper Name	Course Type	Credit	Theory Marks Max(Min)	CCE Marks Max(Min)	Total Marks (Min)
40601	Major Project / Dissertation Evaluation	CC	16			400(200)
40602	Major Project / Dissertation Internal Evaluation	CC	4			100(50)
40603	Comprehensive Viva	Viva	4			100(50)
	TOTAL		24			600

CC = Core Course, GE = Generic Elective, DCE = Discipline Centric Elective

TOTAL CREDITS : 28+28+28+24=108 Grand Total : 800+800+800+600=3000

Programme Objectives (POs):

Master of Computer Applications (MCA) is a full-time four-semester course, which includes one semester of project work in the fourth semester. The objective of MCA programme is to impart quality education in Computer Science and its applications, so that students are well prepared to face the challenges of the highly competitive computer industry. The course structure ensures overall development of the student, while concentrating on imparting technical skills required for computer/IT profession.

Programme Outcomes

- **Critical thinking**: Take informed action after identifying the assumptions that frame our thinking and actions check out the degree to which these assumption are accurate and valid and look at our ideas and decision (intellectual, organization and personal) from different perspectives.

- **Effective Communication:** Speak, read, write and listen clearly in person and throw electronic media in English and in one Indian language, and make meaning of the word by connecting people, ideas, books, media and technology.

- **Social Interaction**: Elicit views of others, mediate disagreements and help reach conclusions in group settings.

- **Social Citizenship:** Demonstrate empathetic social concern and equity-centered national development and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

- **Ethics**: Recognize different value system including your own understands the moral dimensions of your decisions and accept responsibility for them.

- **Environment and sustainability:** Understand the issues of environmental context and sustainable development.

- **Self directed and life-long learning:** Acquire the ability to engage in independent and life-long learning in the broadest context of socio-technological changes

Programme Specific Outcomes (PSOs):

The programme is designed to

PSO1: Enable the students to apply the computing and soft skills acquired in the MCA program for designing and developing innovative applications for the betterment of the society.

PSO2: Identify, formulate, research literature, and solve complex computing problem searching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.

PSO3: provide exposure to techniques that would enable the students to design, implement and evaluate IT solutions. Demonstrate knowledge and understanding of the computing and management principles and apply these to one's own work, as a member and leader in a team to manage projects and in multidisciplinary environments.

PSO4: Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practices. Assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practices.

MCA I Sem - Course Code 10601 :Computer Organization

Credit 4; Theory Max/Min(60/21), CCE Max/Min(40/20)

Course Objectives: To understand the basic organization of computer hardware, Boolean algebra &simple combinational and sequential logic circuits

Course Outcomes:

On completion of this course, the student will be able to:

CO1: Describe the basic organization of computer hardware.

CO2: Represent and manipulate data – number systems, conversion between different number systems, perform binary arithmetic and learn Boolean algebra.

CO3: Design simple combinational and sequential logic circuits - flip-flops, counters, shift registers, adders, subtractor, multiplexer, de-multiplexer, and Arithmetic/Logic unit.

CO4: Learn architecture of Microprocessor 8085 and its basics.

CO5: Design simple programs in assembly language.

UNIT I

Computer Organization: Digital and Analog computers, Major components of a digital computer, Basic concepts of IT, concepts of Data & Information, data processing, history of computers (generations, type of languages), I/O devices, Storage devices, Software's Types & its uses, Binary Number System and Conversion, Complements, Signed Binary Numbers, Binary Codes, Error detecting Code, Introduction of Assembler, Compiler & Interpreters

UNIT II

Computer Arithmetic: Binary representation of Negative Integers using 2's complement andSigned magnitude representation, Fixed point Arithmetic operations on Positive and Signed (Negative) Integers like addition, subtraction, multiplication, Booth's algorithm for multiplication, Division of positive and negative binary numbers. Boolean Algebra and Logic Gates: Basic Definitions, Basic Theorems and properties of Boolean algebra, Boolean Functions, Digital Logic gates.

UNIT III

Gate-Level Minimization: The K-Map Method, 3 and 4 variable K-Map, Combinational Circuits, Decoders, Encoders, Multiplexers and Demultiplexers, Sequential circuits, Latches, Flip Flops: SR, D, JK, T; Master Slave JK Flip flop, Integrated Circuits; Shift Registers- Serial in Serial out, Serial in Parallel out, Parallel in Serial out and Parallel in Parallel out. Designing of Asynchronous (Ripple) Counters, Design of Synchronous Counters.

UNIT IV

Introduction of 8085 Microprocessor: Architecture of 8085 processor, Register Architecture: Accumulator, Register and Flag Register, Addressing Modes: Direct memory addressing mode and Register direct Addressing Mode, Memory addressing capability of a CPU, Word length of a computer, Processing speed of a CPU, Working of CPU, Buses, Block Diagram of 8085.

UNIT V

Introduction to Assembly Language Programming: Various Instructions Classifications:instruction Format, Opcode, Operand and Hex code. Instruction Operation Status, Various Instruction Sets: Data Transfer Group Instructions, Arithmetic Group Instructions, Logical Group Instruction, Branch Group Instructions: Conditional , Unconditional and Machine control Instructions.

Books Recommended:

1. Microprocessor Architecture, Programming and Applications with 8085/8080 by Ramesh S. Gaonkar.
2. Digital Design by M. Morris Mano. Publication: PHI Eastern economy edition.
Reference Book(s):
1. Fundamentals of Computers by B Ram Publication : PHI , Fourth edition
2. Microprocessor and Its applications by R Theagrajan,SDhanapal
3. Computer Architecture By Dr. Rajkamal. Publication: TMH Indian Special edition 2006.

MCA I Sem-Course Code 10602: Mathematical Foundation of Computer Science

Credit 4; Theory Max/Min(60/21), CCE Max/Min(40/20)

Course Objectives : To understand the fundamental concepts of mathematical structures.

Course Outcomes:
On completion of this course, the student will be able to gain fundamental knowledge of:
CO1: Mathematical structures (sets, relations and functions), and will be able to model real world situations mathematically.
CO2: Principles of proportions & lattices.
CO3: Groups, Graphs and their applications in Computer Science.
CO4: Discrete Numeric function and Recurrence relation.
CO5: Growth of functions asymptotically.

UNIT-I
Sets, Relations and Functions: Sets, Subsets, Power sets, Complement, Union and Intersection, Demorgan's law, Cartesian products, Relations, relational matrices, properties of relations, equivalence relation, functions, Injection, Surjection and Bijective mapping, Composition of functions, the characteristic functions and Mathematical induction

UNIT-II
Proportions & Lattices : Proposition & prepositional functions, Logical connections, Truth-values and Truth Table, the algebra of prepositional functions-the algebra of truth values-Applications (switching circuits, Basic Computer Components); Partial order set, Hasse diagrams, upper bounds, lower bounds, Maximal and minimal element, first and last element, Lattices, sub lattices, Isotonicity, distributive inequality, Lattice homomorphism, lattice isomorphism,complete lattice, complemented lattice, distribution lattice

UNIT-III
Groups : Binary Composition, Algebraic Structure, Algebraic properties or Group axioms, Monoid, Semigroup, Groupoid, Groups, Abelian Groups, Finite and Infinite Group, Integral power of anelement, order of an element of a group, Transformations, Permutation and permutations group,Cyclic permutation, Even and odd permutations, Subgroups of a group, Cosets, Lagrangetheorem, Cyclic groups, Normal subgroups

UNIT-IV
Graphs: Finite graphs, incidence and degree, isomorphism, sub graphs and union of graphs,connectedness, walk, paths, and circuits Eulerian graphs,tree properties of trees, pendant vertices in tree, center of tree,spanning trees and cut vertices, binary tree,matrix representation of graph, incidence and adjacency matrix and their properties, applications of graphs in computer science

UNIT-V
Discrete Numeric function and Recurrence relation: Introduction to discrete numeric functions and generating functions, introduction to recurrence relations and recursive algorithms, linear recurrence relations with constant coefficients,homogeneous solutions, particular solutions and total solutions

Books Recommended:
1. J.P.Trembley&R.P.Manohar "Discrete Mathematical Structure with applications to Computer Science".
2. M. K. Gupta, Discrete Mathematics, Krishna Prakashan Media (P) Ltd.
3. Kenneth H. Rosen-203 "Discrete Math & its Applications"
4. K.A. Ross and C.R.B. Writht "Discrete Mathematics"
5. Bernard Kolman& Robert C. Busby "Discrete Mathematical Structures for Computer Science".

MCA I Sem-Course Code 10603 :Operating System

Credit 4; Theory Max/Min(60/21), CCE Max/Min(40/20)

Course Objectives : To understand the fundamental concepts of Operating Systems, process management, memory management and File and Device management.

Course Outcomes:

On completion of this course, the student will be able to:

CO1: Describe basic functions of an Operating System.

CO2: Distinguish between different types of Operating Systems so as to use each of them most efficiently in the respective application areas.

CO3: Describe different techniques for managing computer resources like CPU, memory.

CO4: Implement simple algorithms for managing computer resources.

CO5: To understand Distributed Systems.

UNIT-I

Introduction: Evolution of operating systems (History of evolution of OS with the generations of computers), Types of operating systems, Multitasking, Timesharing, Multithreading, Multiprogramming and Real time operating systems, Operating system concepts and structure, Layered Operating Systems, Monolithic Systems. Processes: The Process concept, The process control block, Systems programmer's view of processes, Operating system services for process management, Scheduling algorithms and types.

UNIT-II

Memory Management : Memory management without swapping or paging, Concepts of swapping and paging, Page replacement algorithms namely Least recently used, Optimal page replacement, Most recently used, Clock page replacement, First in First out (This includes discussion of Belady's anomaly and the category of Stack algorithms), Modeling paging algorithms, Design issues for paging system, Segmentation, Segmented Paging, Paged Segmentation

UNIT-III

Inter-process Communication and Synchronization: The need for inter-process synchronization, Concept of mutual exclusion, binary and counting semaphores, hardware support for mutual exclusion, queuing implementation of semaphores, Classical problems in concurrent programming, Dining Philosopher's problem, Bounded Buffer Problem, Sleeping Barber Problem, Readers and Writers problem, Critical section, critical region and conditional critical region, Monitors and messages. Deadlocks: Concepts of deadlock detection, deadlockprevention, deadlock avoidance; Banker's Algorithm

UNIT-IV

File System: File systems, directories, file system implementation, security protection mechanisms; Input/output: Principles of I/O Hardware: I/O devices, device controllers, direct memory access, Principles of I/O software: Goals interrupt handlers, device drivers, and device independent I/O software. User space I/O Software. Disks: Disk hardware, Disk scheduling algorithms (namely First come first serve, shortest seek time first, SCAN, C-SCAN, LOOK and C-LOOK algorithms) Error handling, track-at-a-time caching, RAM Disks. Clocks: Clock hardware, memory-mapped terminals, I/O software.

UNIT-V

Processes and Processors in Distributed Systems: Threads, System models, processor allocation, scheduling; Distributed File Systems: Design, Implementation, and trends; Performance Measurement, monitoring and evaluation Introduction, important trends affecting performance issues, why performance monitoring and evaluation are needed, performance measures, evaluation techniques, bottlenecks and saturation, feedback loops. Case Studies: WINDOWS and LINUX /UNIX Operating System.

Books Recommended:

1. Deitel, H.M. "An Introduction to Operating Systems". Addison Wesley Publishing Company 1984.

2. Milenkovic, M., "Operating Systems - concepts and Design" McGraw Hill International Edition-Computer Science series 1992.

3. Galvin P., J.L. Abraham Silberschatz. "Operating System Concepts".John Wiley & Sons Company,1989.

4. Tanenbaum, A.S. "Modern Operating System", Prentice Hall of India Pvt. Ltd.1995.

5. William Stallings "Operating Systems" , Prentice Hall of India Pvt. Ltd.

MCA I Sem - Course Code 10604: Data Base Management System

Credit 4; Theory Max/Min(60/21), CCE Max/Min(40/20)

Course Objectives : To acquire the knowledge related to DBMS, RDBMS, PL/SQL and Stored functions.

Course Outcomes:

On completion of this course, the student will be able to:

CO1: Understand basic database concepts, including the structure and operation of the relational data model.

CO2: Apply logical database design principles, including E-R diagrams, conversion of ER diagrams to relations.

CO3: Understand the concepts of integrity constraints, relational algebra, relational domain & tuple calculus, data normalization.

CO4: Construct simple and moderately advanced database queries using Structured Query Language (SQL).

CO5: Understand the emerging fields in database.

UNIT-I

Introduction: Advantage of DBMS approach, various view of data, data independence, schema and subschema, primary concepts of data models, Database languages, transaction management, Database administrator and users, data dictionary, overall system architecture. **ER model**: basic concepts, design issues, mapping constraint, keys, ER diagram, weak and strong entity sets, specialization and generalization, aggregation, inheritance, design of ER schema, reduction of ER schema to tables.

UNIT-II

Domains, Relations and Keys: domains, relations, kind of relations, relational database, various types of keys, candidate, primary, alternate and foreign keys. **Relational Algebra & SQL**: The structure, relational algebra with extended operations, modifications of Database, idea of relational calculus, basic structure of SQL, set operations, aggregate functions, null values, nested sub queries, derived relations, views, modification of Database, join relations, DDL in SQL, Introduction of Database Design, SDLC, DDLC, Automated Design Tools

UNIT-III

Functional Dependencies and Normalization: basic definitions, trivial and non trivial dependencies, closure set of dependencies and of attributes, irreducible set of dependencies, introduction to normalization, non loss decomposition, FD diagram, first, second, third Normal forms, dependency preservation, BCNF, multivalued dependencies and fourth normal form, Join dependency and fifth normal form.

UNIT-IV

Database Integrity: general idea. Integrity rules, domain rules, attribute rules, relation rules, Database rules, assertions, triggers, integrity and SQL. **Transaction, concurrency and Recovery**: basic concepts, ACID properties, Transaction states, implementation of atomicity and durability, concurrent executions, basic idea of serializability, basic idea of concurrency control, basic idea of deadlock, failure classification, storage structure types, stable storage implementation, data access, recovery and atomicity- log based recovery, deferred Database modification, immediate Database modification, checkpoints. **Distributed Database**: basic idea, distributed data storage, data replication, data fragmentation horizontal, vertical and mixed fragmentation

UNIT-V

Emerging Fields in DBMS, Object oriented Databases, Data Warehousing, Database on www, multimedia Databases-difference with conventional DBMS, issues, similarity based retrieval, continuous media data, multimedia data formats, video servers. Storage structure and File organizations, Indexing, Network and hierarchical models, DBTG model, implementations, tree structure diagram, implementation techniques, comparison of the three models, Basics of Decision Support System, Introduction and Installation of MYSQL, SQLLITE, MSSQL, MongoDB, PHP Introduction, Installing PHP, PHP and MYSQL, Case Study : Database Design of an Internet Bookshop

Books Recommended:

1. A Silberschatz, H.F Korth, Sudersan "Database System Concepts" –, MGH Publication.
2. C.J Date "An introduction to Database Systems" –6th ed.
3. Elmasri&Navathe "Fundamentals of Database systems" – III ed.
4. B.C. Desai. "An introduction to Database systems" BPB
5. Raghurama Krishnan "Database Systems" TMH
6. Shio Kumar Singh, "Database Systems", PEARSON

MCA I Sem - Paper Code-10605 :Problem Solving using C & C++

Credit 4; Theory Max/Min(60/21), CCE Max/Min(40/20)

Course Objectives : To help the students to acquire basic knowledge in concepts and theory of principles of programming and to familiarize the students in the C and C++ programming language.

Course Outcomes:

On completion of this course, the student will be able to:

CO1: Learn basic concepts of problem solving using programming language.

CO2: Understand concept of Derived data type and its use in programming problems.

CO3: Select a suitable programming construct and in-built data structure for the given problem.

CO4: Design, develop, document, and debug modular programs.

CO5: Apply procedure oriented &object-oriented paradigm for problem solving

UNIT–I

C language programming: Flowchart, Algorithm, Introduction to C language, Simple I/O functions (scanf, printf, gets, puts, getchar, getche, getch); Data types in C, Assignment statement, Arithmetic, Operators, Precedence of operators. **Control structure:** The if-else statements, nesting of if-else, switch statement, Loops: while and do-while loop, the for loop, Functions: User defined functions, Returning a value from a function, Local and Global variables, Parameters, Type declaration of a function, Functions with more than one parameters, Storage classes

UNIT–II

Arrays &Pointers : Declaration and initialization; the break and continue statement; String and Character arrays, operations with arrays; searching in array (linear and binary). Sorting an array, String & String functions: sprintf, strcpy, scanf, strcat, strlen, malloc, strcmp. Two dimensional array.**Pointers:** The concept of pointers, pointer arithmetic, passing pointers as parameters, pointer & arrays, Pointer to pointers, Array of pointers to strings.

UNIT–III

Structures: The concept of structure, Initializing, Arrays of structures, Arrays within structures, Structures within Structures, passing structures to function; unions.

Files: Files in 'C', Modes for files; Functions used in files (getc, putc, fopen, fclose, fscanf, fread, fwrite, fprintf, fseek, ftell, rewind), text versus binary files; command line arguments; Preliminaries of C preprocessor Directives, (#define, #undef, #include, #ifdef, #ifndef, #endif, #else, #if).

UNIT–IV

Introduction to OOP : Basic concepts of OOP : Object, Classes, Inheritence, Polymorphism, Reusability; Benefits & applications of OOP, Characters used in C++. Basic data types, user defined data types, use of conditional and looping statements in C++. Arrays in C++. Reference variable, **Functions** : prototypes, default arguments, const arguments in functions, Inline functions, call by value, call by reference, function overloading.

Classes and objects : Declaring a class, defining an object, data hiding and encapsulation, public and private data members & functions, friend function. Pointer to data member, pointer to member function and pointer to object, virtual function.

Unit-V

Constructors & Destructors: Parametrized constructors, multiple constructor in a class, copy constructors, object as function arguments, returning objects, the this pointer, memory allocation for objects. **Operator Overloading**: Unary and binary operators.**Inheritence** :Inheritence and derivation, single, multilevel, multiple, hierarchical & hybrid inheritance, Overriding functions, virtual function;Manipulators, managing output with manipulators, user defined manipulators with arguments;**Streams** : C++ streams, stream classes;. Files : Classes for file stream operations, file I/O with streams.

Books Recommended:

1.   Gottfried, Programming with C, TMH
2.   E. Balagurusamy, Programming in ANSI C, TMH
3.   Y. Kanetkar, Let us C, BPB
4.   Y. Kanetkar, Let us C++, BPB
5.   E. Balagurusamy, Object Oriented Programming with C++ , TMH
6.   Robert Lafore, Object Oriented Programming in Turbo C++ ,Galgotia Publications

MCA II Sem-Paper Code-20601:Data Structure & Analysis of Algorithms

Credit 4; Theory Max/Min(60/21), CCE Max/Min(40/20)

Course Objectives : The aim of this course is to provide knowledge of various data structures, operations on them & various applications and searching, sorting algorithms and analysis of algorithms.

Course Outcomes:

On completion of this course, the student will be able to:

CO1: Identify best suited data structure for the problem at hand.

CO2: Identify the programming constructs to optimize the performance of the data structure in different scenarios.

CO3: Describe the algorithm design techniques: iteration, divide and conquer, dynamic programming, greedy approach algorithms.

CO4: Analyze the strengths and weaknesses of each technique.

CO5: Identify and apply technique(s) suitable for simple applications.

Unit – I

Data Structure : types, operations on data structures, Algorithm analysis, time space complexities; Stack : Contiguous implementation of stack, PUSH & POP, applications of stack : Various polish notations – infix, prefix, postfix, conversion using stack; Queue : implementation of queue, operations on queue, priority queue,Linear queue and circular queue, various operation on queue.

Unit – II

General List: list and it's contiguous& linked implementation, it's drawback; singly linked list-operations on it; doubly linked list-operations on it; circular linked list; applications of linked list,
Trees : Definition – height, depth, order degree, etc; Binary Tree, complete binary tree, implementation of Binary tree, Tree traversal algorithms – preorder, inorder& post order, Binary search tree, operations on binary tree, application of binary tree.

Unit – III

Graph: related definition, implementation of graph, traversal algorithms - depth first search, breadth first search; minimum spanning tree, shortest path algorithms, Searching : Sequential search, binary search, indexed sequential search,Hashing, hash methods, collisions & its resolution techniques. Sorting :bubble sort, selection sort, heap sort, insertion sort and tree sort

Unit – IV

Divide and Conquer: Structure of divide and conquer algorithm, Merge sort, Quick sort; Asymptotic Notation;Greedy Method: Overview of the greedy paradigm examples of exact optimization solution(minimum cost spanning tree), Approximate solution (Knapsack problem), Single source shortest paths. Branch and bound; 0/1 Knapsack problem, Traveling Salesman Problem.

UNIT- V

Dynamic programming: Overview, Applications: Shortest path in graph, Traveling salesman Problem, longest Common sequence. Back tracking: Overview, 8-queen problem, and Knapsack problem, Computational complexity, Polynomial and non polynomial time complexity, NP hard and NP Complete Classes.

Books Recommended:

1. Kruse R.L. Data Structures and Program Design in C; PHI
2. Aho "Data Structure & Algorithms"
.3. Trembly "Introduction to Data Structure with Applications".
4. TennenBaum A.M. & others: Data Structures using C & C++; PHI
5. Horowitz &Sawhaney: Fundamentals of Data Structures, Galgotia Publishers.
6. Ullman "Analysis and Design of Algorithm" TMH
7. T. H. Cormen, Leiserson ,Rivest and Stein, "Introduction of Computer algorithm," PHI

MCA II Sem-Paper Code-20602 :Software Engineering Methodologies

Credit 4; Theory Max/Min(60/21), CCE Max/Min(40/20)

Course Objectives : To acquire the knowledge related to software development life cycle models, software requirement analysis & specification, software design, coding & testing and software reliability & quality assurance.

Course Outcomes:

On completion of the course, the student is expected to:

CO1: Demonstrate an understanding of software engineering layered technology and software process models that provide a basis for the software development lifecycle.

CO2: Describe software/system requirements and understand the processes involved in the discovery and documentation of these requirements.

CO3: Practice of software project planning and designing.

CO4: Test software using verification and validation & Appreciate software project management that includes project planning, project estimation techniques, risk management, quality management, and configuration management.

CO5: Understand the concept of re engineering and case tools.

UNIT -I

System concepts and Information system environment: The system concept, characteristics ofsystem, elements of system, The System Development Life Cycle, The Role of System Analyst.Introduction system planning & initial investigation, various information gathering tools, feasibility study, structures tools of system analysis, various methods of processdesign, form design methodologies, introduction to information system testing, quality assurance.

UNIT -II

Software Process, Product and Project: The Product : Software, Software Myths, The process :Software Engineering : A Layered Technology, Software Process Models, The Linear SequentialModel, The Prototyping Model, The RAD Model, Evolutionary Software Process Models, Component – Based Development, Fourth Generation Techniques, Software process and Project Metrics : Software measurement

UNIT-III

Software Project Planning and Design: Software Project Planning : Project planning objectives, Decomposition Techniques, Empirical estimation models, The Make/Buy Decision, Risk analysis. Software Design: Design Principles, Cohesion & Coupling, Design notation andspecification, structure design methodology.

UNIT-IV

Software Quality Assurance and Testing : Software Quality Assurance : Quality Concepts, The Quality Movement, Software Quality Assurance, Software Reviews, Formal Technical Reviews, Formal Approaches to SQA, Statistical Software Quality Assurance, Software Reliability, Mistake Proofing for Software, Introduction to ISO standard. Testing Strategies: A strategicapproach of software testing strategic issues, unit testing, integration testing, validation testing,system testing, the art of debugging. OOA, OOD.

UNIT-V

Advanced Topics: MIS &DSS:Introduction to MIS, long range planning, development andimplementation of an MIS, applications of MIS in manufacturing sector and in service sector. Decision Suppost System concepts, types of DSS. Object Oriented Software Engineering: Object Oriented Concepts, Identifying the Elements of an Object Model, Management of Object Oriented Software Projects. CASE tools, Re-engineering.

Books Recommended:

1. R. S. Pressman, "Software Engineering – A practitioner's approach", 6th ed., McGraw Hill Inc
2. PankajJalote "Software Engg" Narosa Publications.
3. Ian Sommerville : Software Engineering 6/e (Addison-Wesley)
4. Richard Fairley : Software Engineering Concepts (TMH)
5. Elis Awad, "System Analysis & Design", Galgotia publications
6. Hoffer " Modern System Analysis & Design" 3e, Pearson Edition

MCA II Sem-Paper Code-20603 :Computer Graphics & Visualization

Credit 4; Theory Max/Min(60/21), CCE Max/Min(40/20)

Course Objectives : To acquire the knowledge related to computer graphics, transformations, windowing & clipping, algorithms and shading & Color models.

Course Outcomes:

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

CO1 : Describe architecture of basic Input/ Output devices and their underlying working principles along with various primitives for drawing shapes.

CO2 : Illustrate the digitization process of images and related algorithms for drawing basic geometric figures in the 2D Transformation.

CO3 : Learn windowing and clipping concept and color model of graphics.

CO4 : Apply fundamental mathematics in producing spatial 3D-image of an object in an inherently 2D display device.

CO5 : Understand the basics of OpenGL API and to manipulate graphics & images.

UNIT-I

Computer Graphics : definition, classification & applications, Development of Hardware &Software for Computer Graphics. Display devices, Hard copy devices. Interactive Input devices,display processor, Line drawing; various algorithms and their comparison, circle generation-Bresenham'smid point circle drawing algorithm, mid point ellipse drawing algorithm.

UNIT-II

Attributes of output primitives, line style, color and intensity, Area filling algorithms, Scan line algorithm, boundary fill,flood fill algorithm, Antialiasing techniques. Two dimensionaltransformations; translation, scaling, rotation, reflection sheering, composite transformation, transformation commands, character generation.

UNIT-III

Viewing coordinates, Window, view port, clipping, Window to view port transformation, lineclipping algorithm; Cohen Sutherland, polygon clipping; Sutherland Hodgman algorithm, 3D clipping : Normalized view volumes, view port clipping, clipping in homogeneous coordinates. Illumination model: Light sources, diffuse reflection specular reflection, reflected light, intensity levels, surface shading; phong shading gouraud shading, color models like RGB, YIQ, CMY, HSV etc.

UNIT-IV

3-D Viewing: Three-dimensional concepts, 3D display techniques, 3D representation polygon &curved surfaces. Design of curves & surfaces- Bezier's Method, B-spline method, 3Dtransformation transition, scaling, composite transformation rotation about arbitrary axis,projections: Parallel & Perspective, Hidden surface and line removal; back face removal, depthbuffer and scan line methods.

UNIT-V

Introduction to OPENGL- Points, Lines – Specifying a 2D World Coordinate, Reference Frame inOpenGL- OpenGL Point Functions, Line Functions, Polygon Fill Area Functions, Vertex Arrays - Line Drawing Algorithms - Circle Generation Algorithm, Filled Area Primitives, OpenGL fill AreaFunctions - Scan Line Polygon Filling Algorithms – Boundary Fill - Flood Fill Algorithms.

Books Recommended:

1. Donald Hearn and Pauline Baker, "Computer Graphics with OpenGL ", Third Edition, Prentice Hall of India, 2009.
2. S. Harrington – "Computer Graphics - a Programming approach" (2nd ed) McGrawhill.
3. New Mann &Sprovl- "Principles of interactive computer graphics" (2nd ed) McGrawhill.
4. Roger S. David "Procedural Elements for Computer Graphics", McGraw Hill.
5. Roger S David "Mathematical Elements for Computer Graphics", McGraw Hill.
6. Foley &Vandan "Computer Graphics Principles & Practice in "C" "AddisionWesly.

MCA II Sem-Paper Code-206041 :Artificial Intelligence

Credit 4; Theory Max/Min(60/21), CCE Max/Min(40/20)

Course Objectives : To acquire the knowledge related to artificial intelligence, problem solving, search and control strategies, natural language processing and probabilistic reasoning & uncertainty

Course Outcomes:

On completion of this course, the student will be able to:

CO1: Describe various approaches to Artificial Intelligence.

CO2: Design intelligent agents.

CO3: Describe and apply concepts, methods, and theories of search, heuristics, games, knowledge representation, planning.

CO4: Acquire basics knowledge of Natural language processing.

CO5: Understand the limitations of Artificial Intelligence techniques.

UNIT-I

General Issues and Overview of AI : The AI problems, what is an AI technique, Characteristicsof AI applications. Introduction to LISP programming: Syntax and numeric functions, Basic list manipulation functions, predicates and conditionals, input output and local variables, iteration and recursion, property lists and arrays.

UNIT-II

Problem Solving, Search and Control Strategies : General problem solving, production systems, control strategies forward and backward chaining, exhaustive searches - depth first,breadth first search. Heuristic Search Techniques : Hill climbing, branch and bound technique,best first search & A* algorithm, AND / OR graphs, problem reduction & AO* algorithm,constraint satisfaction problems.

UNIT-III

Knowledge Representations : First order predicate calculus, skolemization, resolution principle& unification, interface mechanisms, horn's clauses, semantic networks, frame systems and valueinheritance, scripts, conceptual dependency.

UNIT-IV

Natural Language processing : Parsing techniques, context freegrammer, recursive transitions nets (RNT), augmented transition nets (ATN), case and logic grammers, symantic analysis.Game playing :Minimax search procedure, alpha-beta cutoffs, additional refinements. Planning: Overview an example domain the block word, component of planning systems, goal stackplanning, non linear planning.

UNIT-V

Probabilistic Reasoning and Uncertainty : Probability theory, bayes theorem and Bayesian networks, certainty factor.Expert Systems : Introduction to expert system and application ofexpert systems, various expert system shells, knowledge acquisition, casestudies, MYCIN. Learning ; Rote learning, learning by induction, explanation based learning.

Books Recommended:

1. Elaine Rich and Kevin Knight "Artifical Intelligence" - Tata McGraw Hill.
2. "Artifical Intelligence" 4 ed. Pearson.
3. Dan W. Patterson "Introduction to Artifical Intelligence and Expert Systems", Prentice India.
4. Nils J. Nilson "Principles of Artifical Intelligence", Narosa Publishing House.
5. Clocksin&C.S.Melish "Programming in PROLOG", Narosa Publishing House.
6. M.Sasikumar,S.Ramani etc. "Rule based Expert System", Narosa Publishing House.

MCA II Sem-Paper Code-206042 :Cloud Computing

Credit 4; Theory Max/Min(60/21), CCE Max/Min(40/20)

Course Objectives : To acquire the knowledge related to cloud, its security and challenges.
Course Outcomes:
On completion of this course, the student will be able to:
CO1 : Understand the architecture and infrastructure of cloud.
CO2 : Learn the resource virtualization technique.
CO3 : Build the appropriate file system and database.
CO4 : Understand cloud security and challenges.
CO5 : Evaluate third party cloud services for a real world problem.

Unit-I
Introduction: Historical development,Vision of Cloud Computing, Characteristics of cloud computing as per NIST, Cloud computing reference model,Cloud computing environments, Cloud services requirements, Cloud and dynamic infrastructure, Cloud Adoption and rudiments.Overview of cloud applications: ECG Analysis in the cloud, Protein structure prediction, GeneExpression Data Analysis, Satellite Image Processing,CRM and ERP, Social networking.

Unit-II
Cloud Computing Architecture: Cloud Reference Model, Types of Clouds, CloudInteroperability & Standards, Scalability and Fault Tolerance; Cloud Solutions: CloudEcosystem, Cloud Business Process Management, Cloud Service Management. Cloud Offerings:Cloud Analytics, Testing Under Control, Virtual Desktop Infrastructure.

Unit –III
Cloud Management & Virtualization Technology: Resiliency, Provisioning, Assetmanagement,Concepts of Map reduce, Cloud Governance, High Availability and DisasterRecovery. Virtualization: Fundamental concepts of compute,storage, networking, desktop andapplication virtualization.Virtualization benefits, server virtualization, Block and file levelstorage virtualization, Hypervisor management software, Infrastructure Requirements, VirtualLAN(VLAN) and Virtual SAN(VSAN) and their benefits.

Unit-IV
Cloud Security: Cloud Information security fundamentals, Cloud security services, Designprinciples, Secure Cloud Software Requirements, Policy Implementation, Cloud ComputingSecurity Challenges, Virtualization security Management, Cloud Computing Security Architecture.

Unit-V
Market Based Management of Clouds, Federated Clouds/Inter Cloud: Characterization & Definition, Cloud Federation Stack, Third Party Cloud Services.Case study : Google App Engine, Microsoft Azure, Hadoop, Amazon, Aneka

Books Recommended:
1. Buyya, Selvi ,” Mastering Cloud Computing “,TMH Pub
2. Kumar Saurabh, “Cloud Computing” , Wiley Pub
3. Krutz , Vines, “Cloud Security “ , Wiley Pub
4. Velte, “Cloud Computing- A Practical Approach”,TMH Pub
5. Sosinsky, “ Cloud Computing” , Wiley Pub

MCA II Sem-Paper Code-20605 : JAVA Programming & Technologies

Credit 4; Theory Max/Min(60/21), CCE Max/Min(40/20)

Course Objectives : To acquire knowledge related to the programming language Java and creation of GUI interface.

Course Outcomes:

On completion of this course, the student will be able to:

CO1: Understand the object-oriented concepts – Classes, Objects, Inheritance, Polymorphism– for problem solving.

CO2 : Design, implement, document, test, and debug a Java application consisting of multiple classes.

CO3 : Handle program exceptions.

CO4 : Handle input/output through files.

CO5 : Create Java applications with graphical user interface (GUI).

UNIT-I

The Java Environment: History of Java: Comparison of Java and C++; Java as an objectoriented language, Basic idea of application and applet; Basics: Data types; Operators- precedenceand associativity; Type conversion; Java control statements; arrays; memory allocation and garbage collection in java.Object Oriented Programming in Java: Class& Object; Packages; scope and lifetime; Access specifies;Constructors; Copy constructor; this pointer; finalize () method; arrays; Memory allocation andgarbage collection in java, keywords Inheritance : Inheritance basics, method overriding,dynamics method dispatch, abstract classes.

UNIT-II

Interfaces : defining an interface, implementing & applying interfaces, extending interfaces. Multithreading and Exception Handling: Basic idea of multithreaded programming; The lifecycle of a thread; Creating thread with the thread class and runnable interface; Thread synchronization; Thread scheduling; Producer-consumer relationship; Daemonthread, Selfish threads; Basic idea of exception handling; The try, catch and throw; throwsConstructor and finalizers in exception handling; Exception Handling.

UNIT-III

Applets: the class hierarchy for applets; Life cycle of applet; HTML Tags for applet.The AWT: The class hierarchy of window fundamentals; The basic user interface components Label, Button, Check Box, Radio Button, Choice menu, Text area, Scroll list, Scrollbar; Frame; Layout managers;The Java Event Handling Model,ignoring the event, Self containedevents, Delegating events; The event class hierarchy; The relationship between interface, methodscalled, parameters and event source; Adapter classes; Event classes.

UNIT-IV

Input/Output : Exploring Java I/O., stream classes The Byte stream : Input stream,output stream, file input stream, file output stream, print stream, Random access file, thecharacter streams, Buffered reader, buffered writer, print writer, serialization. JDBC: JDBCODBCbridge; The connectivity model; The driver manager; Navigating the resultset objectcontents; java.sql Package; The JDBC exception classes; Connecting to Remote database.

UNIT-V

Networking & RMI: Java Networking : Networking Basics : Socket, Client server, reservedsockets, proxy servers, Inet address, TCP sockets, UDP sockets. ; RMI for distributed computing;RMI registry services; Steps of creating RMI Application and an example. Collections: Thecollections framework, collection interfaces, collection classes.

Books Recommended:

1. Naughton&Schildt "The Complete Reference Java 2", Tata McGraw Hill
2. Deitel "Java- How to Program:" Pearson Education, Asia
3. Horstmann& Cornell "Core Java 2" (Vol I &II) , Sun Microsystems
4. lvanBayross "Java 2.0" : BPB publications
5. Ivor Horton's "Beginning Java 2, JDK 5 Ed., Wiley India

MCA III Sem-Paper Code-30601 :COMPILER DESIGN

Credit 4; Theory Max/Min(60/21), CCE Max/Min(40/20)

Course Objectives : To acquire the knowledge related to compiler working
Course Outcomes:
On completion of this course, the student will be able to:
CO1: Describe how different phases of a compiler work.
CO2: Understand formal languages and automata.
CO3: Implement top down and bottom up parsing algorithms.
CO4: Use compiler tools like lexfor implementing syntax directed translator.
CO5: Learn implementation of block structure languages.

Unit I

Compilers & Interpreters: aspects of compilation, structure of compiler, compilation of expression compilation of control structures, interpreters. Software tool.Linker & Loaders: Relocation & linking concepts, design of linkers, self relocating programs, linking for overlays, loaders : A two pass loader scheme.

Unit II

Formal Language and Automata: Definition & description, Chomskey classification of languages, regular grammar, finite automata, equivalence of FA and regular expression. Minimizing the number of states of a DFA, FSM with output (mealy and moore models).Lexical Analysis: Role of lexical analyzer, specification and recognition of tokens, automatic generation of lexical analyzer, Implementation of lexical analyzer using lex.

Unit III

Context free grammar, derivation of parse tree, capabilities of CFGs, normal form for CFG, Pushdown automata, relation of PDA with CFG, capabilities of CFG, Parser, Shift reduce parsing, operator precedence parsing top down parsing, Predictive parsing, LR parser, the canonical collection of LR(0) items, constructing SLR parsing table, constructing canonical LR parsing table, constructing LALR parsing table

Unit IV

Syntax direct translation schemes, implementation of syntax directed translators, intermediate code, postfix notation, parse tree and syntax tree, three address code, quadruples and triples, translations of assignment statement, Boolean expression, statements that alter the flow of control, cost fix translations, translation with top down parser.

Unit V

Symbol table, the contents of symbol tables, data structure for symbol tables, representing scope information, run time storage administration, implementation of a simple stack allocation schemes, implementation of block structure languages, storage for block structured languages.

Books Recommended :
1. Principal of compiler design by Afred V. Aho, Jeffrey D. Ulman.
2. "Compiler: principals Technique and tools",Aho, Ravi Sethi, Ulman, Pearson Education, VIII Ed 2002
3. Mishra &ChanderShekhar "Theory of Computer Science (Automate, Language &Computations)", PHI.
4. Hopcroft& Ullman "Introduction to Automata theory, languages & Computation",Narosha Publishing house.
5. LewishPapadimutrau "Theory of Computation" , Prentice Hall of India, New Delhi.

MCA III Sem-Paper Code-30602 :Computer Networking & Internet

Credit 4; Theory Max/Min(60/21), CCE Max/Min(40/20)

Course Objectives : To acquire the knowledge related to computer networks and OSI reference model and seven layers of OSI.

Course Outcomes:

On completion of this course, the student will be able to:

CO1 : Learn the basics of Computer network Technologies.

CO2 : Understand the fundamentals of types of transmission mediums and interfacing standards along with the current edge of the data communication techniques.

CO3 : Learn flow control and error control techniques and Computer Network protocols at Conceptual level.

CO4 : Learn WAN and TCP/IP.

CO5: Learn the architecture & protocols of email and www.

UNIT-I

Introduction: Computer Network, Layered Network Architecture-Review of ISO-OSI Model, Transmission Fundamentals, Communication Media : guided & unguided, Modulation & Demodulation, Digital to Analog Conversion-Frequency Modulation (FM), Amplitude, Modulation (AM), Phase Modulation (PM), Contention Protocol-, Stop-Go-Access Protocol, Aloha Protocol- Pure aloha & Slotted aloha, Carrier sense multiple access with collision detection (CSMA/CD)

UNIT-II

Data Security and Integrity: Parity Checking Code, Cyclic redundancy checks (CRC),Hamming Code, Protocol Concepts, Basic flow control, Sliding window protocol -Go-Back-Nprotocol and selective repeat protocol, Protocol correctness- Finite state machine

UNIT-III

Local Area Network: Ethernet : 802.3 IEEE standard, Token Ring : 802.5 IEEE standard, Token Bus : 802.4 IEEE standard, FDDI Protocol, DQDB Protocol, Inter Networking, Layer 1connections-Repeater, Hubs, Layer 2 connections- Bridges, Switches, Layer 3 connections-Routers, Gateways.

UNIT-IV

Wide Area Network: Introduction, Network routing, Routing Tables, Types of routing, Dijkstra's Algorithm, Bellman-Ford Algorithm, Link state routing, Open shortest path first,Flooding, Broadcasting, Multicasting, Congestion & Dead Lock, Internet Protocols, InternetLayer-Class full Addressing – Class less addressing – Private Addresses – Subnets – Subnet masksOverview ofTCP/IP, Transport protocols, Elements of Transport Protocol, Transmission control protocol(TCP), User data-gram protocol (UDP).

UNIT-V

Network Security, introduction to cryptography, Virtual Terminal Protocol, Overview of DNS, SNMP, email - Architecture and services, MIME, SMTP, Mail Gateways, Remote login, File Transfer Protocol, World Wide Web: Introduction, Architectural overview, static and dynamic web pages, HTTP, LDAP, Browser Architecture.

Books Recommended:

1. A.S.Tanenbaum, "Computer Network", 4th addition,PHI
2. Forouzan "Data Communication and Networking 3ed", TMH
3. J.F.Hayes, "Moduling and Analysis of Computer Communication Networks", Plenum Press
4. D.E.Comer, "Internetworking with TCP/IP", Volume Ist&IInd, PHI
5. Willium Stalling, "Data & Computer communications",Maxwell Macmillan International Ed.
6. D.Bertsekas and R.Gallager,"Data Networks", 2nd Ed. ,PHI.
7. G.E. Keiser ,"Local Area Networks ", McGraw Hill, International Ed.

MCA III Sem-Paper Code-306031 :Cryptography & Network Security

Credit 4; Theory Max/Min(60/21), CCE Max/Min(40/20)

Course Objectives : To acquire the knowledge of classical encryption techniques, secret and public key cryptography, message authentication, IP, web and system security.

Course Outcomes:

On completion of this course, the student will be able to:

CO1: Learn classical encryption techniques and block cipher modes of operation.

CO2: Implement a symmetric and asymmetric cryptographic methods

CO3 : Learn Message authentication and Hash functions.

CO4: Describe the role and implementation of digital signatures.

CO5 : Understand IP security, Web security and system security.

UNIT-I

Classical Encryption Techniques: Symantec Cipher model, substitution Techniques, transposition techniques, rotor machines, steganography. Block Ciphers and the Data Encryption standards: Simplified DES, block cipher principles, the data encryption standard, the strength of DES, block cipher design principles, block cipher modes of operation,Triple DES.

UNIT-II

Confidentiality using symmetric encryption: Placement of Encryption function, trafficconfidentiality, key distribution; Public key Encryption, Public key cryptographyand RSA: Principles of Public key cryptosystems, the RSA algorithm; Key Management otherpublic key cryptosystems : Key management, Diffie-Hallman key exchange algorithm.

UNIT-III

Message authentication and Hash function : Authentication Requirements, Authenticationfunctions, message authentication codes, hash functions, security of hash function and MACs.Hash Algorithms: MD5 message digest algorithm, secure Hash algorithm;Digital Signature and Authentication protocols: Digital signatures, Authentication protocols, anddigital signature standard. Authentication Applications: Kerberos, X.509 Authentication service.

UNIT-IV

Electronic Mail Security: Pretty Good privacy, S/MIME; IP Security: IP Security overview, IP security architecture, authentication header, encapsulating security payload, combining security associations, key management; Web Security: Web security considerations, Secure sockets layer and transport layer security, Secure Electronic Transaction(SET).

UNIT-V

System security: Intruders, intrusion detection, and password Management. Malicious software:Viruses and related threats, virus countermeasures. Firewalls: Firewall Design Principles, Trustedsystems.

Books Recommended:

1. William Stallings "Cryptography and Network Security", 3 ed, Pearson Education.
2. W.Stallings " Network security Essential " Applications & Standards", Pearson ed.
3. Kanfren "Network Security : Private Communications in a public world 2/e
4. Eric Maiwald " Network Security : A Preginner's Guide, second ed.", Tata Mcgraw Hill.
5. Roberta Bragg " Mark Rhodes, Ousley& Keith Strassberg Network Security : The Complete

MCA III Sem-Paper Code-306032 :Mobile Computing

Credit 4; Theory Max/Min(60/21), CCE Max/Min(40/20)

Course Objectives : To acquire the knowledge related to wireless communication, mobile data communication, WLAN and Bluetooth technology.

Course Outcomes:

On completion of this course, the student will be able to:

CO1: Learn multiple access technology for Wireless Communication.

CO2: Understand the concept of mobile data communication.

CO3: Learn Digital Cellular Systems and Standards.

CO4: Describe Components and working of Wireless LAN**.**

CO5: Understand Bluetooth technology & WLL architecture.

UNIT-I

Overview of OSI Model: Significance of layered Model, PDUs, SDUs, IDUs, Higher layer Protocols, Switching and Components : Introduction, Applications, history of wired & wireless Communication systems; Radio Transmission : frequencies,signal propagation, antenna, types of modulation, FHSS, DSSS; Multiple Access technology for Wireless Communication : FDMA,TDMA,CDMA Cellular System: Introduction, types.

UNIT-II

Mobile Data Communication :Cellular Telephony; Structure, Fading, Small scale fading, Multi-path Fading, Speech Coding, Error Coding and Correction, Hand off Management, Switching and authentication, MTSO interconnections, frequency hopping, frequency reuse; Circuit Switched Data Services & Packet Switched Data Services on Cellular Networks, Personal Communication Systems (PCS) Architecture, Digital Enhanced Cordless Telecommunications (DECT), Personal Access Communications System (PACS).

UNIT-III

Digital Cellular Systems and Standards : GSM System overview, Architecture; GSM Practical Model, GSM Mobility Management, SMS security aspects, Broadcast System overview, General Packet Service (GRPS) Architecture, GRPS Network, Interfaces and Procedures (2.5 G), 3G Mobile Services: UMTS and International Mobile Telecommunications (IMT-2000), W-C DM and CDMA 2000, Quality of service in 3G .

UNIT-IV

 WLAN: Components and working of Wireless LAN, Transmission Media for WLAN, Infrastructure & types of WLAN, IEEE 802.11 Standards, Protocols for WLAN, Multiple Access with Collision Avoidance (MACA), MACAW, Infrared technology. Wireless Application Protocol (WAP) model, architecture -Gateway, WAP protocols and WML.

UNIT-V

Introduction to. Bluetooth technology. Wireless in Local Loop (WLL) architecture, products. Satellite as a switch, Components of VSAT system, VSAT topologies access schemes.

Books Recommended :

1. Jochen Schiller "Mobile Communication", Pearson Education
2. Yi -Bing Lin and ImrichChlamtac "Wireless and Mobile Network Architectures", Wiley India. .
3. Raj Pandaya "Mobile and Personal Communication System & Services". '

MCA III Sem-Paper Code-306033 : Software Quality Assurance

Credit 4; Theory Max/Min(60/21), CCE Max/Min(40/20)

Course Objectives : To acquire the knowledge related to software quality, testing, integration, system test planning, automation & execution and software quality standards.

Course Outcomes:

On completion of this course, the student will be able to:

CO1: Understand quality management processes.

CO2: Understand the importance of standards in the quality management process and role of SQA function in an organization.

CO3: Gain knowledge of software quality assurance.

CO4: Understand the need and purpose of software testing.

CO5: Learn the five views of software quality.

Unit-I

Introduction: Software Quality, Role of testing, v & v, objectives and issues of testing, Testing activities and levels, Sources of Information for Test Case Selection, White-Box and Black-Box Testing, Test Planning and Design, Monitoring and Measuring Test Execution, Test Tools and Automation, Test Team Organization and Management; Unit Testing: Concept, Static Unit Testing, Defect Prevention, Dynamic Unit Testing, Mutation Testing, Debugging.

Unit-II

Control Flow & Data Flow Testing: Outline of CFT, CF Graph, Paths in a Control Flow Graph, Path Selection Criteria,Generating Test Input, Examples of Test Data Selection; Overview of Dynamic Data Flow Testing, Data Flow Graph, Data Flow Testing Criteria, Comparison of Testing Techniques.

Unit-III

System Integration Testing & Test Design: Concept of Integration Testing, Different Types of Interfaces and Interface Errors, Granularity of System Integration Testing, System Integration Techniques, Test Plan for System Integration, Off-the-Shelf Component Testing, System Test Categories.

Unit-IV

System Test Planning, Automation & Execution: Structure of a System Test Plan, Test Approach, Test Suite Structure, Test Environment, Test Execution Strategy, Test Effort Estimation, Scheduling and Test Milestones, System Test Automation, Selection of Test Automation Tools, Test Selection Guidelines for Automation, Structure of an Automated Test Case, Test Automation Infrastructure Metrics for Tracking System Test, Metrics for Monitoring Test Execution, Beta Testing, System Test Report, Measuring Test Effectiveness, Acceptance Testing.

Unit-V

Software Quality: Five Views of Software Quality, McCall's Quality Factors and Criteria, Quality Factors Quality Criteria, Relationship between Quality Factors and Criteria, Quality Metrics, ISO 9126 Quality Characteristics, ISO 9000:2000 Software Quality Standard ISO 9000:2000 Fundamentals, ISO 9001:2000 Requirements.

Books Recommended:

1. N.S. Godbole, Software Quality Assurance: Principles and Practice for the New Paradigm (2nd Ed.), Narosa Publishing, 2017.

2. S.H. Kan, Metrics and Models in Software Quality Engineering (2nd ed.), Pearson Education Inc., 2003.

3. Stephen H.Khan ,Metrics and Models in Software Quality Engineering PearsonEducation,India

4. Shari Lawrence Pfleeger,"Software Engineering Theory and Practice PearsonEducation,India.

MCA III Sem-Paper Code-306034 : Internet Of Things

Credit 4; Theory Max/Min(60/21), CCE Max/Min(40/20)

Course Objectives : To acquire the knowledge related to Internet of Things, types of sensors, IOT smart applications, protocols and challenges.
Course Outcomes:
On completion of this course, the student will be able to:
CO1 : Understand the IOT Terminology and Technology.
CO2 : Describe IOT applications.
CO3 : Analyze Protocol standardization for IOT.
CO4 : Perform an analysis of IOT security issues.
CO5: Identify the role of cloud computing in IOT.

Unit-I

Introduction – Digital Electronics, Logical gates and its working, Types of sensors: Temperature sensor (LM35,RTD,Thermocouple), Light sensor(photodiode, optocoupler), Distance and range sensor (IR,LVDT), Accelerometer sensor, Touch screen sensor.

Unit-II

Introduction to IOT - Definition & Characteristics,Importance of IoT,Physical Design of IOT, Logical Design of IOT, IOT Enabling technologies,IoT and M2M, IOT Platform Design Methodology,Purpose & Requirements Specification, Process Specification, Domain Model Specification, Information model Specification, Service specification, IOT level Specifications, Functional View Specifications, Operational View Specification, device and component integration, application development

Unit-III

Iot Smart X Application - Smart Cities, Smart Energy & Smart Grid, Smart Mobility & transport, Smart Home, Smart Building & Infrastructure, Smart Factory & Manufacturing, Smart Health, Smart Logistics & Retails. **Embedded suite for IoT Physical device –** Arduino / Raspberry Pi Interfaces, Hardware requirement of Arduino / Pi, Connecting remotely to the Arduino /Raspberry Pi, GPIO Basics

Unit-IV

Protocols in IOT: RFID: Introduction, Principle of RFID, Components of an RFID system, RFID Protocols & NFC protocols,CoAP, XMPP, AMQP, MQTT
Resource Management In The Internet Of Things: Clustering, Software Agents, Clustering Principles in an Internet of Things Architecture, Design Guidelines, Software Agents for Object Representation, Data Synchronization.

Unit-V

Internet of things Challenges: Vulnerabilities of IoT, Security, Privacy & Trust for IoT, Security requirements Threat analysis, Use cases and misuse cases, Introduction to cloud computing, Role of Cloud Computing in IoT, Cloud-to-Device Connectivity,Cloud data management, cloud data monitoring, Cloud data Exchange.

Books Recommended:
1.Pethuru Raj, Anupama C. Raman, The Internet of Things Enabling Technologies, Platforms, and Use Cases, CRC Press Taylor & Francis Group, International Standard Book Number-13: 978-1-4987-6128-4
2. Internet of Things: A Hands-on Approach", by ArshdeepBahga and Vijay Madisetti (UniversitiesPress)
3. RajkumarBuyya, Amir VahidDastjerdi Internet of Things – Principals and Paradigms, Morgan Kaufmann is an imprint of Elsevier, ISBN: 978-0-12-805395-9 HakimaChaouchi, " The Internet of Things Connecting Objects to the Web" ISBN : 978-1- 84821-140-7, Willy Publications
4. Olivier Hersent, David Boswarthick, Omar Elloumi, The Internet of Things: Key Applications and Protocols, ISBN: 978-1-119-99435-0, 2 nd Edition, Willy Publications
5. Daniel Kellmereit, Daniel Obodovski, "The Silent Intelligence: The Internet of Things",. Publisher: Lightning Source Inc; 1 edition (15 April 2014). ISBN-10: 0989973700, ISBN-13: 978- 0989973700.

MCA III Sem-Paper Code-306041 :DOT NET Technology

Credit 4; Theory Max/Min(60/21), CCE Max/Min(40/20)

Course Objectives : To acquire the knowledge related to .Net Technology, framework and programming constructs, window forms and file handling.

Course Outcomes:

On completion of this course, the student will be able to:

CO1 : Learn .NET Technology and IDE.

CO2 : Understand the Structure Exception Handling Exception Filtering

CO3 : Describe the classes, interfaces& arrays.

CO4 : Learn creation of window forms & controls.

CO5 : Understand file handling and graphics in VB.

UNIT-I

Introduction to .NET Technology, Introduction to VB.NET, Building VB.net Application, IDE Dot.NET, Evolution of Dot.net Framework, Keywords, Statement, Variables, Enumerable, Constant, Data Types, Conversion, Operators, Comments, Decision Making, Looping, Array, Handling Strings, Strings Function.

UNIT-II

Handling Dates and Times, Sub Procedure and Function, Creating Function, Passing Values as arguments, Creating Properties, Handling Exception, Resume Next, Resume Line, ON Error GOTO, Structure Exception Handling Exception Filtering. Throwing Exception, Custom Exception.

UNIT-III

Classes and Objects: Types, Field, Properties, Methods and Events, Class vs Object, Members Overloading, Overriding, Creating Class, Object, Structure & Modules, Accessing Modifiers, Shadowing, Creating Interfaces, Polymorphism, Early and Late binding, Multiple Interface, Using MyBase and MyClass Keyword, Inheritance based Polymorphism and Interface Based Polymorphism.

UNIT-IV

Window Forms: Creating Window Forms, Controls to Form, Setting Title bars, Dialog Boxes, Handling Mouse Events, Handling Key Press Events, Controls Classes: Textbox, Rich Textbox, Labels, Link Labels, Buttons, Checkbox, Panels, Group Boxes, Radio Button, Drop Down, List Boxes, Combo Box, Scroll Bars, Pickers, Tool Tips, Timers, Menu, Min & Max Button, Image, Toolbars, Popup Menu, Setup Dialog, Progress bar, Status Bar, Tab Controls.

UNIT-V

File Handling: File Opening and Creating, Writing Files, Reading Binary Data, Directory class, Files Class, Graphics: Using Brush class, Using Pen Class, Graphics Class, Data Access and ADO.NET: Creating Data set, Populating Dataset, Displaying data in Grids, Data access using Data Adapters Controls, Binding Data to Controls, Using Data Views.

Books Recommended:

1. Jeffrey R. Shapiro "The Complete Reference Visual Basic .NET" Tata Mcgraw Hill.
2. Rox "Beginner and Professional Edition VB.NET" Tata Mcgraw Hill.
3. Steven Holzner "Visual Basic .NET Black Book" Wiley Dreamtech Publication.
4. Alex Homer, Dave Sussman "Professional ASP.NET1.1" Wiley Dreamtech
5. Bill Evzen,Bill Hollis "Professional VB.NET 2003" Wiley Dreamtech
3. Tony Gaddis "Starting Out VB.NET PROG.2nd Edition" Wiley Dreamtech
6. Chris Ullman, Kauffman "Beg. ASP.NET1.1 with VB.NET 2003" Wiley Dreamtech
7. Chris Ullman, Kauffman "Beg ASP.NET1.1 with VC#.NET 2003" Wiley Dreamtech

MCA III Sem-Paper Code-306042 :Python Programming

Credit 4; Theory Max/Min(60/21), CCE Max/Min(40/20)

Course Objectives : To acquire knowledge related to the programming language Python.
Course Outcomes:
On completion of this course, the student will be able to:
CO1 : Understand different data types used in python.
CO2 : Get better understanding of different types of control structures.
CO3 : Use different data structures for different problem domains.
CO4 : Apply different object oriented features for solving real world problems.
CO5 : Develop different web based applications.

UNIT -I
Installing Python, Simple program using Python, Expressions and Values, Variables and Computer Memory, error detection, Multiple line statements, Designing and using functions, functions provided by Python, Tracing function calls in memory model, omitting return statement. Working with Text: Creating Strings of Characters, Using Special Characters in Strings, Creating a Multiline String, Printing Information, Getting Information from the Keyboard.

UNIT-II
A Boolean Type , Choosing Statements to Execute, Nested If Statements, Remembering the Results of a Boolean Expression Evaluation, A Modular Approach to Program Organization, Importing Modules, Defining Your Own Modules, Testing Code Semi automatically Grouping Functions Using Methods: Modules, Classes, and Methods, Calling Methods the Object-Oriented Way, Exploring String Methods, Underscores.

UNIT-III
Storing Collections of Data Using Lists: Storing and Accessing Data in Lists, modifying Lists, Operations on Lists, Slicing Lists, Aliasing, List Methods, Working with a List of Lists. Repeating Code Using Loops: Processing Items in a List, Processing Characters in Strings, Looping Over a Range of Numbers, Processing Lists Using Indices, Nesting Loops in Loops, Looping Until a Condition Is Reached, Repetition Based on User Input, Controlling Loops : UsingBreak and Continue Reading and Writing.

UNIT-IV
Files: Kinds of files, Opening a File, Techniques for Reading Files, Files over the Internet, Writing Files and Writing Algorithms That Use the File-Reading Techniques, Multiline Records. Storing Data Using Other Collection Types: Storing Data Using Sets, Storing Data Using Tuples, Storing Data Using Dictionaries, Inverting a Dictionary, Using the In Operator on Tuples, Sets, and Dictionaries, Comparing Collections.

UNIT-V
Collection of New Information Object-Oriented Programming : Understanding a Problem Domain, Function "Isinstance",Class Object, and Class Book, Writing a Method in Class Book, Plugging into Python Syntax: More Special Methods,Creating Graphical User interface: Building a Basic GUI, Models, Views, and Controllers, Customizing the Visual Style Introducing few more Widgets, Object-Oriented GUIs, Keeping the Concepts from Being a GUI Mess.

Books Recommended :
1. O'Relly, Python Crash Course, 2nd Edition: A Hands-On, Project-Based Introduction to Programming
2. John Zelle, Python Programming: An Introduction to Computer Science
3. Mark Lutz, Python Pocket Reference: Python in Your Pocket
4. O'Relly, Head First Python: A Brain-Friendly Guide, by Paul Barry

MCA III Sem-Paper Code-306043 :Data Warehousing and Mining

Credit 4; Theory Max/Min(60/21), CCE Max/Min(40/20)

Course Objectives : To acquire the knowledge related to data mining & data warehouse.
Course Outcomes:
On completion of this course, the student will be able to:
CO1 : Learn the data mining functionalities.
CO2 : Understand and exhibit the basics of data warehousing and multi-dimensional modeling.
CO3 : Describe data preprocessing.
CO4 : Understand classification , clustering, frequent pattern analysis and regression .
CO5 : Learn cluster analysis and DM tools.

UNIT – I

Motivation, importance, Data type for Data Mining : relational Databases, Data Warehouses, Transactional databases, advanced database system and its applications, Data mining Functionalities: Concept/Class description, Association Analysis classification & Prediction,Cluster Analysis, Outlier Analysis, Evolution Analysis, Classification of Data Mining Systems,Major Issues in Data Mining.

UNIT – II

Data Warehouse and OLAP Technology for Data Mining:Differences between Operational Database Systems and Data Warehouses, a multidimensional Data Model, Data WarehouseArchitecture, Data Warehouse Implementation, Data CubeTechnology.

UNIT- III

Data Preprocessing: Data Cleaning, Data Integration and Transformation, Data Reduction,Discretization and Concept Hierarchy Generation. Data Mining Primitives, Languages, and System Architectures, Concept Description: Characterization and Comparison, AnalyticalCharacterization.

UNIT – IV

Mining Association Rules in Large Databases: Association Rule Mining: Market BasketAnalysis, Basic Concepts, Mining Single-Dimensional Boolean Association Rules fromTransactional Databases: the Apriori algorithm, Generating Association rules from Frequentitems, Improving the efficiency of Apriori, Mining Multilevel Association Rules,Multidimensional Association Rules, Constraint-Based Association Mining.

UNIT – V

Classification & Prediction and Cluster Analysis: Issues regarding classification & prediction, Different Classification Methods, Prediction, Cluster Analysis, Major Clustering Methods, Applications & Trends in Data Mining: Data Mining Applications, currently available tools.

Books Recommended:
1. J. Han and M. Kamber, "Data Mining: Concepts and Techniques", Morgan Kaufmann Pub.
2. Berson "Dataware housing, Data Mining & DLAP, @004, TMH.
3. W.H. Inmon " Building the Datawarehouse, 3ed, Wiley India.
4. Anahory, "Data Warehousing in Real World", Pearson Education.
5. Adriaans, "Data Mining", Pearson Education.
6. S.K. Pujari, "Data Mining Techniques", University Press, Hyderabad.

MCA III Sem-Paper Code-306044 : Bigdata Analytics & Visualization

Credit 4; Theory Max/Min(60/21), CCE Max/Min(40/20)

Course Objectives: To acquire the knowledge related to big data, its characteristics, big data modeling and visualization

Course Outcomes :

On completion of this course, the student will be able to:

CO1 : Learn Big data and its characteristics.

CO2 : Understand best practices for Data modeling and Integration tools.

CO3 : Describe elementary data analysis and Correlation Patterns

CO4 : Learn Bayesian Modeling

CO5 : Understand basics of visualization.

UNIT-I

Introduction of big data, Big data characteristics - Volume, Veracity, Velocity, and Variety – Data, Appliance Challenges and Issues, Case for Big data, Big data sources, Features of data, Evolution of Big data, Best Practices for Big data Analytics and Integration tools.

UNIT-II

Introduction to DataModeling, Data Models Used in Practice: Conceptual data models, Logical data models, Physicaldata models, Common Data Modeling Notations, How to Model Data : Identify entity types, Identifyattributes, Apply naming conventions, Identify relationships, Apply data model patterns, Assign keys, Normalize to reduce data redundancy.

UNIT-III

Introduction to elementary data analysis: Measures of center: Mean, Median, Mode, Variance, Standard deviation, Range. Normal Distribution: Center,Spread, Skewed Left, Skewed Right, outlier. Correlations: Correlation Patterns: Directionrelationship, Magnitude Relationship.

UNIT-IV

Introduction to Bayesian Modeling: Bayes Rule, ProbabilisticModeling Introduction to Predictive Analytics: Simple Linear regression, Multiple Linear regression,Logistic Linear Regression.

UNIT-V

Visualization: History of Visualization, Goals of Visualization,Scientific Visualization, Information Visualization, Visual Analytics, Impact ofvisualization Introduction to Data Processing, Map Reduce Framework, Hadoop, HDFS, S3, Hadoop Distributed file systems, Apache Mahout, Hive,Sharding, Hbase, Impala, Case studies :Analyzing big data with twitter, Big data for Ecommerce, Big data for blogs.

Books Recommended:

1. Frank J Ohlhorst, "Big Data Analytics: Turning Big Data into Big Money", Wiley andSAS Businessm.Series, 2012.

2. The Data Modeling Handbook: A Best-Practice Approach to Building Quality DataModels 1stEdition by Michael C. Reingruber (Author), William W. Gregory(Author) A Wiley QED publications

3. Colleen Mccue, "Data Mining and Predictive Analysis: Intelligence Gathering andCrime Analysis",Elsevier, 2007

4. Correlation and Regression: Applications for Industrial Organizational Psychologyand Management (Organizational Research Methods) 1st Edition, by Philip BobkoMultiple Regression and Beyond 1st Edition by Timothy Z. Keith.

MCA III Sem-Paper Code-30605 :Web Applications Development

Credit 4; Theory Max/Min(60/21), CCE Max/Min(40/20)

Course Objectives: To acquire the knowledge related to web designing, java servlet, JSP, web services and android fundamentals.

Course Outcomes:

On completion of this course, the student will be able to:

CO1 : Understand web architecture.

CO2 : Learn HTML & CSS.

CO3 : Apply different modern technologies used for real-time client server application.

CO4 : Develop different attractive and interactive web pages.

CO5 : Learn basics of android application deployment environment.

UNIT- I

Introduction to Web Designing: Web architecture, Parsing in Browsers, Web site design standards, Client Side Technologies: Introduction to Markup languages HTML 5, Building a form and form elements, Dynamic HTML - JavaScript - Cascading Style Sheets - Including Multimedia. HTTP, Web Server and Application Servers, Installation of application servers, Config files, Web.xml.

UNIT - II

Java Servlet: Servlet Development Process, Deployment Descriptors, The Generic Servlet, Lifecycle of Servlet. Servlet Packages, Classes, Interfaces, and Methods, Handling Forms with Servlet. Various methods of Session Handling. Various elements of deployment descriptors.

UNIT - III

JSP Basics: JSP lifecycle, Directives, scripting elements, standard actions, implicit objects. Connection of JSP and Servlet with different database viz. Oracle, MS-SQL Server, MySQL. java.sql Package. Querying a database, adding records, deleting records, modifying records. Type of Statement.

UNIT - IV

Separating Business Logic and Presentation Logic, Building and using JavaBean. Session handling in JSP, Types of errors and exceptions handling. Introduction to Web Services, MVC Architecture, Struts and Hibernate.

UNIT - V

Introduction to Android: Fundamentals, Application Structure, Basic UI design, Android Application Deployment Environment, Dalvik virtual machine, Testing and Debugging Android Application.

Books Recommended :

1. K. Mukhar, "Beginning Java EE 5: From Novice to Professional", Wrox Press.

2. M. Hall, L. Brown, "Core Servlets and Java Server Pages", 2nd edition, Pearson Education

3. Deitel and Deitel, "*Internet and WWW — How to Program?*" Fifth Edition, Prentice Hall, 2012.

4 G. Franciscus, "Struts Recipes", Manning Press

5. B. Basham, K. Sierra, B. Bates, "Head First Servlet and JSP", 2nd Edition, O'Reilly Media.

6. Android application development for java programmers. By James C. Sheusi. Publisher: Cengage Learning, 2013.

FOURTH SEMESTER

Paper Code-40601: Web Major Project / Dissertation Evaluation

Course Objectives: To acquire the knowledge of software development for real life application.

Course Outcomes :
On completion of this course, the student will be able to:
CO1 : Indentify and define the problem statement.
CO2 : Define and justify scope of the proposed problem.
CO3 : Practice software analysis and design techniques.
CO4 : Develop & implement real time systems
CO5 : Develop technical report writing and oral presentation.