SCHEME OF STUDIES & EXAMINATION
FOR
THE DEGREE
OF
MASTER OF COMPUTER APPLICATIONS
(M.C.A.)
(3-years Post Graduate Programme)
(w.e.f. Session 2013-14)

Faculty of Computer Science & Information Technology
Deenbandhu Chhotu Ram University of Science & Technology
Murthal (Sonipat)-131039, Haryana, India
April 2013
<table>
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### Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonepat)

#### SCHEME OF STUDIES & EXAMINATIONS

Master of Computer Application (MCA) 2\textsuperscript{nd} Year 3\textsuperscript{rd} Semester

Credit Based Scheme w.e.f. 2014-15

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### Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonepat)

#### SCHEME OF STUDIES & EXAMINATIONS

Master of Computer Application (MCA) 2\textsuperscript{nd} Year 4\textsuperscript{th} Semester

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**Elective-I**

- MCA552 Theory of Computation
- MCA554 Optimization Techniques
- MCA556 Network Security and Management
- MCA558 Digital Image Processing
### Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonepat)

**SCHEME OF STUDIES & EXAMINATIONS**

Master of Computer Application (MCA) 3rd Year 5th Semester
Credit Based Scheme w.e.f. 2015-16

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<td>Data Warehousing &amp; Mining</td>
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<td>MCA665</td>
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Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonepat)

SCHEME OF STUDIES & EXAMINATIONS
Master of Computer Application (MCA) 3rd Year 6th Semester
Credit Based Scheme w.e.f. 2015-16

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| TOTAL   | -          | -            | 50                 | -                   | 100              | 150   | 20     | 3             |

The Project work is to be carried out in an Industry/Research lab.

- The Department/Training and Placement (T&P) officer will arrange training slots for the students, however, the student in consultation with the deptt./T&P cell can arrange for industrial training slot in reputed Industry/Research labs.
- At least one faculty member form the deptt. is to be associated with each student and designated as teacher-in-charge.
- The student is required to send his/her joining report, duly signed by the industry coordinator, to the deptt. through his/her teacher-in-charge within two weeks of joining.
- The teacher-in-charges will visit the industries at least twice in the semester. First visit is to be made within first two months of the commencement of Project work. The second visit is to be made in the last month of the Project duration.
- The University will appoint external examiner to conduct the viva-voce examination and the Practical marks will be awarded on the basis of project report, presentation and project execution carrying 30, 30 and 40 marks respectively during the conduct of Practical examination in the institute.
### Master of Computer Application (MCA) 1st Year 1st Semester
w.e.f. 2013-14

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</table>
UNIT 1-Computer Fundamentals: Computer components, characteristics & classification of computers, hardware & software, peripheral devices, memory, types of memory, application software, compiler, interpreter, number system (binary, decimal, octal, hexadecimal), number system conversion. **Programming Languages**: Machine-, Assembly-, High Level- Language, Assembler, Compiler, Interpreter, debuggers, Programming fundamentals: problem definition, algorithms, flow charts and their symbols, introduction to compiler, interpreter, assembler, linker and loader and their inter relationship.

UNIT 2-Operating system: Definition and significance of OS, services and function of OS, OS architecture, Introduction to DOS, UNIX, Linux, GUI windows and their important commands. **Internet basics**: Introduction to the basic concepts of Networks and Data Communications, LAN, MAN, WAN, OSI model, working of Internet, major features of internet, Emails, FTP, Using the internet

UNIT 3-Elements of C: C character set, identifiers and keywords, Data types: declaration and definition, storage classes in C, Type conversion, Types of error, ‘C’ macro, macros vs function. **Operators**: Arithmetic, relational, logical, bitwise, unary, assignment and conditional operators and their hierarchy & associativity.
Data input/output.

UNIT 4-Control statements: Sequencing, Selection: if and switch statement; alternation, Repetition: for, while, and do-while loop; break, continue, goto. **Functions**: Definition, prototypes, passing parameters, recursion. **Data Structures**: arrays, struct, union, string, data files. **Pointers**: Declaration, operations on pointers, array of pointers, pointers to arrays.

TEXT AND REFERENCE BOOKS:
1. E. Balaguruswami, Programming in ANSI C, Tata Mcgraw Hill.
6. Dennis P. Curtin, Kim Foley, Kunal Sen, Cathleen Morin, Information technology, TMH.

Note: Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all taking at least one question from each unit.
UNIT 1 – Introduction: Introduction to the Internet, The world wide web: The idea of hypertext and hyper media; How the web works-HTTP, HTML and URLs; How the browser works-MIME types, plugins and helper applications; The standards-HTML, XML, XHTML and the W3C.

Hypertext markup language: The anatomy of an HTML document; Marking up for structure and style: basic page markup, absolute and relative links, ordered and unordered lists, embedding images and controlling appearance, table creation and use, frames, nesting and targeting.

UNIT 2 - Separating style from structure with style sheets: Internal style specifications within HTML, External linked style specification using CSS, page and site design considerations.

Client side programming: Introduction to the JavaScript syntax, the JavaScript object model, Event handling, Output in JavaScript, Forms handling, miscellaneous topics such as cookies, hidden fields, and images; Applications.

UNIT 3 - Server side programming: Introduction to Server Side Technologies CGI/ASP/JSP., Programming languages for server Side Scripting, Configuring the server to support CGI, applications; Input/ output operations on the WWW, Forms processing, (using PERL/VBSCRIPT/JavaSCIPRT)

UNIT 4 - Other dynamic content technologies: introduction to ASP & JSP, Delivering multimedia over web pages, The VRML idea, The Java phenomenon-applets and servelets, issues and web development.

TEXT BOOKS:

REFERENCE BOOKS:
1. XHTML Black Book by Steven Holzner, 2000
4. Scott Guelich, ShishirGundaram, Gunther Birzniek; CGI Programing with Perl 2/e O’Reilly.
5. Doug Tidwell, James Snell, Pavel Kulchenko; Programming Web services, O’Reilly.

Note: Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all taking at least one question from each unit.
HUM507B – COMMUNICATION SKILLS
MCA Semester - I

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OBJECTIVE

To provide students an opportunity to learn how to communicate fluently and accurately in English in professional contexts.

COURSE CONTENT

UNIT 1
Business letter and memo writing, emails, E-commerce and business vocabulary

UNIT 2
Curriculum Vitae, Resume, Statement of purpose

UNIT 3
Technical Report Writing, technical jargon and persuasive writing skills

UNIT 4
Oral presentations: tele- communication, negotiation skills, presentation in meetings and public gatherings

RECOMMENDED READING


SUGGESTED READING

SCHEME OF END SEMESTER EXAMINATION (MAJOR TEST) AND INSTRUCTIONS FOR THE EXAMINER

Theory

1. The duration of the exam will be 3 hours.
2. The Question Paper for this course shall have four questions in all. The questions may be divided into parts. The marks of each question can be distributed into/among its parts as per its nature and requirement.
3. Question no. 1 on Unit I will be of 20 marks. The question may have two parts with internal choice. Students will be asked to write a letter, memo or e-mail on a business subject/issue. The contents of the unit may also be assessed by asking theoretical question while the stress would be on testing the actual letter writing on a given business/technical situation.
4. Question no. 2 will be of 20 marks. The question may have two parts with internal choice, asking students to prepare CV/Resume/SOP, different components of the Unit II.
5. Question no 3 will be of 20 marks. The question may have two parts divided into theoretical and practical aspects of the unit. The theoretical part will be of 10 marks and practical part (report writing on a given subject) will be of 10 marks.
6. Question no. 4 covering various components of the Unit III will be of 15 marks.
UNIT 1 - Set Theory: Introduction to set theory, Set operations, Algebra of sets, Duality, Finite and Infinite sets, Cartesian Product, Relations, Representation of relations, Types of relation, Equivalence relations and partitions, Partial ordering relations and lattices, Function and its types, Composition of function and relations

UNIT 2 - Graphs And Trees: Introduction to graphs, Directed and Undirected graphs, Homomorphic and Isomorphic graphs, Subgraphs, Cut points and Bridges, Multigraph and Weighted graph, Paths and circuits, Shortest path in weighted graphs, Eulerian path and circuits, Hamilton paths and circuits, Planar graphs, Euler’s formula, Graph Coloring, Trees, Spanning trees, Binary trees and its traversals.

UNIT 3 - Propositional logic: Basic operations: AND(^), OR(\lor), NOT(~), Truth value of a compound statement, propositions, tautologies, contradictions, Validity of Arguments, Boolean Algebra

Group theory: Definition and examples of a monoid, Semigroup, Groups and rings, Homomorphism, Isomorphism and Automorphism, Subgroups and Normal subgroups, Cyclic groups, Cosets, Lagrange’s theorem.

UNIT 4 - Recursion And Recurrence Relation: linear recurrence relation with constant coefficients, Homogeneous solutions, Particular solutions, Total solution of a recurrence relation using generating functions.

Techniques Of Counting: Permutations with and without repetition, Combination.

TEXT BOOK:

REFERENCE BOOKS:

**Note:** Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all taking at least one question from each unit.

Combinational Design using Gates: Design using gates, Simplifications of SOP and POS Boolean Expressions, Karnaugh map up to four variables.

UNIT 2 – Combinational Design using MSI Devices: Multiplexers and Demultiplexers and their use as logic elements, Decoders, Adders / Subtractors, BCD arithmetic circuits, Encoders, Code Converters, Decoders / Drivers for display devices.


UNIT 3 – Digital Logic Families: Switching mode operation of p-n junction, bipolar and MOS devices. Bipolar logic families: RTL, DTL, DCTL, HTL, TTL, ECL, MOS, and CMOS logic families. Tristate logic, Interfacing of CMOS and TTL families.

Semiconductors Memory Devices: Memory organizations, Characteristics of memory devices, Classifications of semiconductors memories.


Programmable Logic Devices: PLA, PAL, FPGA and CPLDs.

TEXT BOOKS:
1. Modern Digital Electronics (Edition III) : R. P. Jain; TMH
2. Digital Electronics : Green; Pearson

REFERENCE BOOKS:
1. Digital Integrated Electronics : Taub & Schilling; MGH
2. Digital Principles and Applications : Malvino & Leach; McGraw Hill.
3. Digital Design : Morris Mano; PHI.

Note: Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all taking at least one question from each unit.
MCA421 – SOFTWARE LAB-I
(Based on MCA401)
MCA Semester - I

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<td>: 20 Marks</td>
<td>: 30 Marks</td>
<td>: 50 Marks</td>
<td>: 03 Hours</td>
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1. Write a program to find the largest of three numbers. (if-then-else).
2. Write a program to find the largest number out of ten numbers (for-statement).
3. Write a program to find the average mail height & average female heights in the class
   (input is in form of sex code, height).
4. Write a program to find roots of quadratic equation using functions and switch
   statements.
5. Write a program using arrays to find the largest and second largest no. out of given 50
   nos.
6. Write a program to multiply two matrices.
7. Write a program to sort numbers using the Quicksort Algorithm.
9. Write a program to check that the input string is a palindrome or not.
10. Write a program to read a string and write it in reverse order.
11. Write a program to concatenate two strings.
12. Write a program which manipulates structures (write, read, and update records).
13. Write a program which creates a file and writes into it supplied input.
14. Write a program which manipulates structures into files (write, read, and update records).

Note: At least 5 to 10 more exercises to be given by the teacher concerned.
MCA423 – SOFTWARE LAB-II  
(Based on MCA403)  
MCA Semester - I

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<td>Duration of Examination</td>
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Students are required to perform at least 10 exercises based on the syllabi of subject “Internet and Web Technologies”.
OBJECTIVE
To enable students communicate important professional information orally in English.

COURSE CONTENT
Practising tele-conferencing, video conferencing and web conferencing through mock business situations; conducting and participating mock meetings; Practice in speaking through correct pronunciation and accurate sentence construction

Requirement: Technological provision for conducting mock conferencing (audio-as well as video)
NOTE: Conversation in English will be mandatory for all the students.

Students are put to practice English language through simulations and practice sessions of conferencing, meetings. Role Play, a common technique can be used for practising all kinds of remote conferencing. This drilling method would certainly give them a feel of real life situations and make them communicate accurately and fluently.

RECOMMENDED READING


SCHEME OF END SEMESTER EXAMINATION (Practical)

An external Practical exam of 50 marks of 2 hour duration for the course will be conducted by an external examiner appointed by the university’s Controller of Exams.

NOTE: Students will be tested for their oral communication competence making them participate in audio/video/web conferencing and in meetings. Students may also be evaluated through a viva conducted by an external examiner.
# Master of Computer Application (MCA) 1st Year 2nd Semester
Credit Based Scheme w.e.f. 2013-14

<table>
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<td>Interpersonal Skills and Personality Development</td>
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MCA402 – DATA STRUCTURES USING C
MCA Semester - II

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UNIT 1 - Basic Terminology: Elementary Data Organization, Data Structure Operations
Arrays: Array Definition and Analysis, Representation of Linear Arrays in Memory, Traversing of Linear Arrays, Insertion and Deletion, Single Dimensional Arrays, Two Dimensional Arrays, Multidimensional Arrays, Sparse Matrix.

UNIT 2
Linked Lists: Singly linked lists: Representation of linked lists in memory, Traversing, Searching, Insertion into, Deletion from linked list, Polynomial Addition, Header Linked List, Doubly linked list, generalized list, Circular Linked List implementation and applications.

UNIT 3
Trees: Basic Terminology, Binary Trees and their representation, expression evaluation, Complete Binary trees, Extended binary trees, Traversing binary trees, Searching, Insertion and Deletion in binary search trees (with and without recursion), AVL trees, Threaded trees, B trees.
Graphs: Terminology and Representations, Graphs & Multigraphs, Directed Graphs, Sequential representation of graphs, Adjacency matrices, Transversal Connected Component and Spanning trees, Shortest path

UNIT 4
Searching, Sorting methodologies: Array- Bubble sort, Selection Sort, Insertion Sort, Linear Search, Binary Search.
Stack - Quick Sort, Merge Sort, Two way Merge Sort, Queue - Radix Sort, Tree – Heap Sort.

TEXT AND REFERENCE BOOKS:
1. An introduction to data structures and application by Jean Paul Tremblay & Pal G. Sorenson (McGraw Hill)
2. R.L. Kruse, B.P. Leary, C.L. Tondo, Data structure and program design in C , PHI
7. Data Structure and Program design in C by Robert Kruse, PHI
8. Theory and Problems of Data Structures by Jr. Symour Lipschetz, Schaum’s outline by TMH.

Note: Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all taking at least one question from each unit.
UNIT 1 – Windows Programming and Visual C++ Programming: Windows environment, a simple windows program, windows and messages, creating the window, displaying the window, message loop, message processing, text output, painting and repainting, introduction to, device context, basic drawing, child window controls, Application Framework, MFC library, Visual C++ Components, Event Handling, Mapping modes, fonts, windows common controls, bitmaps.

UNIT 2 – The Document and View Architecture: Menus, Keyboard accelerators, rich edit control, toolbars, status bars, reusable frame window base class, separating document from its view, reading and writing SDI and MDI documents, splitter window and multiple views, creating DLLs, dialog based applications.

UNIT 3 – ActiveX and Object Linking and Embedding (OLE): ActiveX controls Vs. Ordinary Windows Controls, Installing ActiveX controls, Calendar Control, ActiveX control container programming, create ActiveX control at runtime, Component Object Model (COM), containment and aggregation Vs. inheritance, OLE drag and drop, OLE embedded component and containers, sample applications.

UNIT 4 – Advanced Concepts: Database Management with Microsoft ODBC, Structured Query Language, MFC ODBC classes, sample database applications, filter and sort strings, DAO concepts, displaying database records in scrolling view, Threading, VC++ Networking issues, Winsock, WinInet, building a web client, Internet Information Server, ISAPI server extension, chat application, playing and multimedia (sound and video) files.

TEXT BOOKS:

REFERENCE BOOKS:
Note: Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all taking at least one question from each unit.
HUM506B – INTERPERSONAL SKILLS AND PERSONALITY DEVELOPMENT
MCA Semester - II

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<td>Duration of Examination</td>
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OBJECTIVE
To train students to learn interpersonal skills and personality development.

COURSE CONTENT

UNIT 1
Soft Skills: Importance of soft skills: self-confidence, attitude, ethics, integrity, responsibility; leadership.

UNIT 2
Interpersonal Skills: Essentials of speaking skills: pronunciation, fluency; essentials of listening skills; Do’s and Don’ts of Formal Group Discussion

UNIT 3
Non-Verbal Elements in Interpersonal Skills: Reading Face, eyes, gesture and body posture, time, space and culture in communicative situations

UNIT 4
Personality Development: Personality attributes; personality types; personality analysis

RECOMMENDED READING

SUGGESTED READING
SCHEME OF END SEMESTER EXAMINATION (MAJOR TEST) AND INSTRUCTIONS FOR THE EXAMINER

Theory

1. The duration of the exam will be 3 hours.
2. The Question Paper for this course shall have four questions in all. The questions may be divided into parts.
3. Question no. 1, 2 and 4 based on Unit I, II and IV respectively will be of 20 marks each. The questions may have two/three parts with internal choice. The 20 marks of each question can be distributed into/among its parts as per its nature and requirement.
4. Question no. 3 covering various components of the Unit III will be of 15 marks.
UNIT 1
Information Representation: Number systems, BCD codes, error detecting and correcting codes. Binary arithmetic operations, Booths multiplication.
Binary Logic: Boolean algebra, Boolean functions, truth tables, canonical and standard forms, simplification of Boolean functions, digital logic gates. Encoders, decoders, multiplexers, demultiplexers and comparators.
UNIT 2
UNIT 3
CPU Organization: CPU Architecture types (accumulator, register, stack, memory/ register) Instruction cycle (Fetch-Decode-Execute); Instruction set based classification of processors (RISC, CISC, and their comparison); Addressing modes( register, immediate, direct, indirect, indexed); Operations in the instruction set; Arithmetic and Logical, Data Transfer, Control Flow; Instruction set formats (fixed, variable, hybrid).
UNIT 4
Input / Output & Control Unit : Input Output Interface , Asynchronous data transfer ( Strobe control, handshaking , serial transfer); Serial Vs parallel data transmission; Modes of data transfer ( Programmed I/O, Interrupt driven, Direct Memory access ( DMA)). Control Unit design :- Control unit design methods ( hardwired & microprogrammed with their comparison) Control Memory, Address Sequencing, Micro instructions.
TEXT BOOKS:
REFERENCE BOOKS:

Note: Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all taking at least one question from each unit.


UNIT 3 - Design: System design considerations, Process and stages of system design: Logical and Physical, Selection of best alternate design strategy. Design of Input and Output: Capturing data for input, Input validation design of output: Output objectives, Types of output, Presentation format of output, Design of software: Top Down Structure, Coupling, Cohesion, Span of control, Module size, Shared modules. Training, Conversion Methods

UNIT 4 - Object Oriented Design and Modeling: Introduction to object oriented design, Designing Object responsibilities, and Object reusability. Case Study of Some Common Systems: Inventory control, Laboratory management systems, Hotel reception system, Hospital management system etc./Seminar on State-of-the-art technology.

TEXT BOOKS:

REFERENCE BOOKS:

Note: Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all taking at least one question from each unit.
MCA422 – SOFTWARE LAB-III  
(Based on MCA402)  
MCA Semester - II

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List of Programs:

1. Write a program to perform binary search in an array.
2. Write a program to perform binary search using recursion.
3. Write a program to perform linear search in 2D array.
4. Write a program to perform various operations on matrices.
5. Write a program to swap two nos. using calls by value and reference.
6. Write a program to implement bubble sort.
7. Write a program to implement insertion sort.
8. Write a program to implement selection sort.
9. Write a program of link list implementation of a stack.
10. Write a program of link list implementation of a queue.
11. Write a program of array implementation of a stack.
12. Write a program of array implementation of a queue.
13. Write a program to search an element in a link list.
14. Write a program to maintain a link list.
15. Write a program to implement BST

Note: Teacher may give 5 to 10 more exercises based on course MCA 402.
MCA424 – SOFTWARE LAB-IV  
(Based on MCA404)  
MCA Semester - II

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1. Form Design – Keyboard & Mouse events.
2. Programs on usage of data types - variant, Control arrays.
3. Simple applications using file system controls.
4. Database applications using data control.
5. SDK type programs for creating simple windows with different window styles.
6. SDK type programs code for keyboard and mouse events, GDI objects.
7. Simple Dialog Based application – eg. Calculator, interest computation, money conversions, etc.
8. Creating SDI & MDI applications, Modal and Modeless dialog.
11. Creating static and dynamic splitter windows.
12. Creating DLLs and using them.
13. Winsock and WinInet & Internet Explorer common controls.
14. Data access through ODBC – Cdatabase, Crecordset.
15. Creating ActiveX control and using it.

**Note:** Teacher may give 5 to 10 more exercises based on course MCA503.
HUM508B – INTERPERSONAL SKILLS LAB
MCA Semester - II

L  T  P  Credits  Class Work  :  25 Marks
                               Practical Examination  :  50 Marks
                               Total  :  75 Marks
                               Duration of Examination  :  02 Hours

OBJECTIVE
To improve students’ interpersonal skills for personality development.

COURSE CONTENT
Practice of Conversation – Interpersonal and Telephonic Conversation; Formal Group Discussion; practice of non-verbal communication (Body Language) with verbal to acquire effective Oral communication
NOTE: Conversation in English will be mandatory for all the students in the class.
Students are put to practice English conversation, formal GDs through simulations and practice sessions.

RECOMMENDED READING

SCHEME OF END SEMESTER EXAMINATION (Practical)
An external Practical exam of 50 marks of 2 hour duration for the course will be conducted by an external examiner appointed by the university’s Controller of Exams.
NOTE: Students will be tested for their oral communication competence making them participate in formal and informal conversations and group discussions. Students may also be evaluated through a viva conducted by an external examiner.
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UNIT 1 - Introduction to programming language: Programming language, Features of programming language, types of programming language: procedural, non-procedural, object based, object oriented.

**Introduction to C++:** C++ Standard Library, Basics of a Typical C++ Environment, Pre-processors Directives, Illustrative Simple C++ Programs. Header Files and Namespaces, library files.

**Object Oriented Concepts:** Introduction to Objects and Object Oriented Programming, Encapsulation (Information Hiding), Access Modifiers: Controlling access to a class, method, or variable (public, protected, private, package), Other Modifiers, Polymorphism: Overloading, Inheritance, Overriding Methods, Abstract Classes, Reusability, Class’s Behaviors.

UNIT 2 - Classes and Data Abstraction: Introduction, Structure Definitions, Accessing Members of Structures, Class Scope and Accessing Class Members, Separating Interface from Implementation, Controlling Access Function And Utility Functions,

**Initializing Class Objects:** Constructors, Using Default Arguments With Constructors, Using Destructors, Classes : Const(Constant) Object And Const Member Functions, Object as Member of Classes, Friend Function and Friend Classes, Using This Pointer, Dynamic Memory Allocation with New and Delete, Static Class Members, Container Classes And Integrators, Proxy Classes, Function overloading.


**Inheritance:** Introduction, Inheritance: Base Classes And Derived Classes, Protected Members, Casting Base- Class, Pointers to Derived- Class Pointers, Using Member Functions, Overriding Base –Class Members in a Derived Class, Public, Protected and Private Inheritance, Using Constructors and Destructors in derived Classes, Implicit Derived –Class Object To Base- Class Object Conversion, Composition Vs. Inheritance.

UNIT 4 - Virtual Functions and Polymorphism: Introduction to Virtual Functions, Abstract Base Classes And Concrete Classes, Polymorphism, New Classes And Dynamic Binding, Virtual Destructors, polymorphism, Dynamic Binding.

**Files and I/O Streams:** Files and Streams, Creating a Sequential Access File, Reading Data From A Sequential Access File, Updating Sequential Access Files, Random Access Files, Creating A Random Access File, Writing Data Randomly To a Random Access File, Reading Data Sequentially from a Random Access File. Stream Input/Output Classes and Objects, Stream
Output, Stream Input, Unformatted I/O (with read and write), Stream Manipulators, Stream Format States, Stream Error States.

**Templates & Exception Handling**: Function Templates, Overloading Template Functions, Class Template, Class Templates and Non-Type Parameters, Templates and Inheritance, Templates and Friends, Templates and Static Members. **Basics of C++ Exception Handling**: Try Throw, Catch, Throwing an Exception, Catching an Exception, Rethrowing an Exception, Exception specifications, Processing Unexpected Exceptions, Stack Unwinding, Constructors, Destructors and Exception Handling, Exceptions and Inheritance.

**TEXT AND REFERENCE BOOKS:**
5. Computing Concepts with C++ Essentials by Horstmann, 2003, John Wiley,
6. The Complete Reference in C++ By Herbert Schildt, 2002, TMH.

Note: Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all taking at least one question from each unit.
MCA503 – DATABASE MANAGEMENT SYSTEMS
MCA Semester - III

L  T  P  Credits  Class Work  :  25 Marks
3  1  -  4  Examination  :  75 Marks
               Total  :  100 Marks
               Duration of Examination  :  03 Hours

UNIT 1 - DBMS an overview, Advantages of DBMS, Network, Hierarchical and Relational Model, Levels of abstraction, Data Independence, Data Models, Instances and schemes, Data independence Structures of a DBMS, Application Programmers & Data Base administrators – their function, Transaction Management Entity Relationship Model: Entities, Attributes and Entity Sets, Relation and Relationships sets, mapping and participation constraints, Aggregation, Specialization and Generalization, Features of E-R Model.

UNIT 2 - Relational Model: Introduction to relational model, Integrity constraints over relations, Enforcing Data Integrity, Integrity Constraints, Relational Data, Logical Data Base Design, Reduction of E-R Diagrams to relations, Introduction to views, Querying Relational Algebra and Relational Calculus, Operations on Relational Algebra, Operations on Relational Calculus, Tuple Relational Calculus, Domain Relational Calculus

UNIT 3 - Database Design, Data Redundancy, Introduction to Schema Refinement, Functional Dependencies, Normal Forms-First , Second, Third, Boyce code, Fourth and Multivalued Dependencies
Structured Query Language:Basic SQL Queries, Nested Queries, Aggregate operator, Null Values, implementation of Various Relational Algebra operations, Embedded SQL

UNIT 4 - Transaction management: ACID Properties, Transaction states, Concurrency control: Concurrency Control –Overview, Concurrency control problems, Locks, Locking Protocols, Deadlocks, Serializability,
Recovery System: Types of Failures, Recovery Techniques, ARIES

TEXT BOOKS:

REFERENCE BOOKS:

Note: Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all taking at least one question from each unit.
UNIT 1 - Introduction: Introduction to Operating System Concepts (including Multitasking, multiprogramming, multi user, Multithreading etc), Types of Operating Systems: Batch operating system, Time-sharing systems, Distributed OS, Network OS, Real Time OS; Various Operating system services, architecture, System programs and calls.

UNIT 2 - Process Management: Process concept, process scheduling, operation on processes; CPU scheduling, scheduling criteria, scheduling algorithms - First Come First Serve (FCFS), Shortest-Job-First (SJF), Priority Scheduling, Round Robin (RR), Multilevel Queue Scheduling.

UNIT 3 - Memory Management: Logical & Physical Address Space, swapping, contiguous memory allocation, non-contiguous memory allocation paging and segmentation techniques, segmentation with paging; virtual memory management - Demand Paging & Page-Replacement Algorithms; Demand Segmentation.

UNIT 4 - File System: Different types of files and their access methods, directory structures, various allocation methods, disk scheduling and management and its associated algorithms, Introduction to distributed file system.

Process-Synchronization & Deadlocks: Critical Section Problems, semaphores; methods for handling deadlocks deadlock prevention, avoidance & detection; deadlock recovery.

Text Books:

Reference Books:
1. Operating System by Peterson, 1985, AW.
2. Operating System by Milankovic, 1990, TMH.
3. Operating System Incorporating With Unix & Windows By Colin Ritche, 1974, TMH.
4. Operating Systems by Mandrik & Donovan, TMH
5. Operating Systems By Deitel, 1990, AWL.

Note: Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all taking at least one question from each unit.
UNIT 1 - Brief Review of Graphs, Sets and disjoint sets, union, sorting and searching algorithms and their analysis in terms of space and time complexity.

Divide and Conquer: General method, binary search, merge sort, quick sort, selection sort, Strassen’s matrix multiplication algorithms and analysis of algorithms for these problems.

UNIT 2 - Greedy Method: General method, knapsack problem, job sequencing with dead lines, minimum spanning trees, single source paths and analysis of these problems.

Dynamic Programming: General method, optimal binary search trees, O/I knapsack, the traveling salesperson problem.

UNIT 3 - Back Tracking: General method, 8 queen’s problem, graph colouring, Hamiltonian cycles, analysis of these problems.

Branch and Bound: Method, O/I knapsack and traveling salesperson problem, efficiency considerations. Techniques for algebraic problems, some lower bounds on parallel computations.

UNIT 4 - NP Hard and NP Complete Problems: Basic concepts, Cook’s theorem, NP hard graph and NP scheduling problems some simplified NP hard problems.

TEXT BOOKS:
1. Fundamental of Computer algorithms, Ellis Horowitz and Sartaj Sahni, 1978, Galgotia Publ.,
2. Introduction To Algorithms, Thomas H Cormen, Charles E Leiserson And Ronald L Rivest: 1990, TMH

REFERENCE BOOKS:
3. Introduction to Design and Analysis of Algorithm, Goodman, S.E. & Hedetniemi, 1997, MGH.

Note: Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all taking at least one question from each unit.

Software Development Life Cycle: Waterfall model, Incremental and Evolutionary process models, Personal Software process (PSP) and Team Software process (TSP), Overview of agile process and aspect oriented programming


UNIT 2 - System Design: Design Concepts, design models for architecture, component, data and user interfaces; Problem Partitioning, Abstraction, Cohesiveness, Coupling, Top Down and Bottom Up design approaches; Functional Versus Object Oriented Approach, Design Specification, 4GL.

Coding: TOP-DOWN and BOTTOM-UP structure programming, Information Hiding, Programming Style, and Internal Documentation, Verification.


Software Quality Assurance: Software Configuration Management, Overview of Software Quality Control and Quality Assurance, ISO 9000 Certification for Software Industry, SEI Capability Maturity Model (CMM) and Comparison between ISO & SEI CMM.


TEXT BOOKS:

REFERENCE BOOKS:

Note: Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all taking at least one question from each unit.
1. Raising a number \( n \) to a power \( p \) is the same as multiplying \( n \) by itself \( p \) times. Write a function called \( \text{power}() \) that takes a double value for \( n \) and an int value for \( p \), and returns the result as double value. Use a default argument of 2 for \( p \), so that if this argument is omitted, the number will be squared. Write a main() function that gets values from the user to test this function.

2. A point on the two dimensional plane can be represented by two numbers: an X coordinate and a Y coordinate. For example, (4,5) represents a point 4 units to the right of the origin along the X axis and 5 units up the Y axis. The sum of two points can be defined as a new point whose X coordinate is the sum of the X coordinates of the points and whose Y coordinate is the sum of their Y coordinates.

Write a program that uses a structure called point to model a point. Define three points, and have the user input values to two of them. Then set the third point equal to the sum of the other two, and display the value of the new point. Interaction with the program might look like this:

Enter coordinates for P1: 3 4
Enter coordinates for P2: 5 7
Coordinates of P1 + P2 are: 8, 11

3. Create the equivalent of a four function calculator. The program should request the user to enter a number, an operator, and another number. It should then carry out the specified arithmetical operation: adding, subtracting, multiplying, or dividing the two numbers. (It should use a switch statement to select the operation). Finally it should display the result. When it finishes the calculation, the program should ask if the user wants to do another calculation. The response can be ‘Y’ or ‘N’. Some sample interaction with the program might look like this:

Enter first number, operator, second number: 10/ 3
Answer = 3.333333
Do another (Y/ N)? Y
Enter first number, operator, second number 12 + 100, Answer = 112, Do another (Y/ N)? N

4. A phone number, such as (212) 767-8900, can be thought of as having three parts: the area code (212), the exchange (767) and the number (8900). Write a program that uses a structure to store these three parts of a phone number separately. Call the structure phone. Create two structure variables of type phone. Initialize one, and have the user input a number for the other one. Then display both numbers. The interchange might look like this:

Enter your area code, exchange, and number: 415 555 1212
My number is (212) 767-8900
Your number is (415) 555-1212

5. Create two classes DM and DB which store the value of distances. DM stores distances in metres and centimeters and DB in feet and inches. Write a program that can read values for the class objects and add one object of DM with another object of DB. Use a friend function to carry out the addition operation. The object that stores the results may be a DM object or DB object, depending on the units in which the results are required. The display should be in the format of feet and inches or metres and centimetres depending on the object on display.

6. Create a class rational which represents a numerical value by two double values-NUMERATOR & DENOMINATOR. Include the following public member Functions:
   - constructor with no arguments (default).
   - constructor with two arguments.
   - void reduce() that reduces the rational number by eliminating the highest common factor between the numerator and denominator.
   - Overload + operator to add two rational number.
   - Overload >> operator to enable input through cin.
   - Overload << operator to enable output through cout.
   - Write a main() to test all the functions in the class.

7. Consider the following class definition
   class father {
   protected : int age;
   public:
   father (int x) {age = x;}
   virtual void iam() {
      cout<< “I AM THE FATHER, my age is : ”<< age<< endl;
   }
   
   Derive the two classes son and daughter from the above class and for each, define iam() to write similar but appropriate messages. You should also define suitable constructors for these classes.

   Now, write a main() that creates objects of the three classes and then calls iam() for them. Declare pointer to father. Successively, assign addresses of objects of the two derived classes to this pointer and in each case, call iam() through the pointer to demonstrate polymorphism in action.

8. Write a program that creates a binary file by reading the data for the students from the terminal. The data of each student consist of roll no., name (a string of 30 or lesser no. of characters) and marks.

9. A hospital wants to create a database regarding its indoor patients. The information to store include
   a) Name of the patient
   b) Date of admission
   c) Disease
   d) Date of discharge

   Create a structure to store the date (year, month and date as its members). Create a base class to store the above information. The member function should include functions to enter information and display a list of all the patients in the database. Create a derived
class to store the age of the patients. List the information about all the to store the age of the patients. List the information about all the pediatric patients (less than twelve years in age).

10. Make a class **Employee** with a name and salary. Make a class **Manager** inherit from **Employee**. Add an instance variable, named department, of type string. Supply a method to **toString** that prints the manager’s name, department and salary. Make a class **Executive** inherit from **Manager**. Supply a method **toString** that prints the string “Executive” followed by the information stored in the **Manager** superclass object. Supply a test program that tests these classes and methods.

11. Imagine a tollbooth with a class called **tollBooth**. The two data items are a type unsigned int to hold the total number of cars, and a type double to hold the total amount of money collected. A constructor initializes both these to 0. A member function called **payingCar( )** increments the car total and adds 0.50 to the cash total. Another function, called **nopayCar( )**, increments the car total but adds nothing to the cash total. Finally, a member function called **displays** the two totals.

Include a program to test this class. This program should allow the user to push one key to count a paying car, and another to count a nonpaying car. Pushing the ESC key should cause the program to print out the total cars and total cash and then exit.

12. Write a function called **reversit( )** that reverses a string (an array of char). Use a loop that swaps the first and last characters, then the second and next to last characters and so on. The string should be passed to **reversit( )** as an argument.

Write a program to exercise **reversit( )**. The program should get a string from the user, call **reversit( )**, and print out the result. Use an input method that allows embedded blanks. Test the program with Napoleon’s famous phrase, “Able was I ere I saw Elba”.

13. Create some objects of the string class, and put them in a Deque—some at the head of the Deque and some at the tail. Display the contents of the Deque using the **forEach( )** function and a user written display function. Then search the Deque for a particular string, using the first **That( )** function and display any strings that match. Finally remove all the items from the Deque using the **getLeft( )** function and display each item. Notice the order in which the items are displayed: Using **getLeft( )**, those inserted on the left (head) of the Deque are removed in “last in first out” order while those put on the right side are removed in “first in first out” order. The opposite would be true if **getRight( )** were used.

14. Create a base class called **shape**. Use this class to store two double type values that could be used to compute the area of figures. Derive two specific classes called triangle and rectangle from the base shape. Add to the base class, a member function **get_data( )** to initialize base class data members and another member function **display_area( )** to compute and display the area of figures. Make **display_area( )** as a virtual function and redefine this function in the derived classes to suit their requirements. Using these three classes, design a program that will accept dimensions of a triangle or a rectangle interactively and display the area.

Remember the two values given as input will be treated as lengths of two sides in the case of rectangles and as base and height in the case of triangles and used as follows:

Area of rectangle = x * y
Area of triangle = ½ * x * y
MCA523 – SOFTWARE LAB-VI
(Based on MCA503)
MCA Semester - III

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1. Introduction to SQL.
2. To study Basic SQL commands (create database, create table, use, drop, insert) and execute the following queries using these commands:
   - Create a database named ‘Employee’.
3. To study the viewing commands (select, update) and execute the following queries using these commands:
   - Find the names of all employees who live in Delhi.
   - Increase the salary of all employees by Rs. 5,000.
   - Find the company names where the number of employees is greater than 10,000.
   - Change the Company City to Gurgaon where the Company name is ‘TCS’.
4. To study the commands to modify the structure of table (alter, delete) and execute the following queries using these commands:
   - Add an attribute named ‘Designation’ to the table ‘Emp’.
   - Modify the table ‘Emp’, change the datatype of ‘salary’ attribute to float.
   - Drop the attribute ‘depttname’ from the table ‘emp’.
   - Delete the entries from the table ‘Company’ where the number of employees are less than 500.
5. To study the commands that involve compound conditions (and, or, in, not in, between, not between, like, not like) and execute the following queries using these commands:
   - Find the names of all employees who live in ‘Gurgaon’ and whose salary is between Rs.20,000 and Rs. 30,000.
   - Find the names of all employees whose names begin with either letter ‘A’ or ‘B’.
   - Find the company names where the company city is ‘Delhi’ and the number of employees is not between 5000 and 10,000.
   - Find the names of all companies that do not end with letter ‘A’.
6. To study the aggregate functions (sum, count, max, min, average) and execute the following queries using these commands:
   - Find the sum and average of salaries of all employees in computer science department.
   - Find the number of all employees in company ‘TCS’.
   - Find the maximum and the minimum salary in the HR department.
7. To study the grouping commands (group by, order by) and execute the following queries using these commands:
   - List all employee names in descending order.
   - Find number of employees in each department where number of employees is greater than 5.
   - List all the department names where average salary of a department is Rs.10,000.
8. To study the commands involving data constraints and execute the following queries using these commands:
   - Alter table ‘Emp’ and make ‘enumber’ as the primary key.
   - Alter table ‘Company’ and add the foreign key constraint.
   - Add a check constraint in the table ‘Emp’ such that salary has the value between 0 and Rs.1,00,000.
9. To study the commands for aliasing and renaming and execute the following queries using these commands:
   - Rename the name of database to ‘Employee1’.
   - Rename the name of table ‘Emp’ to ‘Emp1’.
   - Change the name of the attribute ‘ename’ to ‘empname’.
10. To study the commands for joins (cross join, inner join, outer join) and execute the following queries using these commands:
    - Retrieve the complete record of an employee and its company from both the table using joins.
    - List all the employees working in the company ‘TCS’.
11. To study the various set operations and execute the following queries using these commands:
    - List the enumber of all employees who live in Delhi and whose company is in Gurgaon or if both conditions are true.
    - List the enumber of all employees who live in Delhi but whose company is not in Gurgaon.
12. To study the various scalar functions and string functions (power, square, substring, reverse, upper, lower, concatenation) and execute the following queries using these commands:
    - Reverse the names of all employees.
    - Change the names of company cities to uppercase.
    - Concatenate name and city of the employee.
13. To study the commands for views and execute the following queries using these commands:
    - Create a view having ename and ecity.
    - In the above view change the ecity to ‘Delhi’ where ename is ‘John’.
    - Create a view having attributes from both the tables.
    - Update the above view and increase the salary of all employees of IT department by Rs.1000.
14. Study of Integrity Constraints in SQL.
15. Study of Use of Group By and Having Clause.
16. Study of various types of Views.
17. Study of Indexes in SQL.
18. Study of Aggregate Functions in SQL.
### Master of Computer Application (MCA) 2nd Year 4th Semester
Credit Based Scheme w.e.f. 2014-15

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**Elective-I**

- MCA552  Theory of Computation
- MCA554  Optimization Techniques
- MCA556  Network Security and Management
- MCA558  Digital Image Processing

UNIT 2 - Two/Three Dimensional Viewing: The 2-D viewing pipeline, windows, viewports, window to view port mapping; Clipping: point, clipping line (algorithms): - 4 bit code algorithm, Sutherland-cohen algorithm, parametric line clipping algorithm (Cyrus Beck). Polygon clipping algorithm: Sutherland-Hodgeman polygon clipping algorithm. Two dimensional transformations: transformations, translation, scaling, rotation, reflection, composite transformation.


TEXT BOOKS:

REFERENCE BOOKS:
Note: Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all taking at least one question from each unit.
MCA504 – JAVA PROGRAMMING
MCA Semester - IV

L T P Credits
3 1 - 4

Class Work : 25 Marks
Examination : 75 Marks
Total : 100 Marks
Duration of Examination : 03 Hours

UNIT 1 - Java Fundamentals: Features of Java, OOPs concepts, Java virtual machine, Reflection byte codes, Byte code interpretation, Data types, variable, arrays, expressions, operators, and control structures , Objects and classes

UNIT 2 - Java Classes: Abstract classes, Static classes, Inner classes, Packages, Wrapper classes, Interfaces, This, Super, Access control
Exception handling: Exception as objects, Exception hierarchy, Try catch finally, Throw

UNIT 3 - IO package: Input streams, Output streams, Object serialization, Deserialization ,Sample programs on IO files, Filter and pipe streams
Multi threading: Thread Life cycle, Multi threading advantages and issues, Simple thread program, Thread synchronization

UNIT 4 - GUI: Introduction to AWT programming, Layout and component managers, Event handling
Applet class: Applet life-cycle, Passing parameters embedding in HTML
Swing components – JApplet, JButton, JFrame, etc.

TEXT AND REFERENCE BOOKS:

1. Programming with Java A Primer, E.Balaguruswamy Tata McGraw Hill Companies
2. Java Programming John P. Flynt Thomson 2nd
3. Java Programming Language Ken Arnold Pearson
4. The complete reference JAVA2, Herbert schildt. TMH
5. Big Java, Cay Horstmann 2nd edition, Wiley India Edition
6. Core Java, Dietel and Dietel
7. Java – Balaguruswamy
8. Java server programming, Ivan Bayross SPD

Note: Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all taking at least one question from each unit.
MCA506 – COMPUTER NETWORKS  
MCA Semester - IV  

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UNIT 1 - OSI Reference Model and Network Architecture: Introduction to Computer Networks, ARPANET, Internet, Private Networks, Network Topologies, Types of Networks; Layering architecture of networks, OSI model, Functions of each layer, Services and Protocols of each layer, Switching approaches, Transmission media and systems, multiplexing and signaling techniques, Error detection and correction, ISDN and BISDN., Socket System calls.


UNIT 2 - Peer-To-Peer Protocols: Protocols, Service Models and end-to-end requirements, ARQ, Sliding window, RTP, HDLC, PPP protocols, Statistical multiplexing.


UNIT 4.- Wide Area Networks: Introduction of WANs, Routing, Congestion Control, WAN Technologies, Distributed Queue Dual Bus (DQDB), Synchronous Digital Hierarchy (SDH)/ Synchronous Optical Network (SONET), Asynchronous Transfer Mode (ATM), Frame Relay. Wireless Links.


TEXT BOOKS:
REFERENCE BOOKS:

Note: Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all taking at least one question from each unit.
# MCA508 – ARTIFICIAL INTELLIGENCE

**MCA Semester - IV**

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**UNIT 1** - Foundational issues in intelligent systems: Foundation and history of AI, AI problems Breadth first- Depth first- heuristic search techniques, constraint satisfaction problems, stochastic search methods, game tree: Min max algorithms, game playing- alpha beta pruning.


**UNIT 3** - Reasoning under uncertainty, review of probability, Bayesian probabilistic interferences and Dempstershafer theory, Heuristic methods, symbolic reasoning under uncertainty, Statistical reasoning, Non monotonic reasoning.

**UNIT 4** - Planning: planning in situational calculus, representation for planning, partial order planning algorithm, learning from examples, discovery as learning, learning by analogy, explanation based learning, Rote learning, neural learning. Principles of Natural language processing, AI application to robotics, and current trends in artificial intelligence.

**TEXT BOOKS:**

**REFERENCE BOOKS:**

**Note:** Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all taking at least one question from each unit.


UNIT 3 - Pushdown Automata & Turing Machines: Introduction to Pushdown Machines, Applications of Pushdown Machines Deterministic and Non-Deterministic Turing Machines, Design of T.M, Halting problem of T.M., Post’s Correspondence Problem.

UNIT 4 - Chomsky Hierarchies & Computability: Chomsky hierarchies of grammars, Unrestricted grammars, Context sensitive languages, Relation between languages of classes. Primitive Recursive Functions.

TEXT BOOK:
1. Introduction to automata theory, language & computations- Hopcroft & O.D.Ullman, R Mothwani, Addison Wesley Publishers

REFERENCE BOOKS:
2. Introduction to formal Languages & Automata-Peter Linz, 2001, NarosaPubl.

Note: Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all taking at least one question from each unit.
UNIT 1 - Linear optimization, Simplex Method, Revised Simples Method, Karmarkar’s Method and dual Simplex Method.

UNIT 2 - Sensitivity Analysis on an LPP, Assignment and Transportation Problem.

UNIT 3 - Nonlinear programming: Single variable optimization, multivariable optimization with constraints (Lagrange multipliers, Newton-Raphson method, Penalty function, Kuhn-Tucker conditions)

UNIT 4 - Network Analysis: Network minimum span problem, shortest-route problem, maximal flow problem, finding a positive flow path.
Project Planning using PERT/CPM: PERT/CPM. Construction of the network, (arrow diagram, critical path computations for CPM, critical path computations for PERT, Project time Vs project cost.

TEXT AND REFERENCE BOOKS:

Note: Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all taking at least one question from each unit.
UNIT 1 - Introduction: Codes and Ciphers, Some Classical systems, Statistical theory of cipher systems, Complexity theory of crypto systems, Stream ciphers, Block ciphers.

UNIT 2 - Stream Ciphers: Rotor based system, shift register based systems, Design considerations for stream ciphers, Cryptanalysis of stream ciphers, Combined encryption and encoding. Block Ciphers, DES and variant, modes of use of DES, Public key systems, Knapsack systems, RSK, Diffie Hellman Exchange, Authentication and Digital signatures, Elliptic curve based systems.

UNIT 3 - System Identification and clustering: Cryptology of speech signals, narrow band and wide band systems, Analogue & Digital Systems of speech encryption.


TEXT BOOKS:
3. SNMP, Stalling, Willian (AWL)

REFERENCE BOOKS:
1. SNMP: A Guide to Network Management (MGH)
2. Telecom Network Management by H.H. Wang (MGH)
3. Network Management by U. Dlack (MGH)

Note: Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all taking at least one question from each unit.


Color Image Processing: Color Fundamentals, Color models, Basis of full color image processing, Color transformations.


Image Segmentation: Detection of Discontinuities, Edge linking and boundary detection, Thresholding, Region oriented segmentation.

Representation, Description and Recognition: Representation-chain codes, polygonal approximation and skeletons, Boundary descriptors-simple descriptors, shape numbers, Regional descriptors- simple, topological descriptors, Pattern and Pattern classes-Recognition based on matching techniques.

TEXT BOOK:
• Digital Image Processing by Rafael C. Gonzalez & Richard E. Woods –2002, Pearson Education

REFERENCE BOOKS:
• Digital Image Processing by A.K. Jain, 1995,-PHI

Note: Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all taking at least one question from each unit.
1. Write a program for 2D line drawing as Raster Graphics Display.
2. Write a program for circle drawing as Raster Graphics Display.
3. Write a program for polygon filling as Raster Graphics Display.
4. Write a program for line clipping.
5. Write a program for polygon clipping.
6. Write a program for displaying 3D objects as 2D display using perspective transformation.
7. Write a program for rotation of a 3D object about arbitrary axis.
8. Write a program for Hidden surface removal from a 3D object.

**NOTE:** At least 5 more exercises to be given by the concerned teacher.
MCA524 – SOFTWARE LAB-VIII  
(Based on MCA504)  
MCA Semester - IV

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Students are required to perform at least 10 exercises based on the syllabi of subject MCA504 “Java Programming”. 
## Master of Computer Application (MCA) 3rd Year 5th Semester
Credit Based Scheme w.e.f. 2015-16

<table>
<thead>
<tr>
<th>Sr. No.</th>
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<td>.Net Framework with C#</td>
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### Elective-II
- MCA651: Linux & Shell Programming
- MCA653: Data Base Administration
- MCA655: Network Administration
- MCA657: J2EE and Applications

### Elective-III
- MCA661: Software Testing & Quality
- MCA663: Data Warehousing & Mining
- MCA665: Numerical and Statistical Method
- MCA667: Compiler Design
UNIT 1 – Core Java: Introduction to Java, Data types, variables, operators, Arrays, Control Statements, Classes & Methods, Inheritance, Exception Handling, Multithreading, Collections, I/O streams, AVVT & Apolet Programming.

Networking: Connecting to a Server, Implementing Servers, Sending E-Mail, Making URL Connections, Advanced Socket Programming


Distributed Objects: Roles of Client and Server, Remote Method Invocations, Setup for Remote Method Invocation, Parameter Passing in Remote Methods Server Object Activation, Java IDL and CCRA, Remote Method Calls with SOAP

UNIT 3 - Swing: Lists, Trees, Tables, Styled Text Components, Progress Indicators, Component Organizers

AWT: The Rendering Pipeline, Shapes, Areas, Strokes, Paint, Coordinate Transformations, Clipping, Transparency and Composition, Rendering Hints, Readers and Writers for Images, Image Manipulation, Printing, The Clipboard, Drag and Drop

UNIT 4 – Java Beans Components: Beans, The Bean-Writing Process, Using Beans to Build an Application, Naming Patterns for Bean Components and Events, Bean Property Tubes, Beaninfo Classes, Property Editors, Customizes


TEXT BOOK:
- Core JavaTM 2, Volume II-Advanced Features, 7th Edition by Cay Horstmann, Gary Cornell, Pearson Publisher, 2004

REFERENCE BOOKS:
1. Professional Java Programming by Brett Spell, WROX Publication

Note: Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all taking at least one question from each unit.

UNIT 2 - C#-Sharp Language (C#): Introduction, Data Types, Identifiers, Variables, Constants, Literals, Array and Strings, Object and Classes, Inheritance and Polymorphism, Operator Overloading, Interfaces, Delegates and Events Type conversion.


UNIT 4 - Advanced Features Using C#: Web Services, Window Services, Asp.net Web Form Controls, ADO.Net. Distributed Application in C#, Unsafe Mode, Graphical Device interface with C#. .Net Assemblies and Attribute: .Net Assemblies features and structure, private and share assemblies, Built-In attribute and custom attribute.

TEXT BOOK:
1. Balagurusamy, “Programming with C#”, (TMH)

REFERENCE BOOKS:
1. Wiley,” Beginning Visual C# 2008”,Wrox
2. Fergal Grimes,” Microsoft .Net for Programmers”. (SPI)

Note: Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all taking at least one question from each unit.
UNIT 1 - Introduction to Software Project Management (SPM): Definition of a Software Project (SP), SP Vs. other types of projects activities covered by SPM, categorizing SPs, project as a system, management control, requirement specification, information and control in organization.

Stepwise Project planning: Introduction, selecting a project, identifying project scope and objectives, identifying project infrastructure, analyzing project characteristics, identifying project products and activities, estimate efforts each activity, identifying activity risk, allocate resources, review/publicize plan.

UNIT 2 - Project Evaluation & Estimation: Cost benefit analysis, cash flow forecasting, cost benefit evaluation techniques, risk evaluation. Selection of an appropriate project report; Choosing technologies, choice of process model, structured methods, rapid application development, water fall-, V-process-, spiral- models. Prototyping, delivery. Albrecht function point analysis.

Activity planning & Risk Management: Objectives of activity planning, project schedule, projects and activities, sequencing and scheduling activities, network planning model, representation of lagged activities, adding the time dimension, backward and forward pass, identifying critical path, activity throat, shortening project, precedence networks. Risk Management: Introduction, the nature of risk, managing risk, risk identification, risk analysis, reducing the risks, evaluating risks to the schedule, calculating the z values.

UNIT 3 - Resource allocation & Monitoring the control: Introduction, the nature of resources, identifying resource requirements, scheduling resources creating critical paths, counting the cost, being specific, publishing the resource schedule, cost schedules, the scheduling sequence. Monitoring the control: Introduction, creating the frame work, collecting the data, visualizing progress, cost monitoring, earned value, prioritizing monitoring, getting the project back to target, change control.

Managing contracts and people: Introduction, types of contract, stages in contract, placement, typical terms of a contract, contract management, acceptance, Managing people and organizing terms: Introduction, understanding behavior, organizational behavior: a back ground, selecting the right person for the job, instruction in the best methods, motivation, working in groups, becoming a team, decision making, leadership, organizational structures, conclusion, further exercises.

UNIT 4 - Software quality: Introduction, the place of software quality in project planning, the importance of software quality, defining software quality, ISO 9126, Practical software quality
measures, product versus process quality management, external standards, techniques to help enhance software quality.

**Study of Any Software Project Management software:** viz Project 2000 or equivalent

**TEXT BOOK:**
- Software Project Management (2nd Edition), by Bob Hughes and Mike Cotterell, 1999, TMH

**REFERENCE BOOKS:**
1. Software Engineering – A Practitioner’s approach, Roger S. Pressman (5th edi), 2001, MGH
3. Project Management 2/c. Maylor

**Note:** Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all taking at least one question from each unit.
### MCA621 – SOFTWARE LAB-IX
(Based on MCA601)  
MCA Semester - V

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<th>Practical Examination</th>
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Students are required to perform at least 10 exercises based on the syllabi of subject MCA601 “Advanced Java”.

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### MCA623 – SOFTWARE LAB-X
(Based on MCA603)  
MCA Semester - IV

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<td>: 20 Marks</td>
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<td>: 03 Hours</td>
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</table>

Students are required to perform at least 10 exercises based on the syllabi of subject MCA603 “.Net with C#”.

UNIT 2 - Essential linux commands, Understanding shells, Processes in linux-process fundamentals, connecting processes with pipes, tee, Redirecting input output, manual help, Background processing, managing multiple processes, changing process priority with nice, scheduling of processes at, cron, batch, time, kill, ps, who, sleep, Printing commands, find, sort, touch, file, file related commands-ws, sat, cut, dd, etc. Mathematical commands- bc, expr, factor, units. Creating and editing files with vi, joe& vim editor, network files, security, privileges, authentication, Password administration, archiving.

UNIT 3 - System administration: Common administrative tasks, identifying administrative files: configuration and log files, Role of system administrator, Managing user accounts-adding & deleting users, changing permissions and ownerships, Creating and managing groups, modifying group attributes, Temporary disable user’s accounts, creating and mounting file system, checking and monitoring system performance file security & Permissions, becoming super user using su. Getting system information with uname, host name, disk partitions & sizes, users, kernel. Backup and restore files, reconfiguration hardware with kudzu, installing and removing packages with rpm command. Configure X-windows desktop, starting & using X desktop. KDE & Gnome graphical interfaces, changing X settings.

UNIT 4 - Shell programming: Basic of shell programming, Various types of shell available in Linux, comparisons between various shells, shell programming in bash, read command, conditional and looping statements, case statements, parameter passing and arguments, Shell variables, system shell variables, shell keywords, Creating Shell programs for automate system tasks. Simple filter commands – pr, head, tail, cut, paste, sort, uniq, tr. Filter using regular expressions – grep, egrep, and sed. awk programming – report printing with awk.

TEXT AND REFERENCE BOOKS:
2. Unix for programmers and users (Third Ed.) – Graham Glass & King Ables, Pearson Education India.
3. Red Hat Linux 9 Bible – Cristopher Negus, IDG Books India Ltd.
4. A Practical Guide to Ubuntu Linux – Mark G. Sobell

Note: Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all taking at least one question from each unit.
UNIT 1 - Oracle overview and Architecture, Installing and managing oracle, creating a database and data dictionary, control and redo log files, Managing Table spaces and data files, Managing tables, indexes, and constraints, Managing users and security.

UNIT 2- Basic Oracle net architecture - basic net server side configuration, basic net client-side configuration, usage and configuration of Oracle shared server architecture. Backup and Recovery, Transporting data between databases - export and import utility, Loading data into database-SQL*loader, database performance tuning.

UNIT 3 - Basic constructs of PL/SQL , Cursors: need, types and implementation, Stored Procedures, functions

UNIT 4 - Active Database, ECA Rules, implementing ECA rules in PL/SQL. CUBE technology, Data ware house, creating a Data ware House in oracle.

Text Books:
1. Kevin Ioney, Bob Barya Oracle database 10g: DBA handbook, Tata McgrawHills.
2. Biju Thomas, Bob Barya, Oracle DBA Fundamental-I, BPB publications

Note: Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all taking at least one question from each unit.
UNIT 1 - N/w Administration: Intro. to networks, TCP/IP model, IP addressing, Subnetting, NAT, VLAN. Basic Concepts of proxy server, webserver, DNS, Firewall, Router, Mail Server and their respective configuration settings. Various Interconnecting Devices: Hub, Switch, Bridges, Routers, Gateway, repeater, brouter. Knowledge about various network related commands: ping, netstat, tracert, traceroute, ifconfig, ipconfig etc. Steps followed in establishing a network

UNIT 2 – Security: Concept of security, its need, issues, cryptography techniques:- ciphers, substitution cipher, transposition, symmetric key algorithms like AES, DES, public key algo’s like RSA, Authentication algorithms , IPSEC, VAN, Digital signatures, IDS, Firewall. Types of attacks, access control list, filtering rules

UNIT 3 - Host Administration: Introduction to system Administration, what are the necessary issues to be tackled in host management, installation of unix, linux, windows OS, formatting, file systems like FAT , NTFS, ETC., Booting process in various OS, User accounts, group accounts, passwords, shadow passwords, directory structure of various OS. Process, ps, zombie process, backup, recovery, commands like tar, zip etc. , performance analysis of host machine and how to improve the systems performance

UNIT 4 - Knowledge of UNIX commands: directory related files, disk related commands, File related commands, I/O redirection and piping, Unix editor vi, Process related commands, communication related commands, Printing related commands, Programming in the Borne and C-Shell; Wild cards; Simple shell programs; Shell variables; Shell programming constructs; interactive shell scripts; Decision structures in shell, Loop Control structure. Role and functions of a system manager, adding and removing users, starting up the system, shutting the system down, Disk management: mounting and unmounting file system, maintaining user accounts.

AWK utility

TEXT AND REFERENCE BOOKS:

Note: Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all taking at least one question from each unit.

UNIT 2 - Java Mail API: Internet Mail Protocols, Architecture of Java Mail API, Send & Receive Mail using Java Mail API, Working with Mail Attachments, JAAS.

UNIT 3 - Java Message Service [JMS]: Overview of Message Oriented Middleware, JMS Architecture, JMS Messaging Domains, Point to-Point Messaging, Publish/Subscribe Messaging, JMS API Programming Model & Examples, Message Driven Beans, Web Services, Interoperability, CORBA

UNIT 4 - Enterprise Java Beans: Introduction to EJB Component Technology, EJB Architecture, Session Beans, Entity Beans, Transaction Attributes, Transaction in EJB

AJAX: AJAX Example.

TEXT AND REFERENCE BOOKS:
1. Professional Java Programming by Brett Spell, WROX Publication.

Note: Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all taking at least one question from each unit.


Quality Assurance: Inputs, Quality Management Plan, Results of Quality Control Measurements, Operational Definitions, Quality Planning tools and techniques, Quality Audits, Quality Improvements.


Quality Planning: Inputs, Tools and Techniques, Outputs.

TEXT BOOKS:


REFERENCE BOOKS:


Note: Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all taking at least one question from each unit.
MCA663 – DATA WAREHOUSING AND MINING
MCA Semester - V

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<td>: 25 Marks</td>
<td>: 75 Marks</td>
<td>: 100 Marks</td>
<td>: 03 Hours</td>
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UNIT 1 - Overview, Motivation(for Data Mining), Data Mining-Definition & Functionalities, Data Processing, Form of Data , Preprocessing, Data Cleaning: Missing Values, Noisy Data, (Binning, Clustering, Regression, Computer and Human inspection), Inconsistent Data, Data Integration and Transformation. Data Reduction:- Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity Reduction, Clustering, Discretization and Concept hierarchy generation.

UNIT 2 - Concept Description:- Definition, Data Generalization, Analytical Characterization, Analysis of attribute relevance, Mining Class comparisons, Statistical measures in large Databases. Measuring Central Tendency, Measuring Dispersion of Data, Graph Displays of Basic Statistical class Description, Mining Association Rules in Large Databases, Association rule mining, mining Single-Dimensional Boolean Association rules from Transactional Databases, Apriori Algorithm, Mining Multilevel Association rules from Transaction Databases, Mining Multi-Dimensional Association rules from Relational Databases.

UNIT 3 - What is Classification & Prediction, Issues regarding Classification and prediction, Decision tree, Bayesian Classification, Classification by Back propagation, Multilayer feed-forward Neural Network, Back propagation Algorithm, Classification methods K-nearest neighbor classifiers, Genetic Algorithm. Cluster Analysis: Data types in cluster analysis, Categories of clustering methods, Partitioning methods, Hierarchical Clustering- CURE and Chameleon. Density Based Methods-DBSCAN, OPTICS, Grid Based Methods-STING, CLIQUE. Model Based Method –Statistical Approach, Neural Network approach, Outlier Analysis

UNIT 4 - Aggregation, Historical information, Query Facility, OLAP function and Tools. OLAP Servers, ROLAP, MOLAP, HOLAP, Data Mining interface, Security, Backup and Recovery, Tuning Data Warehouse, Testing Data Warehouse.

TEXT AND REFERENCE BOOKS:
1. “Introduction to Data Mining” Authors : Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Addison-Wesley
2. “Data Mining: Concepts and Techniques” Authors : Jiawei Han, Micheline Kamber, Jian Pei

Note: Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all taking at least one question from each unit.
MCA665– NUMERICAL AND STATISTICAL METHODS
MCA Semester – V

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UNIT 1 – Computer Arithmetic: Floating point representation of numbers, arithmetic operations with normalized floating point numbers and their consequences. Error in number representation - pitfalls in computing. Iterative Methods: Bisection, False position, Newton-Raphson methods, Discussion of convergences, Polynomial evaluation, Solving polynomial equations (Bairstow's Method).

Numerical Differentiation and Integration: Differentiation formulae based on polynomial fit, Pitfalls in differentiation, Trapezoidal, Simpson's rules and Gaussian Quadrature.

UNIT 3- Interpolation and Approximation: Polynomial interpolation, Difference tables, Inverse interpolation, Polynomial fitting and other curve fitting. Approximation of functions by Taylor series and Chebyshev polynomials, Regression Analysis and least square curve fitting.

UNIT 4- Statistical methods: Sample distributions, Test of Significance, chi-square, t- test and F test.
Analysis of Variance: Definition, Assumptions, Cochran's Theorem, One-way classification, ANOVA Table, Two-way classification (with one observation per cell).

TEXT BOOKS:
- B.S.Grewal, Numerical Methods, Khanna Publications

REFERENCE BOOKS:
- Rajaraman V., Computer Oriented Numerical Methods, Prentice Hall, India.
Note: Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all taking at least one question from each unit.
# MCA667 – COMPILER DESIGN

**MCA Semester - V**

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UNIT 1 - Structure of compiler, Application of compiler Technology, Compiler construction tool, Lexical analyzer, Input Buffering, Regular Expression, Finite Automata, DFA and NFA, Conversion of NFA to DFA with E-move, Minimization of DFA

UNIT 2 - Parser, Role of parser, Context free grammar, Parser Tree, Ambiguity, Top down and bottom up parsing Techniques : Shift reduce parser, Operator precedence parser, Recursive Descent Parsing, Predictive parsing ,LL(1) Parsing, LR parser, SLR Parser

UNIT 3 - Syntax – Directed Translation, Syntax Tree, Syntax Directed translation scheme, Variants of Syntax Tree, Three- address Code, Translation of Expressions, Type Checking, Symbol Table , its content and data structure for symbol table

UNIT 4 - Issues in the design of a code generator, the target machine, dynamic storgemanagement, translating basic blocks, a simple code generator , Basic Blocks and flow graphs, optimization of basic blocks, A simple Code generator Peephole optimization, Register allocation and assignment

**TEXT BOOK:**

**REFERENCE BOOKS:**
5. Principles of compiler Design, Narosa Publication

**Note:** Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all taking at least one question from each unit.