SYLLABUS FOR MASTER OF COMPUTER APPLICATIONS (M.C.A.)

PANJAB UNIVERSITY CHANDIGARH- 160014 (INDIA)
(Estted. under the Panjab University Act VII of 1947-enacted by the Govt. of India)

FACULTY OF SCIENCE

SYLLABI

FOR

MASTER OF COMPUTER APPLICATIONS (MCA)
(SEMESTER SYSTEM)


i.e.
1st Semester, November/December, 2020
2nd Semester, May/June, 2021
3rd Semester, November/December, 2020
4th Semester, May/June, 2021
5th Semester, November/December, 2020
6th Semester, May/June, 2021

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SYLLABUS FOR MASTER OF COMPUTER APPLICATIONS (M.C.A.)

APPLICABILITY OF REGULATIONS FOR THE TIME BEING IN FORCE

Notwithstanding the integrated nature of a course spread over more than one academic year, the regulations in force at the time a student joins a course shall hold good only for the examinations held during or at the end of the academic year. Nothing in these regulations shall be deemed to debar the University from amending the regulations subsequently and the amended regulations, if any, shall apply to all students whether old or new.
### Outlines of Tests, Syllabi and Courses of Reading for Master of Computer Applications (MCA)

(Three Year Degree Programme) for Session 2020 - 2021.

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<tbody>
<tr>
<td><strong>FIRST YEAR</strong></td>
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<tr>
<td>CS-78</td>
<td>Programming in C</td>
<td>4+4</td>
<td>80</td>
<td>20</td>
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<tr>
<td>CS-60</td>
<td>Computer Organization and Assembly Language</td>
<td>4+0</td>
<td>80</td>
<td>20</td>
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<tr>
<td>CS-61</td>
<td>Data Base Management Systems</td>
<td>4+0</td>
<td>80</td>
<td>20</td>
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<tr>
<td>CS-75</td>
<td>Mathematical Structures in Computer Science</td>
<td>4+0</td>
<td>80</td>
<td>20</td>
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<tr>
<td>CS-56</td>
<td>Linux Operating System</td>
<td>4+4</td>
<td>80</td>
<td>20</td>
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<td><strong>SECOND SEMESTER</strong></td>
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<tr>
<td>CS-63</td>
<td>Data and File Structures(Using C)</td>
<td>4+4</td>
<td>80</td>
<td>20</td>
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<tr>
<td>CS-64</td>
<td>Object Oriented Programming (Through C++ And Java)</td>
<td>4+4</td>
<td>80</td>
<td>20</td>
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<tr>
<td>CS-48</td>
<td>Data Communication and Networks</td>
<td>4+0</td>
<td>80</td>
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<tr>
<td>CS-76</td>
<td>Computer Based Numerical and Statistical Methods</td>
<td>4+0</td>
<td>80</td>
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<tr>
<td>CS-07</td>
<td>Accounting and Financial Management</td>
<td>4+0</td>
<td>80</td>
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<td>CS-81</td>
<td>MOOC</td>
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<td><strong>SECOND YEAR</strong></td>
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<tr>
<td>CS-65</td>
<td>Software Engineering</td>
<td>4+0</td>
<td>80</td>
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<tr>
<td>CS-66</td>
<td>Operating Systems</td>
<td>4+0</td>
<td>80</td>
<td>20</td>
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<tr>
<td>CS-67</td>
<td>Analysis and Design of Algorithms</td>
<td>4+0</td>
<td>80</td>
<td>20</td>
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<tr>
<td>CS-77</td>
<td>ASP.NET Using C#</td>
<td>4+4</td>
<td>80</td>
<td>20</td>
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<tr>
<td>CS-69</td>
<td>Relational Data Base Management Systems</td>
<td>4+4</td>
<td>80</td>
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<td><strong>FOURTH SEMESTER</strong></td>
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<tr>
<td>CS-79</td>
<td>Data Warehousing and Data Mining Techniques</td>
<td>4+0</td>
<td>80</td>
<td>20</td>
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<tr>
<td>CS-12</td>
<td>Interactive Computer Graphics</td>
<td>4+4</td>
<td>80</td>
<td>20</td>
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<tr>
<td>CS-37</td>
<td>Theory of Computations</td>
<td>4+0</td>
<td>80</td>
<td>20</td>
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<tr>
<td>CS-71</td>
<td>Artificial Intelligence (Using LISP)</td>
<td>4+0</td>
<td>80</td>
<td>20</td>
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<tr>
<td>CS-72</td>
<td>Advanced Java and Network Programming</td>
<td>4+4</td>
<td>80</td>
<td>20</td>
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<tr>
<td><strong>THIRD YEAR</strong></td>
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<tr>
<td>CS-17</td>
<td>Computer Based Optimization Techniques</td>
<td>4+0</td>
<td>80</td>
<td>20</td>
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<tr>
<td>CS-57</td>
<td>Software Project Management</td>
<td>4+0</td>
<td>80</td>
<td>20</td>
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<tr>
<td>CS-58</td>
<td>Mobile Communication and Application Development</td>
<td>4+4</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td>CS-59</td>
<td>Soft Computing Techniques using Neural Networks</td>
<td>4+4</td>
<td>80</td>
<td>20</td>
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<tr>
<td>CS-19</td>
<td>Seminar</td>
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<td>Each student will be required to give seminar on selected topics. The seminars will carry 100 marks.</td>
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<tr>
<td><strong>SIXTH SEMESTER</strong></td>
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<tr>
<td>CS-18</td>
<td><strong>PROJECT WORK</strong></td>
<td></td>
<td>320</td>
<td>80</td>
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- **MOOC Courses available on the UGC Portal (SWAYAM)** will be finalized at the start of the semester by Post Graduate Board of Studies in Computer Science and Applications.

- **The evaluation of the MOOC Courses** will be either in the online mode through the UGC Portal or in the offline mode by the Department of Computer Science & Applications.
PRACTICAL EXAMINATIONS (SESSION 2020-21, 2021-22, 2022-23)
The Practical examination will be conducted for each of the following:

<table>
<thead>
<tr>
<th>FIRST YEAR (1st and 2nd Semesters)</th>
<th>SEMESTER</th>
<th>Prac. Exam. Marks</th>
<th>Int. Ass. Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>PR-11  Programming in C (Minor Project)</td>
<td>First</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td>PR-12  Linux Operating System (Minor Project)</td>
<td>First</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td>PR-03  C++ and Java Programming Language (Minor Project)</td>
<td>Second</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td>PR-04  Data Structures (Minor Project)</td>
<td>Second</td>
<td>80</td>
<td>20</td>
</tr>
</tbody>
</table>

Each student is required to undergo two months Summer Training at the end of Second Semester. The Internal Assessment Marks for each practical will be based on Minor Project.

<table>
<thead>
<tr>
<th>SECOND YEAR (3rd and 4th Semesters)</th>
<th>SEMESTER</th>
<th>Prac. Exam. Marks</th>
<th>Int. Ass. Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>PR-05  RDBMS (SQL Server/Oracle/My SQL) (Minor Project)</td>
<td>Third</td>
<td>80</td>
<td>20</td>
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<tr>
<td>PR-06  Programming in ASP.NET Using C# (Minor Project)</td>
<td>Third</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td>PR-07  Computer Graphics and Algorithms Analysis (Minor Project)</td>
<td>Fourth</td>
<td>80</td>
<td>20</td>
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<tr>
<td>PR-08  Advanced Java and Network Programming (Minor Project)</td>
<td>Fourth</td>
<td>80</td>
<td>20</td>
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</tbody>
</table>

Each student is required to undergo two months Summer Training at the end of Fourth Semester. The Internal Assessment Marks for each practical will be based on Minor Project and Summer Training.

<table>
<thead>
<tr>
<th>THIRD YEAR (3rd and 4th Semesters)</th>
<th>SEMESTER</th>
<th>Prac. Exam. Marks</th>
<th>Int. Ass. Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>PR-13  Mobile Application Development using Android (Minor Project)</td>
<td>Fifth</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td>PR-14  Programming for Basic MATLAB &amp; Soft Computing Techniques (Minor Project)</td>
<td>Fifth</td>
<td>80</td>
<td>20</td>
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</tbody>
</table>

The Internal Assessment Marks for each practical will be based on Minor Project.
SYLLABUS FOR MASTER OF COMPUTER APPLICATIONS (M.C.A.)

SYLLABUS AND COURSE OF READINGS

FIRST SEMESTER

Paper Title: PROGRAMMING in C

Paper Code: CS-78 Max. Marks : 80 Time : 3 Hrs.
Course Duration: 60 Lectures of one hour each.

Objective: The objective of this course is to assist students in developing the logic for solving a given problem using the procedure oriented language.

Note:
(i) The Question paper will consist of four units.
(ii) Examiner will set total of nine questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I

1. Problem Solving:
Problem Identification, Analysis, Flowcharts, Decision tables, Pseudo codes and algorithms, Program coding, Program Testing and execution; Types of programming languages, Translators, Interpreters, Compilers, Assemblers and their comparison.

2. Fundamentals of C language:
History of C Language, Structure of a C program, Variables, Constants, Keywords, Data types, Operators, Expressions and their evaluation using rules of hierarchy, typecasting, Input/Output statements, Assignment statements, Control statements: if-else, switch, while, do-while, for, nested loops, break, continue, goto statements.

UNIT II

3. Functions: Declaration, Definition, function prototype, passing arguments: call by value, call by reference, Recursion and stack, Use of library functions, adding functions to the library, Functions with variable arguments; Storage classes: automatic, external and static variables.

4. Arrays: Defining and processing arrays, Passing array to a function, Using multi dimensional arrays, Solving matrices problems using arrays;
SYLLABUS FOR MASTER OF COMPUTER APPLICATIONS (M.C.A.)

UNIT III


6. Structure and Union: Structures: Defining and processing, Passing structure to a function, Arrays of structures, Pointers and structures, Uses of structures; Unions: Defining and processing, Pointers and union, Union of structures, Uses of union.

UNIT IV

7. Files Handling: Concept of files, file opening modes, opening and closing of a file, reading from a file, writing onto a file, Error handling during I/O operations, Record I/O in Files.

8. Miscellaneous: Command line arguments, Enumerated data types, Renaming data types with typedef, Pre-processor directives, Using GCC for programming in C under Linux.

Suggested Readings:

7. Gookin, Dan : C Programming, Wiley India Pvt. Ltd.
Paper Title: COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE

Paper Code : CS-60
Course Duration : 60 Lectures of one hour each.

Max. Marks : 80 Time : 3 Hrs.

Objectives: The objective of the course is to provide students with a solid foundation in computer design. Examine the operation of the major building blocks of a computer system. To introduce students to the design and organization of modern digital computers by showing the relationship between hardware and software and focusing on the concepts that are the basis of the current computers such as microprocessors. Includes machine language, instruction set architecture, and control design, memory hierarchy, and Input / Output and communication. To introduce basic assembly language. Describe the instruction format/ set of a computer. Write simple assembly language programs.

Note:
(i) The Question paper will consist of four units.
(ii) Examiner will set total of nine questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I

1. Information Representation: Number Systems: binary, octal, decimal, hexadecimal numbers and their inter conversions; Complement’s: (r-1)’s and (r)’s complement; Fixed-point and Floating-point representation of numbers; Error Detection and Correction codes: Parity Check, CRC, and Hamming Codes. Binary Logic: Digital logic gates, Boolean algebra, Boolean functions, truth tables, simplification of Boolean functions, K-maps for 2, 3 and 4 variables.

2. Basic Building Blocks:
Combinational logic design: half-adder, full adder, Encoder, Decoder, Multiplexer.
Sequential circuits -Concept, flip-flops (D, RS, JK, T, and Master-Slave); Registers: Buffer, Shift and Controlled shift registers; Counters: Binary, Ripple, Ring Counter.

UNIT II


UNIT III

5. Memory Organization:
Memory Hierarchy, Types of Memory: RAM and ROM Chips, Associative Memory, Cache Memory, Auxiliary Memory; Memory Address Map.

6. Input-Output Organization:
Input-output Interface, Memory-Mapped I/O; Interrupt, Interrupt Cycle, Types of Interrupt: Program interrupt, Priority Interrupts, Direct Memory Access (DMA).

UNIT IV

Assembly Language Programming:

7. Micro Processor Architecture: Microcomputer Architecture, Structure of 8086/8088 CPU, The Bus Interface Unit, Execution Unit (EU); Registers, Addressing modes, Instruction set for 8086/8088; Programmers model of a machine, Example of a typical 16 to 32 bit processor.


Suggested Readings:

3. Indu Chhabra and Gursharan Singh: Insight into Microprocessors (Principles, Implementation and Technology), AP Publishers, New Delhi, India.
12. Rafiquzzaman, Microprocessors & Microcomputers Based System Design, UBS.
13. Gupta, Vikas : Comdix Computer Hardware and Networking Course Kit, Wiley India Pvt. Ltd.
Paper Title: DATABASE MANAGEMENT SYSTEMS

Paper Code: CS-61       Max. Marks: 80 Time: 3 Hrs.
Course Duration: 60 Lectures of one hour each.

Objective: The objective of this course is to teach the student concepts related to database, database design techniques, transaction management, crash recovery, backup and security of databases.

Note:
(i) The Question paper will consist of four units.
(ii) Examiner will set total of nine questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I


UNIT II

3. Storage and File Organization: Overview of physical storage media, RAID, Storage access; File organization, Operations on Files, Serial Files, Sequential Files, Index-Sequential Files, Direct Files.


UNIT III

5. Relational Algebra and Relational Calculus: Relational Algebra: Operations- union, intersection, difference, Cartesian product, projection, selection, division and relational algebra queries; Relational Calculus: Tuple oriented and domain oriented relational calculus and its operations.
6. **Transaction and Concurrency control:** Concept of Transaction, ACID properties, Serializibility, States of transaction, Concurrency control : Locking techniques, Time stamp based protocols, Granularity of data items, Deadlock.

**UNIT IV**

7. **Crash Recovery and Backup:** Failure classifications, storage structure, Recovery & Atomicity, Log base recovery, Recovery with concurrent transactions, Failure with loss of non-volatile storage, Database backup & recovery from catastrophic failure, Remote Backup System.

8. **Security and privacy:** Database security issues, Discretionary access control based on grant & revoking privilege, Mandatory access control and role based access control for multilevel security, Encryption & public key infrastructures.

**Suggested Readings:**

1. Introduction to database systems: C.J.Date
2. Database Management Systems : Bipin Desai
3. Database system concepts : Korth
4. Principles of Database Management: James Martin
5. Computer Database organization : James Martin
7. Object-oriented modeling and design: Rumbaugh and Blaha
8. Object-oriented analysis and design: Grady Booch
SYLLABUS FOR MASTER OF COMPUTER APPLICATIONS (M.C.A.)

Paper Title: MATHEMATICAL STRUCTURES IN COMPUTER SCIENCE

Paper Code: CS - 75 Max. Marks: 80 Time: 3 Hrs.
Course Duration: 60 Lectures of one hour each.

Objective: To provide basic knowledge about mathematical structures required for various computer science courses.

Note:
(i) The Question paper will consist of four units.
(ii) Examiner will set total of nine questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT – I

1. Mathematical Logic:

UNIT – II

3. Ordered Sets, Latices, Boolean Algebra:

4. Introduction to Finite State Machine:
   Introduction to Finite State Machine, Simplification of machine, Machine and regular languages.

UNIT – III

5. Graphs:
   Incidence and Degree, Isomorphism, Connectedness, Walk, Path and Circuits, Shortest Path Algorithm between two Vertices, Eulerian graph, Directed graphs, Kuratowski’s graphs; Detection of planarity.
   6. Trees:
   Properties of Trees, Rooted and Binary Trees; Directed Tree, Spanning Tree and tree traversals (Inorder, Preorder and Postorder).

UNIT – IV

7. Functions:
   Composite functions & their range, domain, Functions for computer science like characteristic function, Hashing function, Growth of a function.
8. Recurrence Relations and Coding Theory:
Recursion, Recurrence Relation, Coding of binary Information & Error detection, Decoding & error correction.

Suggested Readings:
5. Deo, N.: Graph Theory with Applications to Engineering and Computer Science, PHI.
Objective: The objective of the course is to make students aware of the functioning of a multi-user operating system. This course will serve as a foundation for the higher level course in LINUX. The students are expected to learn the commands while doing practical and emphasis should be given to those switches/options and flags, which are most frequently used in real life.

Note:
(i) The Question paper will consist of four units.
(ii) Examiner will set total of nine questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I

1. Theoretical Concepts of LINUX Operating System:
   Basic Features of Operating System; File Structure; CPU Scheduling; memory management: Swapping, Demand paging; file system: ext2 and ext3 architecture, blocks and fragments, inodes directory structure;

2. Getting Started with LINUX:
   User Names and Groups; Logging in; Changing your Password. Format of LINUX commands;

UNIT II

3. Characters with special meaning; LINUX Documentation; Files and Directories:
   Current Directory, Access the directory contents, absolute and relative pathnames, some LINUX directories and files, Access file contents, file permissions, changing permission modes; Standard files, Standard output, Standard input, Standard Error, Filters and Pipelines, Processes: PID,PPID, Process creation, killing a process, stopping background process; LINUX vi Editor.

4. Text Manipulation: Inspecting Files; File Statistics; Searching for Patterns, Comparing Files; Operating on Files; Printing Files; Rearranging Files; Sorting Files; Splitting Files; Translating characters;
UNIT III

5. Shell Programming:

Programming in the Borne and the C-shell; wild cards, simple shell programs; shell variables; shell programming constructs; interactive shell scripts; Advanced features.

6. System Administration:

Definition, Booting the system, Maintaining user accounts, File System and Special Files, Backups and restoration, Role and functions of a system manager.

UNIT IV

7. System Calls:

C as System Programming Language; I/O system calls – umask(); create(); open(); read(); write(); lseek(); dup(); link(); access(); chmod(); chown(); Process management system calls – fork(); getpid(); getppid(); exit(); wait(); sleep(); Signal system calls – kill(); signal().

Suggested Readings:
7. Graham, Steven: Linux Administration, Tata McGraw.
8. Jones, Tim: GNU/Linux Application Programming, Wiley India Pvt. Ltd.
SEMMESTER II
Paper Title : DATA AND FILE STRUCTURES (USING C)

Paper Code : CS-63  Max. Marks : 80  Time : 3 Hrs.
Course Duration : 60 Lectures of one hour each.

Objectives : The emphasis of this course is on the organization of information, the implementation of common data structures such as lists, stacks, queues, trees, and graphs.

Note :
(i) The Question paper will consist of four units.
(ii) Examiner will set total of nine questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I
1. Introduction to Data Structures:
Concepts and definition of data types, Linear and non-linear data structures.

2. Array:
Representation of one and multidimensional arrays in memory, ADT, Operations: traversing, insertion, deletion, reversing, searching, sorting, merging two arrays; Matrix operations: addition, multiplication; Sparse matrices: ADT, representation; Applications of array : Polynomial evaluation and addition of two polynomial.

UNIT II
3. Linked list:
Introduction, sequential vs linked representation, Operations: Traversal, Creation, Insertion, Deletion, Reversing; Application of linked lists: Polynomial addition; Introduction to the operations of Circular linked lists and doubly linked lists; Fundamental concepts of dynamic memory allocation and garbage collection.

4. Stacks And Queues :
Sequential and linked representations, ADT, Stack Operations: Traversal, Pop, Push; Applications of stack: polish notation, infix to post fix, evaluating post fix expression; Queues: Sequential and linked representation , Queue operations : Traversal, insertion, deletion, Dequeue, Circular queues.
SYLLABUS FOR MASTER OF COMPUTER APPLICATIONS (M.C.A.)

UNIT III

5. Trees:
Terminology, ADT, Types: Binary tree, Complete binary tree, Threaded Binary tree, Binary search tree, B-trees; Binary tree : properties, sequential and linked representation, Traversal Techniques: inorder, pre-order, post order; BST operations: traversal, searching, insertion, deletion.

6. Sets and Graphs:
Sets: representation, union and find algorithms; Graphs: ADT, types, sequential and linked representation; Operations: Insertion, deletion, traversal: DFS, BFS; Minimum cost spanning trees: Kruskal’s and Prim’s algorithm.

UNIT IV

7. Searching and Sorting:
Definition of recursion and its applications, Towers of Hanoi; Sorting Techniques: Bubble sort, Selection sort, Merger sort, Heap sort, Quick sort; Implementation of Linear and binary search techniques in C.

8. File structures:
Sequential file organization, variable length records and text files. Indexing structures: B-trees, ISAM, Hashing techniques for direct files.

Suggested Readings:
8. Deshpanday: C and data structures, Wiley India Pvt. Ltd.
Paper Title : OBJECT ORIENTED PROGRAMMING (THROUGH C++ AND JAVA)

Paper Code : CS-64          Max. Marks : 80 Time : 3 Hrs.
Course Duration : 60 Lectures of one hour each.

Objectives : This course will expose you to the features in C++ and Java as well as help you design software using the object oriented paradigm of programming using C++ and Java.

Note :
(i) The Question paper will consist of four units.
(ii) Examiner will set total of nine questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I

1. Introduction to Object Oriented Programming , Characteristics of OOPs, Dynamic binding, Message Passing, Tokens, Expressions, Data Types, Variables, Operators, Control Statements, Arrays, string handling.

UNIT II


UNIT III


UNIT IV

Suggested Readings:
9. Schildt, Herbert: The Complete Reference Java 2, TMH.
SYLLABUS FOR MASTER OF COMPUTER APPLICATIONS (M.C.A.)

Paper Title : DATA COMMUNICATIONS AND NETWORKS

Paper Code : CS-48 Max. Marks : 80 Time : 3 Hrs.
Course Duration : 60 Lectures of one hour each.

Objectives : As part of this course, students will be introduced to computer networks and data communication paradigms, about network models and standards, network protocols and their use, wireless technologies.

Note :  
(i) The Question paper will consist of four units.
(ii) Examiner will set total of nine questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I

1. Introduction :
Data Transmission concepts, transmission impairments, switching, modulation, multiplexing.
Network Hardware: LAN, MAN, WAN, Wireless networks, Internet-works.
Network Software: Layer, Protocols, interfaces and services.

2. Physical Layer :
Transmission Media :
Magnetic, twisted pair, coaxial cable, fibre optics, wireless transmission (radio, microwave, infrared).

UNIT II

3. Introduction to ATM, ISDN, Cellular radio and communication satellites.

4. Data Link Layer :
Framing, Error control, Sliding window protocols (one bit, Go back n, selective repeat).
Examples of DLL Protocols—HDLC, PPP.
Medium Access Sub layer :
UNIT III

5. Network Layer:

Design issues, Routing algorithms (shortest path, flooding, flow based, distance vector, hierarchical, broadcast, multicast, for mobile hosts), Congestion control algorithms (Leaky bucket, Token bucket, Choke Packet, Load shedding), Internetworking, IP Protocol, ARP, RARP.

6. Network Trouble Shooting:

Using Ping, Traceroute, IP config, Netstat, nslookup etc.

UNIT IV

7. Transport Layer:
Addressing, establishing and releasing connection, flow control, buffering, Internet Transport Protocol (TCP and UDP).

8. Application Layer:
Domain name system, E-mail, File transfer protocol, HTTP, HTTPS, World Wide Web.

Suggested Readings:
Paper Title: COMPUTER BASED NUMERICAL AND STATISTICAL METHODS

Paper Code: CS - 76
Course Duration: 60 Lectures of one hour each.

Max. Marks: 80 Time: 3 Hrs.

Objectives: The course aims at discussing various significant and fundamental concepts to inculcate in the students an adequate understanding of the application of Numerical Algorithms and Statistical Methods.

Note:
(i) The Question paper will consist of four units.
(ii) Examiner will set total of nine questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

Prerequisite: Mathematical Foundation of Computer Science, Probability and Statistics.

UNIT I

Numeric Computation:
Computer Arithmetic: Error: Types of error, error propagation; Floating point numbers - Operations, Normalization and their consequences.

Iterative Methods: Zeros of a single transcendental equation and zeros of polynomial using Bisection, False-position, Newton-Raphson Methods, Convergence of solution.

UNIT II

Simultaneous Linear Equations: Solution of simultaneous Linear equation, Gauss elimination method and pivoting, ILL -conditioned equations and refinement of solution, Gauss-Siedel iterative method, Algorithms.


UNIT III

**Time Series and forecasting:** Components of Time-Series, Method of moving averages, Forecasting models and methods.

**UNIT IV**

**Statistical Computation :**
Frequency Charts: Different Frequency charts.

**Regression Analysis:** Linear and Non-Linear Regression: Straight line, Polynomial and non-linear regression, Algorithms; Introduction to Multiple regression.

**Tests of significance:** Chi square test and F-test.

**Suggested Readings:**

Paper Title: ACCOUNTING AND FINANCIAL MANAGEMENT
Paper Code: CS-07  Max. Marks: 80 Time: 3 Hrs.
Course Duration: 60 Lectures of one hour each.

Objectives: To provide an overview of theoretical and practical concepts of Accounting.

Note:
(i) The Question paper will consist of four units.
(ii) Examiner will set total of nine questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I
1. Accounting:
   Principles, concepts and conventions, double entry system of accounting, introduction of basic books of accounts of sole proprietary concern, closing of books of accounts and preparation of trial balance.

2. Final Accounts:
   Trading, profit and loss accounts and balance sheet of sole proprietary concern with normal closing entries, Introduction to manufacturing account, final accounts of partnership firms, limited company.

UNIT II
3. Financial Management: Meaning and role.


UNIT III

7. Marginal Costing: Nature, scope and importance, Break-even analysis, its uses and limitations, construction of break even chart, practical applications of marginal costing.

UNIT IV

9. **Budget and Budgetary Control:**

10. **Introduction to Computerized Accounting System:**
Coding logic and codes required, master files, transaction files; introduction to documents used for data collection, processing of different files and outputs obtained (The concepts may be explained using available accounting package).

**Suggested Readings:**
SYLLABUS FOR MASTER OF COMPUTER APPLICATIONS (M.C.A.)

Paper Title: MOOC
Paper Code: CS - 81
Max. Marks: 50 Time: 3 Hrs.
SYLLABUS FOR MASTER OF COMPUTER APPLICATIONS (M.C.A.)

THIRD SEMESTER

Paper Title: SOFTWARE ENGINEERING

Paper Code: CS-65
Course Duration: 60 Lectures of one hour each.

Max. Marks : 80 Time : 3 Hrs.

Objectives: The course aims to give students a theoretical foundation in Software Engineering and help them learn its principles and methods including emerging practices and support tools. It also familiarizes students with concepts of software testing and quality assurance and its various techniques.

Note:
(i) The Question paper will consist of four units.
(ii) Examiner will set total of nine questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I

1. Introduction:
   Software Engineering goals, SDLC, Software Process Models: Waterfall, Prototyping, Spiral; S/w Inspection, Preview and Inspection Procedures, Communication skills for Software Engineer. Software requirements, Definition, Software requirements specifications (SRS): Components & Structure of SRS.

2. Software Project Planning:
   Objectives, Decomposition techniques: Problem based estimation(LOC, FP); Empirical Estimation Models: COCOMO model; Risk in estimation.

UNIT II

3. Software Design:

4. Quality Assurance:
UNIT III

5. Software Testing and Techniques:

6. Software Testing Strategies:

UNIT IV

7. Software Maintenance
Characteristics, Components of Software Maintenance Process, Types of software maintenance, Software maintenance process models, Reverse Engineering,. 

8. System Configuration Management (SCM) :

Suggested Readings:
SYLLABUS FOR MASTER OF COMPUTER APPLICATIONS (M.C.A.)

Paper Title: OPERATING SYSTEMS
Paper Code: CS-66
Course Duration: 60 Lectures of one hour each.

Max. Marks : 80 Time : 3 Hrs.

Objectives: To understand the various concepts of Operating System like process management, synchronization, deadlocks, storage and memory management.

Note:
(i) The Question paper will consist of four units.
(ii) Examiner will set total of nine questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I

1. Introduction to Operating System:

Introduction to operating system, its need and services; Operating system classification: Single user, Multi user, Simple batch processing, Multiprogramming, Multitasking, Parallel systems, Distributed system, Real time system;

2. Process Management:


UNIT II

3. Synchronization:

Critical section problem, Peterson’s solution, Synchronization hardware, Semaphores: Mutual exclusion, Binary semaphores, Bounded concurrency, Producer-consumers, Reader-writers problem; Deadlocks & starvation, Problems of synchronization: Bounded buffer, Dining philosophers; Monitors.

4. Deadlocks:

System model, Deadlock characterization: Necessary conditions, Resource allocation graph, Method for handling deadlock; Deadlock prevention: Mutual exclusion, Hold and wait, No
preemption, Circular wait, Deadlock avoidance: Safe state, Resource allocation graph algorithm, Banker’s algorithm; Deadlock detection, Recovery from deadlock.

UNIT III

5. Memory Management-I:

Static and dynamic memory allocation, Memory allocation to process: Stacks, Heap, Memory allocation model; Reuse of memory: Performing fresh allocations using a free list, Memory fragmentation, Merging free areas; Contiguous memory allocation: Fragmentation, Swapping;

6. Memory Management-II:


UNIT IV

7. Storage Management I:

File Concept: Attributes, Operations, Types, Structure; Access methods: Sequential and direct access, Index; Directory structure: Single level, Two Level, Tree Structured, acyclic Graph directories; File System mounting, File sharing, Protection: Types of access, access Control.

8. Storage Management II:

File system structure, File system implementation, Directory implementation, Allocation methods, Free space management, Disk scheduling: FCFS, SSTF, SCAN, C-SCAN, LOOK, C-LOOK; Disk management, Swap space management, RAID.

Suggested Readings:
5. Richie: Operating System, BPB.
Paper Title: ANALYSIS AND DESIGN OF ALGORITHMS

Paper Code: CS-67
Course Duration: 60 Lectures of one hour each.

Max. Marks: 80 Time: 3 Hrs.

Objective: The objective of the module is to create skills in students to design and analyze algorithms.

Note:
(i) The Question paper will consist of four units.
(ii) Examiner will set total of nine questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I

1. Algorithms and Analysis:

Introduction, Algorithms specification, Recursive algorithms, space and time complexity, Asymptotic Notation (O, _, and Θ, o) practical complexities, Best, average and worst case performance of algorithms, examples, Introduction to recurrence relations.

2. Divide and Conquer:

General method, Binary search, Merge sort, Quick sort, Selection problem, Strassen's matrix multiplication and analysis of these problems.

UNIT II

3. Greedy Method:

General Method, Knapsack problem, Job sequencing with deadlines, Minimum spanning Trees, Single source shortcut paths and analysis of these problems.

4. Dynamic Programming:

General method, Optimal binary search trees, 0/1 Knapsack, Travelling salesperson problem.

UNIT III

5. Back Tracking:

General method, 8 queen's problem, Graph coloring, Hamiltonian cycles and Analysis of these problems.
6. **Branch-And-Bound:**

Method, 0/1 Knapsack and Travelling Salesperson problems, Efficiency considerations.

**UNIT IV**

7. **Lower-Bound Theory:**

Introduction to Algebraic problems, Introduction to lower bounds, Comparison Trees, Techniques for Algebraic problems, Some Lower Bounds on Parallel Computation.

8. **NP-hard and NP-complete problems:**

Basic concepts, Statement of Cook's Theorem, Examples of NP-hard graph and NP-scheduling problems (job shop, identical processors), some simplified NP-hard problems (clique decision problem and chromatic number decision problem).

**Suggested Readings:**

Paper Title: ASP .NET Using C#

Paper Code: CS-77

Max. Marks: 80 Time: 3 Hrs.

Course Duration: 60 Lectures of one hour each.

Objectives: The objective of the course is to enable a student to develop web based applications in ASP.NET using C# programming language.

Note: (i) The Question paper will consist of four units. (ii) Examiner will set total of nine questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units. (iii) The students are required to attempt one question from each unit and the compulsory question. (iv) All questions carry equal marks.

UNIT I

1. Introduction to .NET environment:
The .NET strategy, the origins of the .NET technology, the .NET framework, the common language runtime, framework base classes, user and programs interface, visual studio .NET, .NET languages, benefits of the .NET approach.

2. Introduction to C#:
Overview of C#: History, Structure of C# Program, Namespaces, Using Aliases, Multiple Main Methods; Literals, Variables, Data Types: Value types, Reference types; Boxing and Unboxing; Operators and Expressions, Branching and Looping, Methods: Declaration, Method Parameters: value, ref, out and variable argument lists, Method Overloading; Arrays: Declaration, Initialisation, Overview of methods used in System.Array class; Strings : Creating mutable and immutable strings; Difference between C++ and C#, Difference between Java and C#.

UNIT II

3. C# programming concepts I:
Classes and Objects : Defining a class, Member Access Modifiers, Creating objects, Accessing class members and functions; Types of Constructors: Default, Parameterized, Copy, Static, Private; Working of Destructors, Constant and read only members, Overview of Properties : Read only and write only properties; Inheritance : Defining a base class and sub class, visibility control, defining subclass constructors, Types of inheritance, Overriding methods, Abstract classes and methods, Usage of Sealed; Implementing Dynamic Polymorphism;

4. C# programming concepts II:
Interfaces: Defining interface, Extending interface, implementing interface, explicit interface implementation; Delegates: Introduction, Steps for creating a delegate, Multicast Delegates, Covariance and Contra variance; Errors and Exceptions : Introduction, Types of Errors,
Exceptions, Syntax of exception handling code, multiple catch statements, Exception Hierarchy, general catch handler, using finally, Nested try block, throwing own exceptions, Checked and Unchecked operators; I/O: System.IO Namespace, Streams, TextWriter, TextReader, BinaryWriter, BinaryReader, FileStream;

UNIT III

5. Developing ASP.NET web applications I:
Understanding ASP.NET: Adding an ASP.NET webpage, web.config file, ASP.NET standard controls: Label, Textbox, Checkbox, radio button, button, link button, image button, Image, Image Map, Panel, Hyperlink; Using Validation Controls: Overview, Required Field Validator, Range Validator, Compare Validator, Regular Expression Validator, Custom Validator, Validation Summary; Master Pages: Introduction and use, creating master pages, Creating default content, Using images and hyperlinks in master pages, Registering master pages in web configuration, Modifying master pages content;

6. Developing ASP.NET web applications II:
Creating and registering user controls in web.config file; Using Login Controls: Login control, Create User Wizard control, Login Status, Login Name, Change Password, Password Recovery, Login view; ASP.NET membership: Configuring authentication: windows, forms, .net passport; Configuring authorization: By role, by location, with images; Maintaining Application State: Introduction, Cookies: creation, reading, deletion, multivalued cookies; Session state: Session Object, Handling session events; Using Profiles;

UNIT IV

7. Accessing data with ADO.NET:
ADO.NET: Architecture, Components, Steps for creating Database Connectivity, Overview, usage and Implementation of: Data Reader, Data Adapter, Dataset; Viewing data using Data Grid View Control;

Suggested Readings:

2. Walther, Stephen: ASP.NET 2.0 Unleashed SAMS, Pearson Education (Unit III)
Paper Title: RELATIONAL DATA BASE MANAGEMENT SYSTEMS

Paper Code: CS-69 Max. Marks: 80 Time: 3 Hrs.
Course Duration: 60 Lectures of one hour each.

Objective: The course aims at providing the students through insight on few DBMS principles and practices. Students will learn and implement the operations for making and using databases with help of SQL and PL/SQL.

Note:
(i) The Question paper will consist of four units.
(ii) Examiner will set total of nine questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I

1. Relational Design:
Relation scheme, Codd’s Rules for RDBMS, Anomalies in a database, Functional Dependency: Dependencies and logical implications, Closure set, Testing if FD is in closure, Covers, Non-redundant and minimum cover, Canonical cover, functional dependencies and keys.

2. Normalization:
Normal forms- INF, 2NF, 3NF, BCNF, Difference between 3NF and BCNF, Multivalued dependencies and join dependencies, 4NF, 5NF, Difference between 4NF and 5NF.

UNIT II

3. SQL:
Introduction to SQL, Oracle server and oracle database, Oracle products, Oracle data types, Starting SQL *Plus, Querying database tables, Conditional retrieval of rows, Working with null values, Matching a pattern from a table, Ordering the result of a query, Aggregate Functions, Grouping the result of a query, ROLLUP operation: Getting sub totals, CUBE operation: Getting cross tabs, Command summary of SQL *Plus editor, Querying multiple tables: Equi Joins, Cartesian Joins, Outer Joins, Self Joins; SET Operators: Union, Intersect, Minus; Functions: Arithmetic functions, Character functions, Date functions, Group functions.
4. Data Manipulation and Control-I:

Data Definition Language (DDL), Creating Tables, Creating a Table with data from another table, Inserting Values into a Table, Updating Column(s) of a Table, Deleting Row(s) from a Table, Dropping a Column; VIEW : Manipulating the Base table, Rules of DML Statements on Join Views, Dropping a VIEW, Inline Views, Materialized Views.

UNIT III

5. Data Manipulation and Control-II:

Database security and privileges, GRANT command, REVOKE command, Application privileges management, Enhancing performance, Sequences, Maintaining database objects, COMMIT and ROLLBACK.

6. PL/SQL-I:


UNIT IV

7. PL/SQL-II:

Cursor management in PL/SQL, Cursor manipulation, Implicit cursor attributes, Exception handling in PL/SQL; Predefined exceptions, User defined exceptions.

8. Advanced PL/SQL:

Subprograms in PL/SQL, advantages of subprograms, procedure, functions, actual versus formal parameters, argument modes, stored packages, advantages of packages, dropping a procedure, dropping a function, dropping a package, using stored function in SQL statements, database trigger, types of triggers, dropping triggers.

Suggested Readings:

3. Ivan Bayross : PL/SQL The Programming Language of ORACLE, (BPB Publication)
FOURTH SEMESTER

Paper Title: DATA WAREHOUSING AND DATA MINING TECHNIQUES

Paper Code: CS-79  Max. Marks: 80  Time: 3 Hrs.

Course Duration: 60 Lectures of one hour each.

Objectives: This course will introduce concepts and techniques of data mining and data warehousing, including concepts, principle, architecture, design, implementation, application of data warehousing and data mining. Some systems for data warehousing and/or data mining will also be introduced. To study the methodology of engineering legacy databases for data warehousing and data mining to derive business rules for decision support systems.

Note:
(i) The Question paper will consist of four units.
(ii) Examiner will set total of nine questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I

1. Introduction:

Data Warehousing: Definition, Characteristics of a Data Warehouse, Data warehouse Usage, DBMS vs. Data warehouse

2. Developing Data Warehouse:

Data warehousing components, Steps and Crucial decisions for the design and construction of Data Warehouses, Three-tier Data warehouse architecture, Data Warehouse Implementation, Design, performance and technological considerations, Metadata.

UNIT II

3. Developing Data Mart based Data warehouse

Types of data marts, Metadata for a data mart, Data model for a data mart, Maintenance of a data mart, Software components for a data mart, Performance issues, Security in data mart.

4. OLAP Systems

Types of OLAP, Relational vs. Multidimensional OLAP, Data modeling: Star schema, Snowflake schema, OLAP tools.
UNIT III

5. Data Mining:

Introduction to data mining, Data mining process, Major issues and Application of Data mining, Data preprocessing: Data cleaning, Data integration and transformation and Data reduction; Tools for data mining.

6. Data Mining Techniques:


UNIT IV

7. Classification and Prediction:

Definition, Issues regarding Classification and Prediction, Classification by Decision Tree Induction, Support Vector Machines, k-Nearest-Neighbour, Prediction: Linear and Non-Linear Regression

8. Clustering:


Suggested Readings:
3. Jiawei Han, Micheline Kamber, 2000: Data Mining: Concepts and Techniques, Morgan Koffman Elsvier.
Paper Title : INTERACTIVE COMPUTER GRAPHICS
Paper Code : CS-12  
Max. Marks : 80  Time : 3 Hrs.
Course Duration : 60 Lectures of one hour each.

Objectives : The aim is to introduce the students to key concepts of Computer Graphics like display devices, co-ordinate system, transformations, line and circle drawing, pointing, positioning, projections, etc.

Note :
(i) The Question paper will consist of four units.
(ii) Examiner will set total of nine questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I

1. Display Devices :

Line and point plotting systems, Raster, vector, pixel and point plotters, Continual Refresh and storage displays, Digital frame buffer, Plasma panel displays, Display processors, Character generators, Colour-display techniques : shadow mask and penetration CRT, Colour look-up tables, hard-copy colour printers.

UNIT II

2. Display Description:

Screen co-ordinates, user co-ordinates, use of homogeneous coordinates, Display code generation, Graphical functions, the view algorithm, Two-dimensional transformation, Line-drawing, Circle drawing algorithms.

UNIT III

3. Interactive Graphics:

Pointing and positioning devices (cursor, light pen, digitizing tablet, the mouse, track balls), Interactive graphical techniques, Positioning, (Elastic or Rubber Band lines, Linking, zooming, panning, clipping, windowing, scissoring), Mouse Programming.

4. 3-D Graphics:

Wire-frame, perspective display, perspective depth, Projective transformations, Hidden line and surface elimination (Back-face removal algorithm).
UNIT IV

5. Turbo-C Graphic Language:

Primitives (constants, actions, operators, variables), plotting and geometric transformations, display subroutines, Concept of Animation, Saving, Loading and Printing graphics images from/to disk, Animated algorithms for Sorting, Towers of Hanoi.

6. Open GL:

Primitives of the language and interface with C/C++.

7. Programming Projects:

Two Dimensional Transformations, 3-dimensional Transformations, Interactive Graphical Techniques, GUI, Turbo C (Graphics Routines) is to be used as the standard teaching tool.

Suggested Readings:
Paper Title: THEORY OF COMPUTATIONS
Paper Code: CS-37
Max. Marks: 80
Time: 3 Hrs.
Course Duration: 60 Lectures of one hour each.

Objectives: The goal of this course is to provide students with an understanding of basic concepts of Theory of Computation.

Note:
(i) The Question paper will consist of four units.
(ii) Examiner will set total of nine questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I

1. Recursive Languages:

Recursive definition, Alphabets, Language, Regular expression, definitions of Finite state machine, Transition graphs, Deterministic & non-deterministic finite state machines, Regular grammar, Left-linear and right linear, Thomson’s construction to convert regular Expression to NDFA & subset algorithm to convert NDFA to DFA. Minimization of DFA, Finite state machine with output (Moore and Meally Machine), Conversion of Moore machine to Meally machine & vice-versa.

UNIT II

2. Properties of Regular languages:

Conversion of DFA to regular expression, Pumping lemma, Properties and limitations of finite state machine, Decision properties of regular languages, Applications of finite automata.

3. Context Free Grammar:

Context free grammar, Writing context free grammar for problems, Derivation tree and ambiguity, Application of context free grammars, Chomsky and Greibach Normal form, Conversion of CFG to CNF and GNF. Properties of context free grammar, CYK algorithm.

UNIT III

4. PDA:

Push down stack machine, Design of deterministic and non-deterministic push-down stack, Parser design.

5. Turing Machine:

UNIT IV

6. Incommutability:

Halting problem, Turing enumerability, Turing acceptability and Turing decidabilities, Unsolvable problems about Turing machines.

7. Computation Complexity:

P, NP and NP Complete Problems.

Suggested Readings:

Paper Title : ARTIFICIAL INTELLIGENCE (USING LISP)

Paper Code : CS-71       Max. Marks : 80 Time : 3 Hrs.
Course Duration : 60 Lectures of one hour each.

Objectives : The objective of this course is to familiarize students with concepts of AI, its tools & technologies.

Note :
(i) The Question paper will consist of four units.
(ii) Examiner will set total of nine questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

Prerequisite: System Software, Operating System, Data and File Structure.

UNIT I

1. Introduction to Artificial Intelligence (AI) and Problem Space:

Introduction AI technique, Turing test, History and developments in AI, applications of AI, State space representation, production systems, systematic control strategies : Breadth first search and Depth first search, problem characteristics, product system characteristics, issues in the design of search programs.

2. Heuristic Search Technologies:

Introduction to heuristic search, Generate and test, Hill Climbing, Best First search, A*, Problem reduction, AO*, constraint satisfaction and Means-ends-analysis techniques.

UNIT II

3. Knowledge representation:

Information and knowledge, Knowledge acquisition and manipulation, Issues in knowledge representation, Knowledge representation methods - Propositional logic and first order predicate logic, Resolution principle, Horn's clauses, Features of language PROLOG, Semantic networks, Partitioned semantic nets, Frames, Scripts and conceptual dependencies.

4. Game playing:

MiniMax search procedure, reducing alternatives using Alpha-Beta pruning method examples.
UNIT III

5. **Expert systems**
   Introduction, examples, characteristics architecture, people involved and their role in building an expert systems, case studies of expert systems, MYCIN and DENDRAL; features of knowledge acquisition systems: MOLE and SALT.

6. **Natural Language understanding and processing:**
   Introduction, Complexity of the problem, Chompsky hierarchy of grammars, Techniques for Syntactic processing, Semantic Analysis, Discourse and pragmatic processing

UNIT IV

7. **Tools and Technologies for AI:**
   Introduction to AI language LISP: Symbolic expression, creating, appending and modifying lists, defining functions, Predicates, Conditionals, Recursion, Iteration, Printing and reading, Lambda expressions and higher order function, List storage.

**Laboratory work:**
1. Programming in LISP & PROLOG.
2. Hands on experience with expert system shell.

**Suggested Readings:**
Paper Title : ADVANCED JAVA AND NETWORK PROGRAMMING

Paper Code : CS-72 Max. Marks : 80 Time : 3 Hrs.
Course Duration : 60 Lectures of one hour each.

Objectives : To create enterprise application development skills among students using Advanced Java.

Note :
(i) The Question paper will consist of four units.
(ii) Examiner will set total of nine questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I

1. Review of Java Basic Features, Applets, AWT Controls, Event Handling, Multithreading, I/O files.

2. Swing : Features, components, swing vs AWT, swing containers, controls, using Dialogs, sliders, progress bars, tables, creating user interface using swing.

UNIT II

3. Java Database Connectivity : Connectivity model, Java.SQL package, JDBC Exception classes, Database connectivity, Data manipulation and navigation, creating database applications.

4. Java RMI : Distributed object technologies, RMI architecture, creating RMI applications.

UNIT III

5. Java Servlets : Servelets vs CGI, Servlet lifecycle, creating and running simple servlets.


UNIT IV


Suggested Readings:
1. Schildt, Herbert: The Complete Reference Java 2, TMH.
2. Ivan Bayross: Web Enabled Commercial Application Development using Java 2.0, BPB.
SYLLABUS FOR MASTER OF COMPUTER APPLICATIONS (M.C.A.)

FIFTH SEMESTER

Paper Title: COMPUTER BASED OPTIMIZATION TECHNIQUES

Paper Code: CS-17
Course Duration: 60 Lectures of one hour each.
Max. Marks: 80 Time: 3 Hrs.

Objectives: To introduce linear programming, dynamic programming and related Optimization Theories to solve real life / simulated problems.

Note:
(i) The Question paper will consist of four units.
(ii) Examiner will set total of nine questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.
(v) The students can use only Non-programmable & Non-storage type Calculator.

UNIT I


UNIT II

2. Special types of linear programming problems - Transportation and assignment problems.

UNIT III

4. Assignment and Travelling salesman problems
5. Dynamic Programming, Deterministic and probabilistic dynamic programming.

UNIT IV

6. Queuing models: Application and characteristics of queuing models, Structure of basic queuing system.
7. PERT and CPM: Phases of project management, PERT and CPM computations.
8. Simulation: Definition: Types of simulation models; Phases of simulation; Applications of simulation; Inventory and queuing problems; Advantages and disadvantages.
Suggested Readings:

Paper Title: SOFTWARE PROJECT MANAGEMENT

Paper Code : CS-57
Course Duration : 60 Lectures of one hour each.
Max. Marks : 80 Time : 3 Hrs.

Objective: To familiarize the students with Project management, Project Planning and Scheduling, Advanced DSS, ERP and Software metrics.

Note:
(i) The Question paper will consist of four units.
(ii) Examiner will set total of nine questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.
(v) The students can use only Non-programmable & Non-storage type Calculator.

UNIT I

1. Project Management: Introduction to project and project management, problems with software projects, Project management knowledge area and framework, Stages of project : feasibility study :cost-benefit analysis , Planning, project execution, project and product life cycle ; Project stakeholders : All parties of project, role of project manager ; Exploration of open source software tools for project management .


UNIT II

3. Project Planning : Integration management : Introduction, Project plan development, Plan execution ; Scope management : Introduction, methods for selecting projects, project charter, scope statement, work breakdown structure ; Stepwise project planning :Overview , Main steps in project planning.

4. Project Scheduling: Time Management: Importance of project schedules, Schedules and activities, Sequencing and scheduling activity; Project network diagrams: Network planning models, Duration estimating and schedule development, Critical path analysis, Program evaluation and review Techniques.
UNIT III


UNIT IV


8. DSS: Decision structure, Decision support trends, DSS components, Using DSS: What-if analysis, sensitivity analysis, Goal seeking analysis, Optimization analysis, Executive information systems, Enterprise portals and decision support, knowledge management systems.

Suggested Readings:

SYLLABUS FOR MASTER OF COMPUTER APPLICATIONS (M.C.A.)

PAPER: MOBILE COMMUNICATION AND APPLICATION DEVELOPMENT

Paper Code : CS-58  Max. Marks : 80 Time : 3 Hrs.
Course Duration : 60 Lectures of one hour each.

Objective: The course will familiarize the students with basic concepts about mobile communication, its architecture, protocols, mobile databases and operating systems. It will also enable them to develop mobile applications using Android.

Note :
(i) The Question paper will consist of four units.
(ii) Examiner will set total of nine questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.
(v) The students can use only Non-programmable & Non-storage type Calculator.

UNIT I


UNIT II

2. Mobile database: Database hoarding techniques, Data Caching, Client Server computing: 2 tier and 3 tier client server architecture; Transactional models, Query processing, Data Recovery process; Data Dissemination; Communication Asymmetry, Classification of Data delivery mechanism: Push based, pull based, Hybrid; Selective tuning and indexing techniques, Mobile Application Languages, Mobile Operating system: Symbian, Android, iOS, Windows.

UNIT III

UNIT IV

4. Android Application Development: Managing Application Resources: Working with Simple Resource values, Draw able Resources, Layouts, Files; Configuring the Android Manifest file and basic application Settings, registering activities, Designating the launch activity, Managing Application permissions, Designing an application framework.

Suggested Readings:
6. Shane Conder, Lauren Darcey: Sams Teach Yourself Android™ Application Development in 24 Hours.
SYLLABUS FOR MASTER OF COMPUTER APPLICATIONS (M.C.A.)

Paper Title : SOFT COMPUTING TECHNIQUES USING NEURAL NETWORKS
Paper Code : CS-59       Max. Marks : 80 Time : 3 Hrs.
Course Duration : 60 Lectures of one hour each.

Objectives: To get the knowledge and exposure for Advanced AI Techniques to solve the problem lying in fuzzy environment.

Note:
(i) The Question paper will consist of four units.
(ii) Examiner will set total of nine questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.
(v) The students can use only Non-programmable & Non-storage type Calculator.

UNIT I

Fundamentals:

1. Introduction to Soft Computing: Basic soft computing techniques: Neural networks, Fuzzy logic, Genetic algorithms; Hybrid systems, Application to soft computing.

2. Basics of Neural Networks: Characteristics of neural networks; Comparison between Artificial & Biological Neural Networks, Basic Building Blocks of artificial neural network; Connections; Learning methods, Activation functions; Neural network architectures.

UNIT II

Neural Network Learning Models:

3. Supervised Learning Networks: Introduction to supervised learning, Architecture and training algorithms for perception network and back propagation networks


UNIT III

**Fuzzy Logic:**

6. **Fuzzy Logic:** Introduction and Application to Fuzzy logic, Classical sets, Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Techniques, Membership functions: Features & Methods of membership value assignment, Defuzzification methods.

7. **Fuzzy Logic Control Systems:** Architecture and Operation of Fuzzy Logic Control (FLC) systems, FLC System Models, Applications of FLC Systems.

UNIT IV

**Genetic Algorithms:**

8. Introduction to genetic algorithms; Biological background, Genetic algorithms versus traditional algorithms. Basic terminologies in genetic algorithm: Genes, fitness and populations.


**Suggested Readings:**

5. Rao and Rao: C++ Neural Networks & Fuzzy Logic, BPB.
GUIDELINES FOR SUBMISSION OF PROJECT REPORT (CS-18)

The report should consist of the following:

- Cover page including Project title, Name of the student, Name of the Department and Names of the Project Guides (both External and Internal).
- Acknowledgements.
- Certificates from company and department duly signed by external guide, chairman and internal guide.
- Contents with page numbers.
- Introduction (includes background and application or importance of the project).
- Objectives.
- System Analysis.

**System Feasibility Study:**

- Software requirement specifications.
- Design with system flowcharts and input/output design.
- Implementation and Testing
  - Hardware and software used.
  - Listing of well commented programs with result/output or detailed algorithms with input and output.

**Further Scope of the Project:**

- Bibliography.
- Appendices (any other information related to project).

Each student should observe the following norms while submitting the synopsis/thesis for the Project:

(a) Use both sides of the paper instead of only single side.
(b) Use one and half interline spacing in the text (instead of double space).
(c) Stop using a blank sheet before the page, carrying figure or table.
(d) Try to insert figure/table in the text page itself (instead of using a fresh page for it, each time).

Students must consult/inform the internal guides regarding the progress of their work at least once in 20 days. It is the duty of the student to be in touch with his/her internal guide. The student must prepare 5 copies of the report including one copy for self. The remaining four are to be submitted before 31st May every year as per the following:


One softcopy of the work is to be submitted to the concerned head of the dept./institution along with the report. The student must present his/her work in 15 minutes mainly focusing on his/her contribution with the help of slides followed by demonstration of the practical work done. The Project Viva will be completed before 15th June every year. Exact dates will be informed before 31st May every year.

Project Viva will be conducted by an external examiner, internal examiner and the internal guide.
CS-19 Seminar  

Max. Marks: 100

Each student will be required to give seminar on selected topic and submit the report.

SEMINARS TOPICS
1. Artificial Neural Networks.
2. Tele Immersion-The future of Internet telecommunication.
5. Natural Language Processing.
7. Honey pots & Honey net.
8. Ubiquitous Computing.
10. MANET.
14. Cloud Computing
15. J2EE
17. Digital Watermarking.
19. Information Security(Security, Cryptography, Digital Signatures etc.).
22. Robotic Surgery.
23. Any other topic related to recent developments.