# SEMESTER – I

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<th>SUBJECT CODE</th>
<th>COURSE TITLE</th>
<th>LECTURE hrs</th>
<th>LAB hrs</th>
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**Weightage for Theory Courses:**
- During Semester Evaluation Weightage - 40%
- End Semester Examination Weightage - 60%

**Weightage for Lab Courses:**
- During Semester Evaluation Weightage - 60%
- End Semester Examination Weightage - 40%
MCA - 1 SEMESTER

MCA-101 COMPUTER PROGRAMMING

L T P Total Credits
4 0 0 4

Duration of Exam- Three hours

Programming and problem solving: Basics of Computer organisation, High level and low level languages, Steps involved in computer programming, Developing algorithms and flow charts,

C data types, C operators, Expressions, Order and Precedence of evaluation, Statements in C.

Control Statements, Functions, Arrays, Pre-processor Directives.

Pointers, Pointers and Arrays, String Handling, Functions and pointers, Dynamic Memory Allocation.

User defined data types – Structures and Unions, Bit Fields, Array of Structures, Structures with arrays.

Command line arguments, Input-output operations, File Handling.

Suggested References
MCA - 1 SEMESTER

MCA 103 COMPUTER ORGANIZATION AND ARCHITECTURE

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Introduction to number system, Boolean Algebra, Fundamentals of Digital Circuits—Combinational and Sequential, Multiplexers, Flip flops, Registers and Counters.

Arithmetic and Logic Unit, Instruction Sets, Types of operands and operations, Addressing modes, Register Organization, Simple ALU design, Instruction cycle and pipelining.

Memory Classification: Memory Organization, Associative, Cache and Virtual memory.

Peripheral Devices, Data Transfer Techniques—Programmed I/O, Interrupt Driven and DMA, I/O Processors, Asynchronous Data transfer.

Introduction to Advanced computer architecture, RISC v/s CISC, Multiprocessing and multiprocessors, Parallel Processors.

Suggested References

MCA - 1 SEMESTER

MCA-105 DISCRETE MATHEMATICS

L  T  P  Total  Credits-4
4  0  0  4  Duration of Exam- Three hours

Sets and Propositions
Introduction, Combination of sets, Finite and Infinite sets, Uncountably Infinite Sets, Mathematical Induction, Principle of Inclusion and Exclusion, Multisets, Properties of Binary Relations, Equivalence Relations and Partitions, Partial Ordering Relations, Functions and Pigeonhole Principle, Propositions.

Algebraic System
Definitions and elementary properties of algebraic structures, Semigroups, monoids and submonoids, Groups and subgroups, Homomorphisms and Isomorphisms of Monoids and Groups, Definition and Examples of Rings and Subrings, Types of Rings, Commutative Ring, Ring with Unity, Ring with or without Zero divisions, Integral Domain, Division Ring, Relation of Isomorphism in the set of rings, Field, its characteristics and subfield.

Graphs and Planar Graphs

Permutations, Combinations and Recurrence Relations
The Rules of Sum and Product, Permutations, Combinations, Generation of Permutations and Combinations, Recurrence Relations, Linear Recurrence Relations with Constant Coefficients, Homogeneous Solutions, Particular Solutions, Total Solutions, Solution by the Method of Generating Functions.

Suggested References
1. C.L. Liu; Elements of Discrete Mathematics
MCA - 1 SEMESTER

MCA 107 MICROPROCESSOR

| L | T | P | Total | Credits | Duration of Exam
|---|---|---|-------|---------|------------------|
| 4 | 0 | 0 | 4     | 4       | Three hours      

**8085 Microprocessors**


Programming 8085 Microprocessor: Addressing modes, instruction set, assembly language programming, programs for multibyte addition/subtraction, multiplication, division, block transfer. Stacks and subroutines, Interrupts, Counters and time delays. Details of interfacing devices 8255 and 8253, Interfacing with A/D and D/A converters,

**8086 Microprocessors**

Salient features of x86 architecture, Addressing modes and basic operations.

**Suggested References**

1. R. Gaonkar, “The 8085 Microprocessor” PHI
2. Liu and Gibson, Microcomputer Systems: 8086/8088 family: Architecture, Programming and Design, PHI.
File Processing Operations: Physical and Logical files, Opening, reading & writing and closing files in C, seeking and special characters in files, Physical devices and logical files, file related header files in C.


Byte Journey and Buffer Management: File Manager, IO Buffer, IO Processing, Buffer strategies and bottlenecks.

File Structure concepts: A stream file, field structures, reading a stream of fields, record structures and that uses a length indicator, Mixed numbers and characters – use of a hex dump, reading the variable length records from the file.

Managing records in C files: Retrieving records by keys, sequential search, direct access, choosing a record structure and record length, header records, file access and file Organization.

Organizing files for performance: Data compression, reclaiming space – record deletion and storage compaction, deleting fixed – length records for reclaiming space dynamically, deleting variable – length records, space fragmentation and replacement strategies.

Indexing: Index, a Simple index with an entry sequenced file, basic operations on an index, entry sequenced file, indexes that are too large to hold in memory, indexing to provide access by multiple keys, retrieval using combination of secondary keys, improving the secondary index structure – inverted lists

Index Sequential files : Access and prefix B+ trees – Simple index to the sequence set, the content of the index : separators instead of keys, the simple prefix B+ tree, simple prefix B+ tree maintenance, index set block size, internal set block size, the internal structural of index set blocks : a variable order B-tree, loading a simple prefix B+ tree.

Hashing: Collisions in hashing, a simple hashing algorithm, function and record distributions, memory requirements, collision resolution by progressive overflow, buckets, deletion, Extendable hashing: Working of extendable hashing, implantation, deletion, extendable hashing performance

Suggested References
1. File Structures – An Object Oriented Approach with C, Muchael J Folk, Bill Zoellick and Greg Riccardi, Addison Wesley
# MCA - II SEMESTER

**SCHEME AND SYLLABI**  
**MASTER OF COMPUTER APPLICATIONS**  
**NATIONAL INSTITUTE OF TECHNOLOGY, KURUKSHETRA**  
(2007-08)

## SEMESTER – II

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**Total Credits**  
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MCA - II SEMESTER

MCA-102 DATA STRUCTURES AND ALGORITHMS

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Duration of Exam - Three hours

Review of data types: Scalar types – Primitive types, Enumerated types, Subranges
Structures types – Character strings, arrays, records, sets, files. Data abstraction.
Complexity of algorithms: Time and space complexity of algorithms using “big oh”
notation.
Recursion: Recursive algorithms, Analysis of recursive algorithms.

Linear data structures: Stacks, queues, lists. Stack and queue implementation using
array, linked list. Linked list implementation using pointers.

Non linear Structures: Graphs, trees, sets. Graph and tree implementation using array
linked list. Set implementation using bit string, linked list.

Searching: Sequential Search – Searching arrays and linked lists. Binary Search –
Searching arrays and binary search trees. Hashing – Introduction to simple hash
functions, resolution of collisions.

Sorting : \( n^2 \) Sorts – Bubble sort, insertion Sort, selection sort. \( n \log n \) sorts – quick sort,
heap sort, merge sort. External sort – merge files.

Suggested References
1. Sahni S., Data Structures, Algorithms, and Applications in C++, Mc Graw Hill,
2. Cormen T.H., Leiserson C.E, and Rivest R.L., Introduction to Algorithms,
   Prentice Hall India, New Delhi, 1990.
Introduction: Introduction to OOP, Basic Concepts of OOP, Applications of OOP. Introduction to C++, function Prototypes, Inline functions, Reference Parameters, Dynamic memory allocation, default arguments, Scope resolution operator, Linkage specifications

Classes, Constructors, Friend Class: Introduction, Comparing class with Structure, Class Scope, Accessing Members of a class, Constructor, Destructor, Const objects, Const member functions, Friend class, Friend function, This pointer, Data abstraction and Information hiding, container classes and Iterators.

Overloading & Inheritance: Operator Overloading, Fundamentals, Restrictions, Overloading stream, Insertion and stream extraction operators, Overloading unary & binary operators, Converting between types, Overloading ++ and --. Inheritance, Introduction, Protected members, Casting base _class pointers to derived _class pointers, Overloading Base class members in a Derived class, Public, Protocols and Private inheritance, Direct base classes and Indirect Base Classes, Using Constructors and Destructors in Derived classes, Implicit Derived class object to base class object conversion.


Files: File Operations –File pointers, error handling during file Operations
Templates & Exception Handling: Templates, Function templates, Class templates, Overloading template functions, Class template and non type parameters –Templates with Multiple parameters. Exception Handling: When exception handling, Basic of C++ exception, Catching an exception, re throwing an exception, exception specifications.

Namespace: Introduction to Namespace

Suggested References

MCA - II SEMESTER

MCA-106  PROGRAMMING LANGUAGES

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Credits-4  Duration of Exam- Three hours

High level languages, Programming Paradigms, Language implementation. Syntactic structure – Language representation, Abstract syntax tree, Lexical syntax, Context Free grammars (CFG), Normal forms of CFG.

Structured programming, its need and design issues, block structures, types, variables, binding, types of binding, type checking, strong typing, type conversion, named constant, principle data types, character string, user defined data types, pointer and reference.

Fundamentals of subprogram, referencing, environment – local and non local parameter passing, subprogram name as parameter, overloaded subprogram, generic subprograms, co routine, CALL-RETURN structure, recursion, implementing non-local referencing environment, scope-static and dynamic, implementation of scopes.

Introduction, subprogram level concurrency, and synchronization, through semaphores, monitors and message passing, Introduction to Exception handling.

Fundamentals of functional programming, features and implementation, Types – values and operations, product of types, Lists and operations on Lists, Functions from a domain to a range, Function application and lexical scope. Binding of values and functions.

Fundamentals of logical programming, basic elements of Prolog, deficiencies and application of Prolog.

Suggested References

1. T.W. Pratt, Programming Languages: Design & Implementation, PHI, 3rd Ed.
MCA - II SEMESTER

MCA-108 OPERATING SYSTEMS

L  T  P  Total
4  0  0  4

Credits-4

Duration of Exam- Three hours

Types of Operating Systems (OS), historical evolution of operating systems, Real time systems, Distributed systems. OS concepts – Processes, Files, System calls, Shell, Interrupt mechanisms.


CPU Scheduling: Levels of Scheduling, Comparative study of scheduling algorithms, multiple processor scheduling.

Memory management, memory allocation, paging, virtual memory, page replacement algorithms, Paging, Segmentation combination of Paging and Segmentation, Virtual memory concepts, Demand Paging, Page replacement Algorithms

Device and Input-Output management.

Deadlocks, prevention and avoidance, concurrent processes, Semaphores.

Device and Input-Output management.

Study of UNIX operating system.

Suggested References

MCA - II SEMESTER

MCA 110  NUMERICAL ANALYSIS AND OPTIMIZATION TECHNIQUES

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Errors in numerical calculations, sources of errors, significant digits, numerical solution of polynomial and transcendental equations, bisection method, regula-falsi method, Newton-Raphson method, fixed point method of iteration, rates of convergence of these methods, solution of system of algebraic equations, exact methods, Crout's triangularization method, iterative methods, gauss - seidel and relaxation method, polynomial interpolation, Lagrange interpolation polynomial, divided differences, Newton’s divided difference interpolation polynomial, finite differences, operators Δ, V, e, δ, Gregory, Newton forward and backward difference interpolation polynomials, central differences, stirlings interpolation formulae.

Numerical differentiation, differentiation formulae in the case of equally spaced points, numerical integration, trapezoidal and Simpson’s rules, compounded rules, errors of interpolation and integration formulae numerical solution of ordinary differential equations, single stepmethods, Taylor series method, Euler’s method, modified Euler’s method, Picard’s iteration method, Runge - Kutta methods (2nd, 3rd and 4th order formulae- derivations not required), multistep methods, Milne’s predictor and corrector formulae.

Optimization methods, mathematical formulation of linear programming problem, simplex method, artificial variables, Charnes M method, two phase technique, duality in linear programming, dual simplex method, Transportation assignment and routing problems

Suggested References

2. S. S. Rao, Optimization Techniques, New Age Int., New Delhi
### MCA - III SEMESTER

**SCHEME AND SYLLABI**  
**MASTER OF COMPUTER APPLICATIONS**  
**NATIONAL INSTITUTE OF TECHNOLOGY, KURUKSHETRA**  
*(2008-09)*

#### SEMESTER – III

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**Total Credits**  
24
Basic Concepts
What is database system, why database, Data independence, 3 levels of architecture; external level, conceptual level, internal level, mapping DBA, DBMS, organization of databases, components of DBMS, Data Models, Relational Models, Networks data model, Hierarchical Model, semantic data model.

Relational Model
Introduction – Relational Model, base tables & views, relations, domains, candidate keys, primary key, alternate keys, foreign key, Integrity rules, relational Operators – relational algebra, relational calculus, Data Base Design – Introduction, Basic Definitions, Non-loss decomposition and functional dependencies, 1NF, 2NF, 3NF, BCNF, MVD & 4NF, JD & 5NF, Normalization procedure, other normal forms.

SQL: Data definition, Constraints, & Schema Changes in SQL, insert, Delete and update statements, View in SQL, Specifying constraints and Indexes in SQL, Queries in SQL.


Concurrency
Transaction concept, transaction state, concurrent executions, serializability lock based protocols, timestamp based protocols, validation based protocols, deadlock handling.

Distributed Data Bases
Introduction, fundamental principles, objectives, Problems of distributed processing-query processing, catalog management, updates propagation, recovery control, and concurrency control.

Suggested References
MCA - III SEMESTER

MCA-203  SOFTWARE ENGINEERING

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Duration of Exam - Three hours

Introduction
Introduction to Software crisis & Software processes; Software life cycle models – Build & Fix, waterfall prototype evolutionary, spiral model.

Requirement Analysis & Specifications
Problem Analysis – DFD, Data dictionaries, ER diagrams, object diagrams; approaches to problems analysis; SRS; specifying behavioral & non-behavioral requirements.

Software Design
What is design? Modularity, strategy of design, function oriented design, object oriented design.

Software Metrics
Introduction, size metrics, data structure metrics, information flow metrics, entropy-based measures, metric analysis.

Software Reliability
Importance, Software reliability & Hardware reliability, failures & faults, reliability concepts, reliability models – macro, basic, logarithmic Poisson, calendar time component, micro models; estimating number of residual errors; reliability allocation.

Software Testing
Introduction, Functional testing, structural testing, activities during testing, debugging, testing tools.

Software Maintenance
Introduction, types of maintenance, maintenance process, maintenance models, reverse engineering, re-engineering.

Suggested References
MCA - III SEMESTER
MCA-205 COMPUTER NETWORKS

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Duration of Exam- Three hours

Introduction
Network Functions, Network Topology, Network Services, Switching Approaches, Transmission media and systems, multiplexing and signaling techniques, Error detection and correction, ISDN and BISDN

Layered Architectures
Examples, OSI Reference Model, Overview of TCP/IP architecture, Socket system calls, SNMP, Electronic Mail.

Peer-to-Peer Protocols
Protocols, Service Models and End-to-End requirements, ARQ, Sliding Window, RTP, HDLC, PPP protocols, Statistical Multiplexing.

MAC and LAN Protocols
Multiple access communication, Random Access-ALOHA, Slotted-ALOHA, CSMA, CSMA-CD, Channelization – FDMA, TDMA, CDMA, Channelization in Cellular networks LAN Standards - 802.3, 802.4, 802.5, 802.6, FDDI, 802.11, LAN Bridges.

Packet Switching Networks

TCP/IP

Suggested References
4. William Stallings: Data and Computer Communications 5/e, PHI.
MCA - III SEMESTER

MCA-207  VISUAL PROGRAMMING

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Visual Basic

The VB Integrated Development Environment, VB language and its elements: Variables, constants, arrays, collections, subroutines, functions, arguments, and control structures.

Designing a VB application: Working with VB forms and managing forms at run time, coding event procedures, implementing drag and drop operations, menu designing.

Coding a VB application: Implementing user interface controls, common controls and their properties, dynamic controls, custom controls, control arrays, using variables, subroutines, function and control structures, accessing data through code and data controls, using DLLs in VB applications, building ActiveX clients, ActiveX servers, ActiveX controls, ActiveX documents, and web-enabled applications, Multiple Document Interface. Database programming (DAODC, ADODC)

Visual C++
Windows basic concepts, window API, DEF files, creating windows, message, Mouse and keyboard. Introduction to resources, designing and creating menus, pop-up menus, user defined resources. Bitmaps and dialogues; windows animation; font basics; window controls; font display; static controls, edit controls, list boxes.

Overview and structure of windows programming, coding conventions.
Programming using visual C++

Suggested References
1. Visual Basic – 6 by Howard Hawee PHI
2. Teach yourself Visual Basic by Warner TMH
3. Mastering VB – 6 by Evangelos Petroutos TMH
4. Programming in VB – 6 by J C Bradley TMH
5. VB – 6 The Complete Reference by Jerks TMH
6. Windows Programming by Charles Petzol
MCA - III SEMESTER

MCA 209    WEB ENGINEERING

L    T    P    Total                                      Credits-4
4    0    0    4                                       Duration of Exam- Three hours


C#.NET — Variables, Operators and Expressions, Writing Methods and Applying Scope, Decision statements, Iteration statements, Managing errors and Exceptions values and references, Value types with enumerations and Structures, Arrays and Collections parameter arrays, Inheritance, Garbage collection and Resource management.

Introducing ASP.NET — Understanding validation controls — Accessing Data with web forms — Building ASP.NET applications Building XML web service, handling XML.

Suggested References

1. Jeff Prosise, Programming Microsoft .NET, Microsoft Press
3. Doug Tidwell, James Snell, Pavel Kulchenko; Programming Web Services with SOAP, O’Reilly
# MCA - IV SEMESTER

## SCHEME AND SYLLABI

MASTER OF COMPUTER APPLICATIONS

NATIONAL INSTITUTE OF TECHNOLOGY, KURUKSHETRA

(2008-09)

## SEMESTER – IV

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List of Electives

- MCA 220   Data Warehousing and Data Mining
- MCA 222   System Security and Cryptography
- MCA 224   E-Governance
- MCA 226   E-Commerce
DEPARTMENT OF COMPUTER APPLICATIONS, NIT Kurukshetra

MCA - IV SEMESTER

MCA-202  SERVER SIDE COMPUTING WITH JAVA

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Duration of Exam- Three hours

An overview of Java: - Java features how java differs from C & C++, data types, constants & variables, operators & expressions, control structure in java, classes, objects & methods, arrays, strings & vectors introduction to Java Design patterns.

Interfaces & Packages: - Defining, extending, implementing interfaces, accessing interface variables, Packages: - Introduction using system package, accessing a package, using a package, adding a class to a package & hiding classes, Introduction to multithread programming.


Applet Programming: - Applet fundamentals, life cycle of applet, creating an executable applet, applet tags, running the applet & passing parameters to applet.

Suggested References
2. Mark Grand Patterns in Java Vol. 1-3, Wiley-India
4. B. Eckel Thinking in JAVA, Pearson Education.
5. Deitel & Deitel How to Program JAVA. Pearson Education.
MCA-204 LINUX AND SHELL PROGRAMMING

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1. Linux Startup
User accounts, accessing linux – starting and shutting processes, Logging in and Logging out, Command line, simple commands

2. Shell Programming
Unix file system: Linux/Unix files, inodes and structure and file system related commands, Shell as command processor, shell variables, creating command substitution, scripts, functions, conditionals, loops, customizing environment

3. Regular Expressions and Filters
Introducing regular expressions patterns, syntax, character classes, quantifiers, introduction to egrep, sed, programming with awk and perl.

4. The C Environment
The C compiler, vi editor, compiler options, managing projects, memory management, use of makefiles, dependency calculations, memory management – dynamic and static memory, building and using static and dynamic libraries, using ldd, soname, dynamic loader, debugging with gdb

5. Processes in Linux
Processes, starting and stopping processes, initialization processes, rc and init files, job control – at, batch, cron, time, network files, security, privileges, authentication, password administration, archiving, Signals and signal handlers, Linux I/O system

Suggested References

INTRODUCTION


ASSEMBLER AND MACRO PROCESSORS


LOADERS AND LINKERS

Basic Loader Functions, Machine-dependent and Machine-independent Loader features, Design options, Linkage Editors, Dynamic Linking and Bootstrap Loaders. Implementation Examples, MS-DOS linker, SUN-OS linkers and Cray MPP linker.

COMPILERS AND SOFTWARE TOOLS


Suggested References
MCA - IV SEMESTER

MCA 220  DATA WAREHOUSING AND DATA MINING

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Duration of Exam- Three hours

INTRODUCTION
Data Mining-motivation, importance-DM Functionalities, Basic Data Mining Tasks, DM Vs KDD, DM Metrics, DM Applications, Social implications.

DATA WAREHOUSING
Difference between Operational Database and Data warehouse-Multidimensional Data Model: From tables to data Cubes, Schemas, Measures-DW Architecture: Steps for design and construction of DW, 3-tier DW Architecture-DW Implementation: Efficient computation of DATA Cubes, Efficient Processing of OLAP queries, Metadata repository.

DATA PREPROCESSING, DATA MINING PRIMITIVES, LANGUAGES
Data cleaning, Data Integration and Transformation, Data Reduction. Discretization and concept Hierarchy Generation. Task-relevant data, Background Knowledge, Presentation and Visualization of Discovered Patterns. Data Mining Query Language-other languages for data mining

DATA MINING ALGORITHMS

WEB, TEMPORAL AND SPATIAL DATA MINING

Suggested References
MCA - IV SEMESTER

MCA  222 SYSTEM SECURITIES AND CRYPTOGRAPHY

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**Basic Encryption and Decryption**
Attackers and Types of threats, challenges for information security, Encryption Techniques, Classical Cryptographic Algorithms: Monoalphabetic Substitutions such as the Caesar Cipher, Cryptanalysis of Monoalphabetic ciphers, Polyalphabetic Ciphers such as Vigenere; Vernam Cipher, Stream and Block Cipher

**Number Theory**
Prime Numbers, Greatest Common Divisor, Euclidean algorithm, Modular Arithmetic, Properties of Modular Arithmetic, Computing the inverse, Fermat’s Theorem, algorithm for computing inverses, Random number generation

**Secret key Systems**
The Data Encryption Standard (DES), Analyzing and Strengthening of DES, Introduction to Advance Encryption Standard (AES)

**Key Management Protocols**
Solving Key Distribution Problem, Diffie-Hellman Algorithm, Key Exchange with Public Key Cryptography

**Public Key Encryption Systems**

**Hash Algorithms**
Hash concept, description of Hash algorithms, Message Digest Algorithms such as MD4 and MD5, Secure Hash Algorithms such as SH1 and SHA2
Public Key Infrastructure (PKI)

Introduction to Network Security
Network security Issues such as Impersonation, Message Confidentiality, Message Integrity, Code Integrity, Denial of Service, Securing Switches and Routers, Firewalls, DMZs, Virtual Private Networks, Network Monitoring and Diagnostic Devices, Virtual LANs, IPSec Secure Communication Mechanism, PKI based Authentication and Kerberos

Introduction to Web Security

Suggested References

2. Principles of Cryptography, William Stallings, Pearson Education
E-government, need of e-governance, e-assistance, e-democracy, e-administration, citizen services, e-procurement, Mobile government

Law and policies, IT Act. Right for Information Act, Introduction to various Tax Payable, Purchase and Tender procedures and E-filing of Information, Concepts of E-portals

E-governance implementations: Software and Hardware required for E-governance Implementation, E-governance in a Small Office, E-governance for public utilities, E-governance in a medium enterprise, E-governance and finance, E-Tender and Web E-governance efforts of State Government in India

Detailed study of domestic and one international sample of E-governance system, E-governance model of Haryana, Implementation of one E-governance model in .NET/Enterprise Java

**Suggested References**

1. ‘Professional Office Procedure’ By Susan H Cooperman, Prentice Hall
2. ‘Public Information Technology and E-governance : Managing the virtual state’ (paperback) By G.David Garson
MCA - IV SEMESTER

MCA 226 E-COMMERCE

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Duration of Exam- Three hours


Security issues - threats to e-commerce - approaches to safe e-commerce - secure transactions and protocols - intruder approaches - security strategies and tools - encryption - security teams - protecting e-commerce assets - protecting client machines - servers and channels - transaction integrity

Electronic payment systems - types of e-payment - internet monetary payment and security requirements - payment and purchase order process - electronic cash - electronic wallets - smart cards - credit and charge cards - risks - design of e-payment systems


Implementation of sample E-Commerce model in .NET/ Enterprise Java

Suggested References
5. Treese G.W. & Stewart L. C., "Designing Systems for Internet Commerce", Addison Wesley, New Delhi
<table>
<thead>
<tr>
<th>SUBJECT CODE</th>
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List of Electives:

*Any one out of the following:

MCA 311  Compiler Design  
MCA 313  Wireless and Mobile Computing

#Any one out of the following:

MCA 315  Bioinformatics  
MCA 317  Enterprise Resource management
MCA - V SEMESTER

MCA-301 SYSTEM ANALYSIS AND DESIGN

L T P Total Credit 04
4 0 0 4

Duration of Exam- 03 hours

**Project Management:** Fundamentals, Responsibilities of Project Manager, Project Planning and Scheduling, Types of Project Organizations.

**System Analysis:** Approaches to System Development, Modeling System Requirements, Traditional and Object Oriented approach to Requirements, Role of System Analyst.

**System Design:** Design Phase Activities, Traditional and Object Oriented approach to Design, Designing of Databases, UI, System Interfaces, Controls and Security.

Current Trends in System Development.

**Suggested References**

MCA - V SEMESTER

MCA 303  COMPUTER GRAPHICS AND MULTIMEDIA

L  T  P  Total  Credits 04
4  0  0  4  Duration of Exam- Three hours

Line Drawing: Geometry and line generation, Vector Generation, Bresenham's algorithms for line and Circle, Anti Aliasing, Character generation.


2D Transformations: Scaling, Rotation, Translation, Homogenous coordinates, Coordinate Transformations, Rotation about arbitrary point, Other types of transformations.

Windowing and Clipping: Viewing transformations, Line and Polygon clipping algorithms, Generalized clipping, multiple windowing.


Multimedia: Multimedia and Hypermedia, Overview of Multimedia software tools.

Suggested References

MCA - V SEMESTER

MCA -311  COMPILER DESIGN

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Duration of Exam- Three hours

**Compiler Structure:** Analysis-synthesis model of compilation, Various phases of a compiler, Lexical, Syntax & Syntactic analysis.

**Run time system:** Storage Organization, Activation Tree, Activation Record, Parameter Passing, Symbol Table, Dynamic Storage Allocation.


**Code Generation and Instruction selection:** Object programs, Problems in Code Generation, a machine model, a Simple Code Generator, Register Allocation and Assignment, Code Generation from DAGs, Peephole Optimization

**Suggested References**

MCA - V SEMESTER

MCA-313    WIRELESS AND MOBILE COMPUTING

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Introduction: Challenges in Mobile Computing, Coping with uncertainties, Resource poorness, Cellular architecture, Mobility Management.

(Wireless) Medium Access Control: Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA.

Publishing & Accessing Data in Air: Pull and push based data delivery models, Data dissemination by broadcast, Broadcast disks, Directory service in air, Energy efficient indexing scheme for push based data delivery.

File System Support for Mobility: Distributed file sharing for mobility support, Coda and other storage manager for mobility support.


Mobile Transaction and Commerce: Models for mobile transaction, Kangaroo and Joey transactions, Team transaction, Recovery model for mobile transactions, Electronic payment and Protocols for mobile commerce.

Suggested References:

MCA –V SEMESTER

MCA-315 BIOINFORMATICS

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Duration of Exam: Three hours

**Introduction to Bioinformatics**: Fundamentals of Bioinformatics systems modeling.

**Computing Evolution**: Phylogenetic Analysis Sequence-based taxonomy, Mathematical tools of proteins and nucleic acids, sequence-Function Relationships, Sequence Homology and Conserved Regions, Conserved DNA sequences.

**Bioinformatics tools**: Networks - WWW, CERN EMBnet; EMBL Database, SEQNET, GenBank, NLM., Sequence Databases and Sequence Analysis: genomic, cDNA EMBL database GenBank protein sequence, pattern recognition tools, Genome databases, Molecular graphics software and other packages.

**Suggested References**

MCA –V SEMESTER

MCA- 317 Enterprise Resource Planning

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**Enterprise Resources Planning:** Introduction, Growth of ERP.


**ERP Modules and Vendors:** Finance, Production Planning, Control and Management, Sales and Distribution, Human Resources Management, Inventory Control System, Quality Management, ERP market.


**ERP Case Studies:** Post Implementation review of ERP package in manufacturing, Service and others Organizations.

**Suggested References:**

MCA – VI SEMESTER

SCHEME AND SYLLABI
MASTER OF COMPUTER APPLICATIONS
NATIONAL INSTITUTE OF TECHNOLOGY, KURUKSHETRA

Proposed (2007-10)

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* Project work shall be pursued for a minimum of 16 weeks.
Research Lab