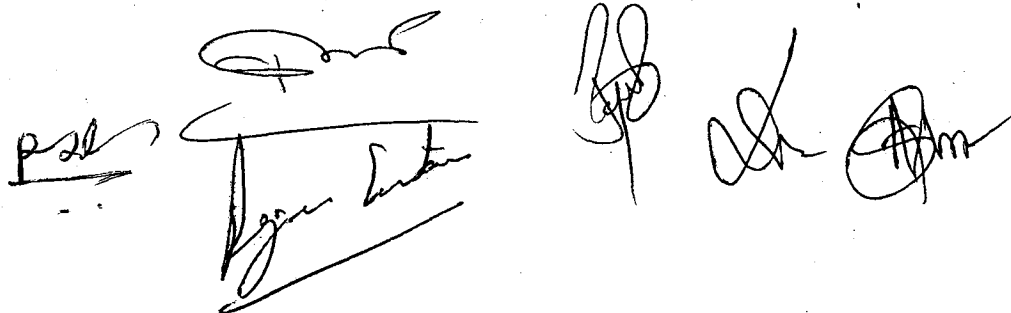


MCA

MCA 2014-15 – I/II Semester  
MCA 2015-16 – III/IV Semester  
MCA 2016-17 – V/VI Semester

A collection of handwritten signatures in black ink, including a large signature with a horizontal line underneath, and several smaller, more stylized signatures.

2. Igor Hawryzkiewyez, Introduction to System Analysis and Design, 4<sup>th</sup> edition. Prentice-Hall
3. Jain Mdhulika, Jain Satish; Structred system Analysis and Design; 2<sup>nd</sup> Edition, 2007.
4. Jeffrey L. Whittren, and Lennie D. Bentey, Systems analysis and Design Methods 4<sup>th</sup> edition, Tata McGraw-Hill.
5. Philip L Weaver, Practical SSADM wer 4+A Complete Tutorial Guider, Pitman Publishing.
6. Don Yeates, Maura Shields and David Helmy, System Analysis and Design Longman group limited.
7. Robert Mudrick; Management Information System; PHI.
8. W.S. Jawadkar; Management Information System; McGraw-Hill.

*Igor Hawryzkiewyez*

*Jain Mdhulika*

*W.S. Jawadkar*

*Philip L Weaver*

**Eligibility :**

All the graduate (with 10+2+3) with at least 50% marks or CGPA of 3.0 in the UGC Seven Point Scale (45% marks or CGPA 2.5 in the UGC Seven Point Scale for SC/Non-Creamy layer OBC) in aggregate with Mathematics either at XII level or graduation level or BCA/B.Sc.(CS)/B.Sc.(IT) or B.E. from recognized university in Rajasthan and minimum 60% marks for non-Rajasthan candidate. Reservation as per the University Rules.

**Scheme of Examination :**

1. Each theory paper EoSE shall carry 100 marks The EoSE will be of 3 hours duration. Part 'A' of theory paper shall contain 10 short Answer Questions of 20 marks, based on Knowledge, understanding and applications of the topics/texts covered in the syllabus . Each question will carry two marks for correct answer.
2. Part B of the paper shall contain four questions. One question will be set from each unit. Each Question will have three parts . Candidates are required to attempt all four units by taking any two parts from each question of the unit. Each question carry 20 marks.
3. Each Laboratory EoSE will be of four/six hour durations and involve laboratory experiments/ exercises, and viva-voce examination with weightage in ration of 75:25.

**Course Structure:**

The details of the courses with code, title and the credits assign are as given below:

Abbreviations Used

Course Category

CCC: Compulsory Core Course

ECC: Elective Core Course

OEC: Open Elective Course

SSC: Supportive Course

SEM: Seminar

PRJ: Project Work

RP: Research Publication

Contact Hours

L:Lecture

T: Tutorial

P: Practical

S: Self Study

Relative Weights

IA: Internal Assessment (Attendance/Classroom Participation/Quiz/Home Assignment etc.)

ST: Sessional Test

EoSE: End of Semester Examination

## MCA-First Semester

S. No.	Subject Code	Subject Title	Course category	Credit	Contact Hours per Week			EoSE Duration(Hr)	
					L	T	P	Thy	P
1	MCA 101	Computer Architecture	CCC	4	3	1	0	3	0
2	MCA 102	Business Accounting Fundamentals	CCC	4	3	1	0	3	0
3	MCA 103	Database Management Systems	CCC	4	3	1	0	3	0
4	MCA 104	Algorithms and Data Structures	CCC	4	3	1	0	3	0
5	MCA 105	Programming in C	CCC	4	3	1	0	3	0
6	MCA 106	Discrete Mathematics	CCC	4	3	1	0	3	0
7	MCA 111	Programming in C & DS Lab	CCC	4	0	0	6	0	4
8	MCA 112	DBMS Lab	CCC	4	0	0	6	0	4
9	MCA 113	Office Management Lab	CCC	4	0	0	6	0	4

## MCA-Second Semester

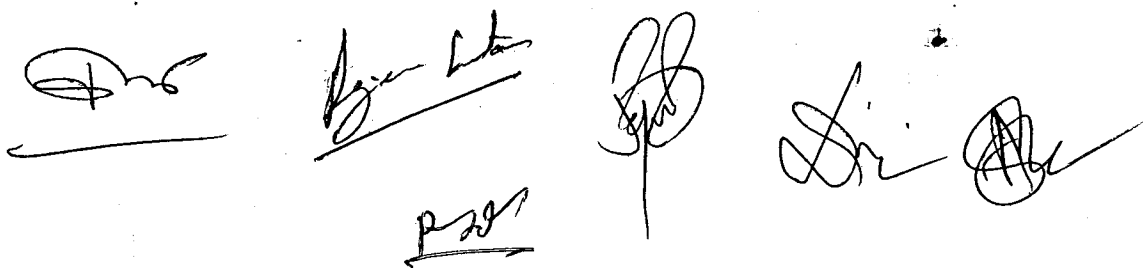
S. No.	Subject Code	Subject Title	Course category	Credit	Contact Hours per Week			EoSE Duration(Hr)	
					L	T	P	Thy	P
1	MCA 201	Object Oriented Programming Using C++	CCC	4	3	1	0	3	0
2	MCA 202	Operating System Fundamentals	CCC	4	3	1	0	3	0
3	MCA 203	Computer Oriented Numerical Methods	CCC	4	3	1	0	3	0
4	MCA 204	Data Communication and Computer Networks	CCC	4	3	1	0	3	0
5	MCA 205	Web Design and Development	CCC	4	3	1	0	3	0
6	MCA 206	Computer Graphics	CCC	4	3	1	0	3	0
7	MCA 211	CONM Lab	CCC	4	0	0	6	0	4
8	MCA 212	Programming in C++ Lab	CCC	4	0	0	6	0	4
9	MCA 213	Web Authoring Tools Lab	CCC	4	0	0	6	0	4

## MCA-Third Semester

S. No.	Subject Code	Subject Title	Course category	Credit	Contact Hours per Week			EoSE Duration(Hr)	
					L	T	P	Thy	P
1	MCA 301	Programming in Java	CCC	4	3	1	0	3	0
2	MCA 302	System Analysis & Designing Concepts	CCC	4	3	1	0	3	0
3	MCA 303	Linux OS and Shell Programming	CCC	4	3	1	0	3	0
4	MCA 304	Application Development Using .NET Frame Work	CCC	4	3	1	0	3	0
5	MCA 305	Data Warehousing & Data Mining	CCC	4	3	1	0	3	0
6	MCA 306	Theory of Computing	CCC	4	3	1	0	3	0
7	MCA 311	Programming in Java Lab	CCC	4	0	0	6	0	4
8	MCA 312	Linux OS and Shell Programming Lab	CCC	4	0	0	6	0	4
9	MCA 313	.NET Lab	CCC	4	0	0	6	0	4

## MCA-Fourth Semester

S. No.	Subject Code	Subject Title	Course category	Credit	Contact Hours per Week			EoSE Duration(Hr)	
					L	T	P	Thy	P
1	MCA 401	Computer Based Optimization Techniques	CCC	4	3	1	0	3	0
2	MCA 402	Advanced Java Programming & Technology	CCC	4	3	1	0	3	0
3	MCA 403	Advanced Database Systems	CCC	4	3	1	0	3	0
4	MCA 404	Software Engineering	CCC	4	3	1	0	3	0
5	MCA 405	E-Commerce	CCC	4	3	1	0	3	0
6		Core Elective-1	ECC	4	3	1	0	3	0
7	MCA 411	Advanced Java Lab	CCC	4	0	0	6	0	4
8	MCA 412	Advanced DBMS Lab (Oracle/DB2/MySQL)	CCC	4	0	0	6	0	4
9	MCA 423	Mini Project	PRJ	4	0	0	6	0	4



### MCA-Fifth Semester

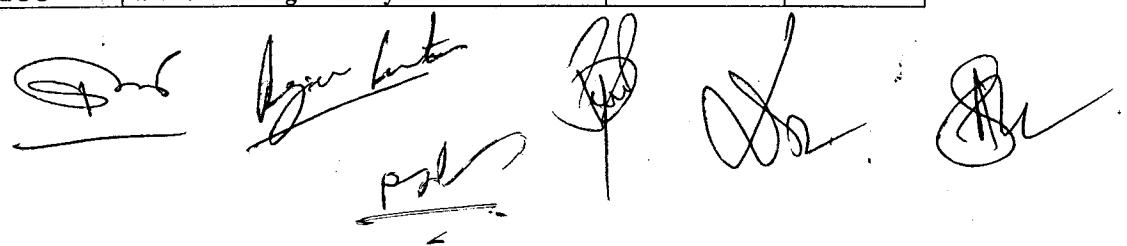
S. No.	Subject Code	Subject Title	Course category	Credit	Contact Hours per Week			EoSE Duration(Hr)	
					L	T	P	Thy	P
1	MCA 501	Information Security & Cryptography	CCC	4	3	1	0	3	0
2	MCA 502	Wireless Technology	CCC	4	3	1	0	3	0
3	MCA 503	Analysis and Design of Algorithms	CCC	4	3	1	0	3	0
4	MCA 504	Simulation & Modeling	CCC	4	3	1	0	3	0
5		Core Elective - 2	ECC	4	3	1	0	3	0
6		Core Elective - 3	ECC	4	3	1	0	3	0
7	MCA 511	ADA Lab	CCC	4	0	0	6	0	4
8	MCA 522	Mini Project	PRJ	4	0	0	6	0	4
9	MCA 523	Seminar	SEM	4	0	0	6	0	4

### MCA-Sixth Semester

S. No.	Subject Code	Subject Title	Course category	Credit	Contact Hours per Week			EoSE Duration(Hr)	
					L	T	P	Thy	P
1	MCA 621	Major Project : Minimum Four Months in an Organization approved by the Director/Head of the Centre/Department	PRJ	36	0	0	42	0	4

### Elective Core Courses :

Elective Course Code	Course Category	Subject Title	Prerequisite	Semester
MCA A01	ECC	Artificial Intelligence		IV
MCA A02	ECC	Network Management		IV
MCA A03	ECC	Compiler Design		IV
MCA A04	ECC	Multimedia Systems		IV
MCA B01	ECC	Bio-Informatics		V
MCA B02	ECC	Geo-Informatics		V
MCA B03	ECC	ERP Systems		V
MCA B04	ECC	Embedded Systems		V
MCA C01	ECC	Mobile Communication & Network		V
MCA C02	ECC	Object Oriented Software Engineering		V
MCA C03	ECC	Web Information System		V
MCA C04	ECC	Pattern Recognition System		V



## Course Contents in Detail - MCA I Semester-2014 -15

### Note :

1. Papers I to VI are compulsory papers.
2. Internal assessment will be done by teacher concerned on the basis of test papers, regularity in the class and performance of the candidate. Maximum marks in internal assessment of each paper is 100.

### MCA-101: Computer Architecture

**Theory & Tutorial: 4 hours per week ( 4 Credits)**

**Examination: Theory Paper – 3 hours; Max. Marks – 100**

### Note:

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

### Unit-I

Logic gates, basic combinational logic, Boolean functions & Expressions, multiplexer, decoders, encoders, comparators, adder and substructures, BCD to 7 segment-decoder, sequential circuits, RS, JK, D and T flip flops, counter and shift register, Clock and Timing events.

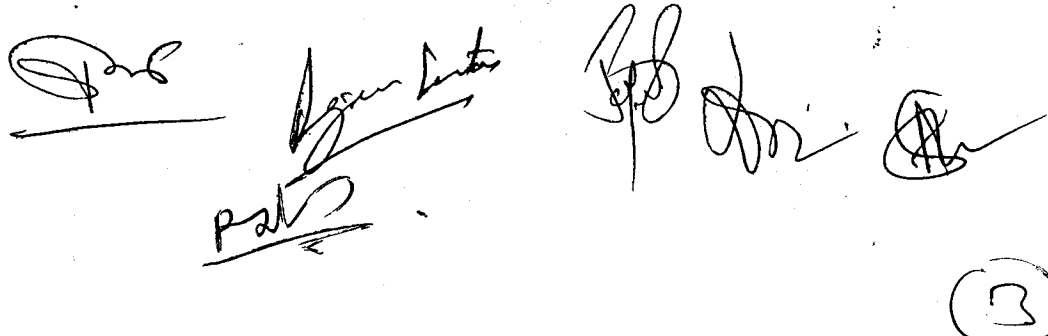
### Unit-II

Addressing methods and machine program sequencing memory location addresses, encoding of information, instructions types, Instruction format and instructions sequencing addressing modes, paging, relative, indirect and indexed addressing.

Basic of Computer organization: System buses and instruction cycles, memory subsystem organization and interfacing, I/O subsystem organization and interfacing, Register transfer languages.

### Unit-III

CPU design: Specifying a CPU, design and implementation of a simple CPU (fetching instructions from memory decoding and executing instructions, establishing required data paths, design of ALU, Number representation, Arithmetic operations, floating point arithmetic. Design of the control unit and design verification), design and implementation of a simple micro-sequencer.



### Unit-IV

Memory Organization: Main memory concepts, Auxiliary memory, Associative memory, virtual memory & paging and cache memory organization.

Input and Output organization: Asynchronous data transfer, programmed I/O Interrupts (types, processing of interrupts implementing interrupts inside CPU) Direct memory access, I/O processors, serial communication.

#### Recommended reference/Text Books

1. John D. Carpinelli: Computer Systems Organization & Architecture; 3<sup>rd</sup> Edition; Person Education Asia, 2008
2. M, Morris Mano; Computer System Architectures; III Edition, Prentice Hall of India, 2008
3. Malvino B ; Digital Computer Electronics III Edition; TMHL
4. John P. Hayes, Computer Architecture and Organization, McGraw Hill, International Edition.
5. Vincent J P Heuring and Harry f Jordan: Computer Systems Design & Architecture , Addison Wesley, Person Education Asia.

### MCA102: Business Accounting and Financial Management

**Theory & Tutorial: 4 hours per week ( 4 Credits)**

**Examination: Theory Paper – 3 hours; Max. Marks – 100**

**Note:**

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

### UNIT I

**Financial Accounting** – Definition ,Scope and Objective of Financial Accounting. Users of accounting information, Limitations of Financial Accounting. Financial Accounting Principles, Concepts and Conventions. Accounting Standards – Concepts, objective and Benefits, Accounting Standards in India.

**Management Accounting** – Nature and Scope of Management Accounting, Difference between Cost Accounting and Management Accounting, Cost Control, Deducting and Management



## UNIT II

**Methods of Accounting :** Double Entry Accounting System, Type of Accounts, Prime & Subsidiary Books, Rules for Debit and Credit, Cash, Bank and Credit Transactions. Cash and Trade Discounts.

Preparation of Journal & Ledger Accounts, Bank Reconciliation Statements, Preparation of Trial Balance.

**Depreciation** – Meaning, need and importance of depreciation, Methods of Changing Depreciation, Provisions & Reserves, Rectification of Errors.

## UNIT III

**Final Accounts :** preparation of Final Accounts, Trading accounts, Profit accounts, Loss accounts, and Balance Sheet covering simple adjustments.

**Financial Analysis :** Meaning and Importance of Financial Analysis, Techniques – Comparative Financial Statements, Common Size Financial Statements and Trend Analysis.

**Ratio Analysis-** Meaning, Advantages and Limitations of Accounting Ratios. Ratios Computation- Gross Profit, Net Profit, Stock Turnover, Current, Liquid, Debtors and Creditors ratios, Return on capital employed, Earning per share, Return on shareholders fund.

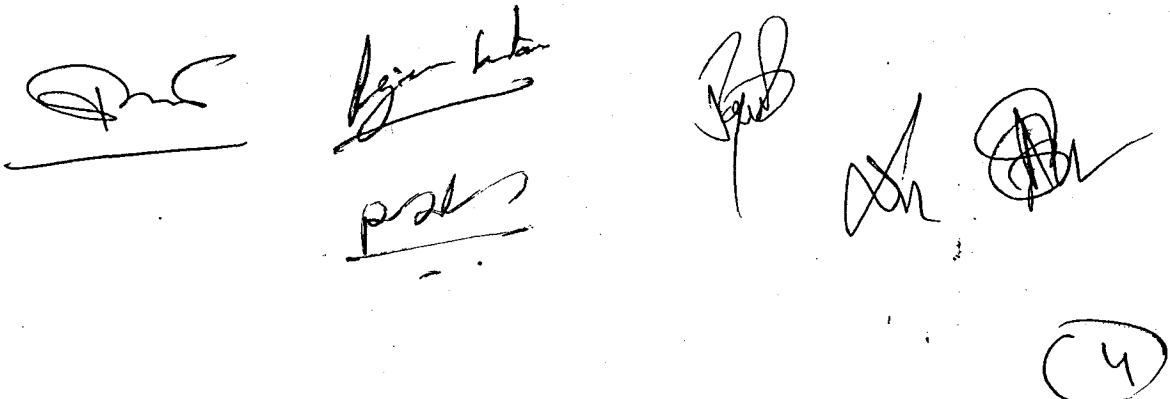
## UNIT IV

**Budgetary Control :** Meaning, Advantages and Limitations of Budgetary Control, Procedure for setting up Budgetary Control, Type of Budgets, Advantages and Limitations of Cash Budget and Preparation of Cash Budget.

**Marginal Costing -** Meaning, Advantages and Limitations of Marginal Costing, Break Even Point, Margin of Safety, Profit Volume Ratio, Simple Applications of Marginal Costing. (including simple problems of make, buy and product).

### Recommended reference books :

1. Shukla & Grewal : Advanced Accounts.
2. Sharma, Shah, Agrawal : Financial Accounting.
3. Rajesh Agrawal & R. Srinivasan : Accounting Made Easy (Tata McGraw-Hill)
4. Anil Chowdhary; Fundamentals of Accounting and Financial Analysis; Pearson Education.



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### MCA 103: Database Management Systems

**Theory & Tutorial: 4 hours per week ( 4 Credits)**

**Examination: Theory Paper – 3 hours; Max. Marks – 100**

**Note:**

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

#### Unit-I

**Overview of DBMS:** Basic concepts, Database system architecture, Schemas, Instances, Components, Database users, Three-tier architecture, Centralized, Distributed and Client/Server architecture, Data independence. Database models: Entity relationship model, hierarchical model, relational model, network model, Object-Oriented data model.

**Data Modeling using ER Model:** ER model concepts, ER diagram, mapping constraints, Keys, Generalization, aggregation, reduction of ER diagrams to tables, extended ER model, Relationship of higher degree. Enhanced ER Model : Concepts, Specialization, Generalization, Data abstraction, Knowledge representation and University EER Model as example.

#### Unit-II

**Relational Model :** Concepts, Constraints, Languages, Relational database design by ER & EER mapping, Relational algebra relational calculus.

**Normalization :** Functional dependencies, Normal forms – First, second, third and BCNF, inclusion dependencies, loss join & decompositions, normalization using FD, MVD and JDs, Alternative approach to database design.

#### Unit-III

**Data storage :** Magnetic disk and flash storage, RAID technology, tertiary storage, Indexing structure, Single and multiple level.

**Transaction processing :** Transactions atomicity, durability, serializability and isolation. Concurrency control techniques – Two phase locking, timestamp ordering, multiversion, Granularity locking techniques, Database recovery techniques based on deferred & immediate updates and shadow paging.

#### Unit-IV

SQL: Characteristics of SQL, advantages, data types in SQL, SQL Operators, types of SQL commands, Tables indexes, Views Nulls, Aggregate Functions, Select statement, Sub queries, Insert, Update and Delete operations, Joins, Unions. Introduction to Embedded SQL, Dynamic SQL & SQLJ, Data security, Integrity and concurrency, Backup and recovery, numeric and text data in SQL dealing with dates, Synonyms, Snapshots, Programming with SQL.

**Reference Books:**

1. Korth H F and Silberschataz A, System Concepts, Sixth Edition; McGraw Hill, 2006
2. Leon, and Leon, SQL Tata McGraw Hill Pub. Co. Ltd.
3. Ivan Bayross; SQL/PL 4<sup>th</sup> Edn: BPB, 2009
4. Navathe S.B. Elmasri R.; Fundamentals of Database Systems, Fifth Edition, Pearson 2009.
5. Ramakrishan and Gharke, Database Management Systems, 3<sup>rd</sup> Edition, Tata Mc Graw Hill, 2003.
6. Data C J Database Management Systems, Pearson Education Asia.
7. Singh S.K.; Database Systems; I Edition; Pearson, 2006.

**MCA 104 : Algorithm and Data Structure**

**Theory & Tutorial: 4 hours per week ( 4 Credits)**

**Examination: Theory Paper – 3 hours; Max. Marks – 100**

**Note:**

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

**Unit-I**

Algorithms, pseudo code, efficiency of algorithms, analyzing algorithms and problems, complexity measures, basic time analysis of an algorithm, space complexity. Data abstraction and basic data structures, data types and abstract data types.

Basic data structure – Arrays, Stack, Queues and their applications, linked and sequential representation of arrays, stacks & queue.

**Unit-II**

Linked lists, representation of linked list in memory. insertion, deletion and searching of linked list, two way lists. Arithmetic expressions, Polish notations, dequeue and priority queues.

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Trees: Basic concepts, linked representation, representation in continuous memory. Binary and N-ary trees, Searching, insertion and deletion in binary search tree, traversing algorithms using stacks, header nodes threads.

### Unit-III

Graphs and their representations, sequential representation- Adjacent matrix, linked representation of graphs, operations on graph, traversing a graph. DFS and BFS algorithms. Heap structures, heap sort algorithm .

### Unit-IV

Sorting and Searching: Use various data structures for searching and sorting, Internal and external sorting techniques, linear and binary search, Hash tables & Hashed searching, Bubble sort, Insertion sort, Selection sort, Merge sort, Radix sort, quick sort.

#### Recommended reference books

1. S. Lipschutz: Data Structures; Mc Graw Hill International Edition, 2008.
2. A.V. Aho, J.E. Hopcroft, and J.D. Ullman, Data Structures and Algorithms, 3<sup>rd</sup> Edition; Pearson Education Asia, 2008
3. Salaria R.S.: Data Structure and Algorithms Using C/C++; 4<sup>th</sup> Edition; Khanna.
4. Jean-Paul Tremblay and Paul G. Sorenson, An Introduction to Data structures with applications TMH Publishing Co.Ltd.
5. A. Michael Berman: Data Structures via C++ Oxford University Press.
6. Jean-Paul Tremblay and Paul G. Sorenson, An Introduction to Data Structures with application, TMH Publishing Co. Ltd.

## MCA 105 : Programming in C

**Theory & Tutorial: 4 hours per week ( 4 Credits)**

**Examination: Theory Paper – 3 hours; Max. Marks – 100**

#### Note:

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

### Unit-I

Problem solving with computers, Flow charts, Basic concepts of programming languages, programming domains.

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C Character set, variables and constants, keywords, Type checking, Scope and lifetime data types. Operators, Instructions, assignment statements, arithmetic expression, comment statements, simple input and output, Boolean expressions.

### Unit-II

Control structures, decision control structure, loop control structure, case control structure. String and character handling, arrays and string processing, data validation examples. Functions, function prototype, subroutines, scope and lifetime of identifiers parameter passing mechanism, recursion.

### Unit-III

User defined data types, enumerated data types, unions, structures, array of structures,

Unions of structures. Storage class specifies, Pre processors header files and standard lib, Functions.

Pointer : Definition and uses of pointers, arithmetic , pointers and arrays, pointers and function, pointer to pointer, pointer to structures. Dynamic memory allocation.

### Unit-IV

Console Input and Output functions, data files, operations on data files, text and binary files, formatted data files.

**Implementation of simple data structures :** Stacks, Queues, Linked Lists, trees, searching and sorting algorithms.

Interaction with hardware, system calls, command line arguments, operations on bits, Bit-fields. Graphics in C

#### Recommended reference books:

1. Gottfried B; Programming with C: Schaum Qutlines; Mc Graw Hill Edition.
2. Balagurusamy E; Programming in ANSI C;Fifth Edn; Mc Graw Hill,2011.
3. Kanetkar Y.; LET US C; X Edition, BPB,2010
4. Deitel HM & Deitel JP; C How to program; 5<sup>th</sup> Edn; Pearson Pub.

### MCA 106: Discrete Mathematics

**Theory & Tutorial: 4 hours per week ( 4 Credits)**

**Examination: Theory Paper – 3 hours; Max. Marks – 100**

#### Note:

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.

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3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

### Unit-I

**Set Theory :** Ordered set, Cartesian product of sets, partition of set, countable and uncountable sets, Russell's paradox, principle of inclusion-exclusion, mathematical induction.

**Relations and Function:** Binary relation, n-ary relation, representation of a relation by a directed graph and matrix, equivalence relation, partially order relation, partially ordered set, total order relation, dual of partial order relation, hasse-diagram, chains and anti-chains.

Modules function, greatest integer function, hash function, composition of function, pigeonhole principle.

**Groups, Rings And Fields:** Definition and simple examples of Groups, Rings Integral Domains, fields.

### Unit-II

**Logic & Proofs:** Propositions, Basic Logical operations, truth tables, Logical equivalence, Algebra of Propositions, conditional and Bi-conditional propositions, de Morgan laws for logic, Tautologies & contradiction, Quantifiers, Arguments, Logic Inference, Direct Proof by contradiction.

**Lattices, Boolean Algebra, Switching Circuits & Digital Logic Gates:** Definition & examples of lattices, elementary properties of lattices, distributive lattice, Bounded lattice, Complemented lattice, Dual of lattice.

Boolean Algebra, Boundaries laws, absorption laws, Idempotent laws, Involution Laws, cancellation laws, associative laws, De' Morgan's laws, Boolean expressions and functions, Disjunctive normal form, conjunctive normal form.

Switching circuits, Equivalent switching circuits, combination of swatches, digital logic gates.

### Unit-III

**Graph Theory :** Simple and multi-graph, Types of simple graph ( Regular graph, complete graph, Bipartite graph, cycle, wheel, planner graph, complementary graph) directed graph, Connectedness, in graph, Euler graph, Hamiltonian graph, weighted graph, shortest path problems, traveling salesman problems, Euler formula, operations on graphs, sub graph colouring of graph, chromatic number.

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Trees: Properties of Trees, eccentricity of vertex, centre of graph, Radius & diameter of graph, sub tree, Rooted tree, Binary tree, M-ary tree, Height of Binary tree, Spanning tree, Kruskal's Algorithm, Minimal spanning tree.

#### Unit-IV

**Recurrence Relation & Generating Function:** Discrete numeric function, generating function, Recurrence relations, Homogeneous linear Recurrence relation with constant coefficients.  
**Finite State Machine :** Finite state machines as models of physical systems, equivalent machine, finite state machine as language recognizes, finite state language of type-3 languages.

#### Recommended Books:

1. C.L. Liu "Elements of Discrete Mathematics" ; 12<sup>th</sup> Edition, Tata McGraw Hill Pub. Comp. Ltd., 2000.
2. John Truss " Discrete Mathematics for Computer Scientists" – Pearson Education, Asia
3. Kenneth H.Rosen" Discrete Mathematics & its Applications", 6<sup>th</sup> Edition, Tata McGraw-Hill pub. 2007.
4. Seymour Lipschutz, Mare Lars Lipson and Varsha H. Patil " Discrete Mathematics"; 2<sup>nd</sup> Edition Tata Mc Graw-Hill Pub. Comp. Ltd., India. 2008.
5. Chaurasia VBL, Srivastava A.; Discrete Mathematics; 5<sup>th</sup> Edition; Genius; 2010.
6. Johnson Baugh; Discrete Mathematics; 5<sup>th</sup> Edition Pearson; 2002.
7. Bernard Kolman, Robert C. Busby and Sharon Culter Ross " Discrete Mathematical Structures" Prentice Hall of Indian New- Delhi.

#### MCA 111: Programming in C & DS Lab

Practical Lab

Examination : Practical Examination

Lab Exercise on Theory Paper MCA 104 and MCA 105

#### MCA 112: DBMS Lab

Practical Lab

Examination : Practical Examination

Lab Exercise on Theory Paper MCA 103

#### MCA 113: Office Management Lab

Practical Lab

Examination : Practical Examination

Word Processing, Spread sheet program, data processing, Presentation Program, Web Surfing and other Internet services.

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# Syllabus of MCA II Semester: 2014-15

## MCA-201: Object Oriented Programming Using C++

Theory & Tutorial: 4 hours per week ( 4 Credits)

Examination: Theory Paper – 3 hours; Max. Marks – 100

**Note:**

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

### Unit-I

Need of object Oriented Programming, Advantages of OOP, Comparison of Functional Programming and OOP approach, Essentials of OOP ( Objects, Classes, Encapsulation, Data abstraction, Inheritance, Reusability, Polymorphism, Delegation, Message Communication).

C++ Basics : Preprocessors, comments, Data types, Operators, Expressions, Loops and Decisions, Arrays and String handling, Modular programming with Functions, Structure and Unions.

### Unit II

Pointers and Run time binding, Dynamic memory allocation, Storage class specifies. Classes, Member functions, Objects, Arrays of objects. Pointers : Addresses and pointers, pointer & arrays, pointer & functions, use of pointers in strings and pointers to objects. and Classes, Nested classes, Constructors, Destructors, Inline member functions, Friend Functions, Static member function.

Inheritance, Single Inheritance, types of base classes, types of derivations, multiple inheritance, container classes, member access control.

### Unit- III

Functions Overloading, Operator Overloading, polymorphism, early binding polymorphism with pointers, Unary and Binary Operator Overloading, Overload Assignment Operator, Copy Constructor, Data Conversion between Objects of different classes. C++ Free Store.

Virtual Function : Virtual Function, late binding, pure virtual functions, abstract classes, Generic Programming with Templates, Friend function, Overloaded Function Templates, Multiple Arguments function Template.

The bottom of the page contains several handwritten signatures and initials. From left to right, there is a signature that appears to be 'D. S.', followed by another signature that is partially obscured and looks like 'V. S. S.', then a signature that looks like 'P. S.', and finally a signature that looks like 'A. S.' with a circled 'A' next to it.



## Unit-IV

Stream Computation with Console, Stream Computation with Files, opening and closing of file stream state member function binary file operations structures and file operations, classes and file operations, random access file processing. Exception handling: Exception handling mechanism throwing mechanism, Catching mechanism. Implementation of basic data structures in C++ such as arrays, stack, queues, linked list and sequential representation.

### Recommended Books

1. Herbert Schildt; C++ : The Complete Reference 4<sup>th</sup> Edn; TMH, 2003.
2. Robert Lafore; Object Oriented Programming in C++ 4<sup>th</sup> Edition; Techmedia.
3. Balagurusamy ; Object Oriented Programming in C++; 4<sup>th</sup> Edition TMH,2009.
4. Venugopal, Rajkumar; Mastering C++; Tata Mcgrow Hill, 2006.
5. Kanetkar Y.: LET US C++; BPB; 2009.
6. Deitel and deitel; How to program C++, Addison Wesley, Pearson Education Aisa
7. John R. Hubbard, Programming with C++, McGraw Hill Internatinal.

## MCA 202 : Operating System Fundamentals

**Theory & Tutorial: 4 hours per week ( 4 Credits)**

**Examination: Theory Paper – 3 hours; Max. Marks – 100**

### Note:

4. Candidate has to attempt five questions in all. All questions carry equal marks.
5. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
6. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

### Unit-I

Necessity of an Operating System, Operating system structure, Evolution of Operating System ( multiprogramming systems, batch systems, timesharing system, distributed systems and Real Time system), Operating system structure, Operating system components and services, system calls, system programs, Virtual machines.

### Unit-II

Process management: process concept, process scheduling, cooperating processes, Threads, Inter-process communication, CPU scheduling criteria, Scheduling algorithms, Multiple-processor scheduling, Real time scheduling and Algorithm evaluation.

Process Synchronization and Deadlocks: The Critical section problem, synchronization hardware semaphores, Classical problems of synchronization, Critical regions, Monitors,

The bottom of the page contains several handwritten signatures and marks. From left to right, there is a signature that appears to be 'Raj', a signature that appears to be 'Ajay Kumar', a signature that appears to be 'Raj', a signature that appears to be 'Raj', and a signature that appears to be 'Raj'. Below these signatures, there are several circular marks, including a large circle containing the number '8'.

Deadlocks-System model, Characterization, Deadlock prevention, Avoidance and Detection, Recovery from deadlock, Combined approach to deadlock handling.

### Unit-III

Storage management: Memory management- Logical and Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation with paging, Virtual Memory, Demand paging and its performance, page replacement algorithms, Allocation of frames, Threshing, Page Size and other considerations, Demand segmentation, File systems, secondary storage Structure, File concept access methods, directory implementation, Efficiency and performance recovery, Disk structure, Disk scheduling methods, Disk management , Recovery Disk structure, disk structure, disk scheduling methods, disk management, Swap-Space management, Disk reliability.

### Unit-IV

Goals of Protection, Domain of protection, The Security problem, Program threats, Authentication, One Time passwords, program threats, System threats, Threat Monitoring, Encryptions. Computer Security techniques.

**Case Study:** Windows NT – Design principles, System components, Environments subsystems, File system, Networking and program interface.

#### Recommended books:

1. Galvin P.B, Silberschatz; Operating System Principles; ( Seventh Edition),J Wiley 2008
2. Tanenbaum A.S, Modern Operating Systems, 2<sup>nd</sup> Edn. PHI Publ,2003
3. William Stalling: Operating Systems, Internal & Design Principles, Sixth Edn; Pearson, 2009.
4. Gary Nutt: Operating Systems-A Modern Perspective (Second Edition) , Pearson Education, 2008.
5. D.M. Dhamdhare: Systems Programming and Operating Systems ( Second Edition), Tata McGraw Hill Publishing company Limited.
6. Harvey M. Deitel, Operating Systems, Pearson Education.

### MCA-203 – Computer Oriented Numerical Methods

**Theory & Tutorial: 4 hours per week ( 4 Credits)**

**Examination: Theory Paper – 3 hours; Max. Marks – 100**

#### Note:

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.

3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

#### Unit-I

Floating Point Arithmetic-Representation, Operation, Normalization, Pitfalls of Floating – point Representation; Errors in Numerical computation, Measures of Accuracy.

Locating Roots of Equations: Bisection Method, Newton's Method, Secant Method, Muller's Method.

#### Unit-II

Interpolation and Numerical differentiation: Newton's Forward Difference Interpolation, Newton's Backward Difference Interpolation, Langrange's Interpolation Formula.

Numerical Integration Definite Integral, Trapezoid Rule, Simpson's Rule, Romberg Algorithm, Adaptive Simpson's Scheme, Gaussian Quadrate Formulas.

#### Unit-III

Solution of Linear Equations: Gaussian Elimination, Gaussian Elimination with Scaled Partial Pivoting, Iterative Solution of Linear Systems, Gauss-Seidel Iteration Method, Power Methods, Eogenvales and Eignevectors.

Ordinary differential Equations Initial-Value Problem: Analytical vs. Numerical Solution, Taylor Series Methods, Runge-Kutta Methods, Euler method.

#### Unit-IV

Smoothing of Data and the Method of Least squares, Least Squares curve fitting, Straight line and non Linear curve fitting, Cubic splines, Chebyshev polynomials.

Random Numbers, Estimation of Areas and Volumes by Monte Carlo Techniques.

Recommended Books;

1. Rajaraman V : Computer Orinted Numerical Methods, 3<sup>rd</sup> Edition; PHI,2005.
2. R.S. Salaria; Computer Orinted Numrical Methods; 4<sup>th</sup> Edition; Khanna Pub.
3. Balagurusamy E; Numerical Methods; 1 Edition; Mc Graw Hill.,2010
4. Sastri; Introductory methods of Numrical Analysis; 3<sup>rd</sup> Edition; PHI,2001.
5. K. Sankara Rao, Numerical Methods for scientists and Engineers, Prentice Hall India.
6. Cheney and David Kincaid, Numerical Methods and Computing, Brooks/Ie, 2004
7. Krishnamurthy E. V., Sen S.K. Computer Based Numerical Algorithms, East-West Press

The image shows several handwritten signatures and initials in black ink. From left to right, there are: a signature that appears to be 'Rajaraman V', a signature that appears to be 'R.S. Salaria', a signature that appears to be 'Balagurusamy E', a signature that appears to be 'Sastri', a signature that appears to be 'K. Sankara Rao', a signature that appears to be 'Cheney and David Kincaid', and a signature that appears to be 'Krishnamurthy E. V., Sen S.K.'. Below these signatures, there are several initials and a circled number '9'.

## MCA 204: Data Communication and Computer Network

**Theory & Tutorial: 4 hours per week ( 4 Credits)**

**Examination: Theory Paper – 3 hours; Max. Marks – 100**

**Note:**

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

### Unit-I

Overview of Data Communication and Network: Basic concept –Computer communication methods, Data Transmission modes, Signals, Modulation – Principles of Modulation, AM and FM Modulator Circuits, pulse Code Modulation, signaling and decoding Digital Band-pass Modulation, Demodulation – detection, signals and Noise, Detection of Binary Signal in Gaussian Noise, Demodulation of shaped Pulses, Digital Band Pass demodulation.

Network Models : Internet model, OSI seven layer network model, Functions of OSI layers, LAN technologies – protocols and standards, LAN hardware, TCP/IP ( Protocols, architecture, layers, services).

### Unit-II

Data transmission: Data Communication Systems, DTE-DCE Interface, Modems, Transmission media( Guided & Unguided), Multiplexing – FDM, WDM, TDM, Digital Subscriber Line ( Operation, Layers, Traffic control), FTTC, Error detection and correction; Microwave-Electromagnetic spectrum, Characteristics, use of MIW in communications; PM Microwave Radio Repeaters, Satellite- Artificial Satellite, Geosynchronous Satellites, Orbital classification, Spacing and Frequency allocation, Multiple accessing.

Optical fiber communication : Basic concept of light propagation, Fiber Cables, Light sources, Optical Detectors, Fiber cable losses, wave division multiplexing, fiber distributed data interface, the fiber channel

### Unit-III

Internet: Internet Architecture, Internet protocol and datagram, Routing protocols, UDP, Internet standard services, DNS.

Networking Technology, ISDN ( Services, Channels, Layers, Broadband ISDN), Cable Modem System, SMDS, Frame relay, fast Ethernet, 100VG-any LAN and Gigabit Ethernet, FDDI and CDDI, Asynchronous Transfer, SONET ( architecture, Layers, frame, Applications), DWDM Switching and Virtual LAN, Non-ATM Virtual LANs IEEE 802.IQ VLAN standard, X.25 protocols, ATM ( Architecture, layers, classes, services).

Networking and Internetworking Devices : Repeaters, Bridges, routers, Gateways and roles of these devices in communication.

The bottom of the page features several handwritten signatures and initials. From left to right, there is a signature that appears to be 'D. S.', followed by a signature that looks like 'Rajendra Kumar', then a signature that is partially obscured and looks like 'P. S.', and finally two more signatures on the right side, one of which is a circular stamp or signature.

**Unit-IV**

Network Performance, Analytical approaches, simulation, traffic monitoring, Network Management- SNMP, RMON and RMONv2, TMN, Directory services and network management.

Issue related to network reliability and security, SSL and VPN, Introduction only to firewalls and Kerberos, Cyber Laws.

**Recommended Books;**

1. Behrouz A Foruzan, Data Communication and Networking; 3<sup>rd</sup> Edition; Tata McGraw Hill, 2004
2. Behrouz A Foruzan, TCP/IP Protocol Suite; 2<sup>nd</sup> Edition; Tata McGraw Hill, 2003.
3. Stalling William; Data and Computer Communication; 8<sup>th</sup> Edition Pearson, 2009.
4. Tannenbasum; Computer Networks; 4<sup>th</sup> edition, PHI 2008.
5. Wayne tomasim electronic Communications Systems, Pearson, Education Asia.
6. M.A. Miller, Data and Network Communications, Thomson Kearing
7. Gilbert Held, Understanding Data Communication, Techmedia.
8. Fred Harshal, Data Communications Communications, Networks, Pearson Education Asia.

**MCA 205: Web Design and Development**

**Theory & Tutorial: 4 hours per week ( 4 Credits)**

**Examination: Theory Paper – 3 hours; Max. Marks – 100**

**Note:**

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions, carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

**Unit-I**

Creating and Maintaining Web Sites; Planning, Navigation and Themes, Site types and Architecture, Elements of a Web page( Pages & Layout, Text, colour, Images, GUI Forms & GUI Features), steps of creating a site, Web site Planning, Web Site Designing Process, publishing and publicizing site/structuring web site. The Web Medium, Web Searching, Adding Search facility, Optimizing for Search Engines, Site Maps and other Navigation Aid, Site Delivery and Management.

**Unit-II**

Introduction of HTML and XHTML : introduction markup language, editing HTML & XHTML: Common tags, headers, text styles linking, images, formatting text, horizontal rules and more line breaks unordered lists nested and ordered lists, basic HTML/XHTML tables:

The bottom of the page contains several handwritten signatures and marks. From left to right, there is a signature that appears to be 'P. S. D.', followed by another signature that looks like 'P. S. D.', and then a signature that is partially obscured. To the right of these signatures, there are several circular marks, including one that contains the number '10'.

Theory & Tutorial: 4 hours per week ( 4 Credits)

Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

### Unit-I

Introduction: Elements of graphics workstation , Video Display Devices. Raster Scan Systems. Random Scan systems. Input devices, Graphics Software ,Coordinate Representations.

Algorithms: Line drawing algorithms- DDA Algorithm. Bresenham's Line Algorithm. Frame buffers. Midpoint Circle Algorithm. Midpoint Ellipse Algorithm, Scan-Line polygon fill algorithm. Inside-Outside tests Scan-Line fill of curved Boundary Areas. Boundary fill algorithms. Flood fill Algorithm.

### Unit-II

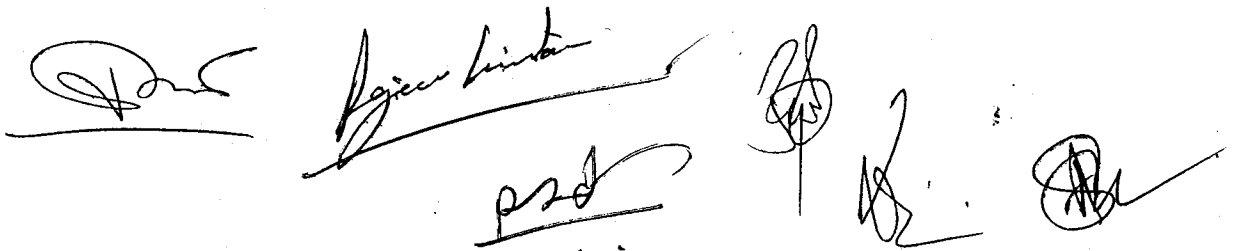
Graphics Primitives: Primitive Operations, The display file interpreter, Normalized Device Coordinates. Attributes of output primitives: Line attributes, Color and gray scale levels. Colortables. Gray scale. Area-Fill Attributes, Fill styles. Pattern fill. Soft fill. Character Attributes.

Geometric Transformations: Matrices. Scaling Transformations. Sin and Cos Rotation. Homogeneous Co-ordinates and Translation. Co-ordinate Translations. Rotation about an arbitrary point. Inverse Transformations, Scaling Transformation, Reflection and Shear transformations, Transformations Routines.

### Unit-III

2-D Viewing – The viewing pipeline, Viewing co-ordinate, Reference Frame. Windows to view ports. Co-ordinate transformation 2-D Viewing functions. Clipping operations point clipping. Line clipping. Cohen-Sutherland. Line Clipping. Polygon clipping. Sutherland Hodge man clipping.

3-D concepts: Three dimensional Display Methods, Parallel projection. Perspective projection, Visible line and surface identification. Surface rendering. Three Dimensional Object representations. Bezier curves and surfaces. B-Spline curves and surfaces. Visibility, Image and Object Precision Z-buffer algorithm.

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intermediate tables and formatting, forms, more complex forms, internal linking, creating and using image maps.

### Unit-III

Java script- introduction to scripting language, memory concepts, arithmetic decision making. Java script control structures, Java script functions, program modules in java script, function definitions duration of identifiers, scope rules, recursion java script global functions.

Java script arrays: introduction, array declaring and allocating memory, passing arrays to functions, multiple subscripted arrays. java script objects-introduction, math, string, data, Boolean and number objects etc.

Introduction to PHP: Advantages of PHP, functions, Data types, Arrays, SQL, Connecting Databases using ODBC, Files, Forms, Images, IMap objects.

### Unit-IV

Dynamic HTML : CSS : introduction- inline styles, creating style sheets with the style element, conflicting styles, linking external style sheets, positioning elements, background element dimensions, text flow and the box model, user style sheets.

Dynamic HTML; object model and collections; introduction object referencing collections all and children, dynamic style, dynamic positioning using the frames collection, navigator object.

Dynamic HTML; event model : introduction, event ON CLICK, event ON LOAD – error handling with ON ERROR, tracking the mouse with event more DHTML, events. Filters and Transitions; Dynamical HTML; Client side scripting with VB script. Introduction – Operators-Data Types and control structures – VB Script functions-arrays- string manipulation classes and objects.

#### Recommended Books:

1. M.L. Young; Complete Reference b: Internet; 2<sup>nd</sup> Edition; Tata McGraw Hill, 2006
2. Thomas A; Powel: Web Design ; C.R. : Second Edition TMH,2009.
3. Thomas A. Powel : HTML & XHTML : C.R. Fourth Edition; TMH, 2008
4. Harely Hahn: the Internet, Tata Mc Graw Hill.
5. G. Roverston; Hands on HTML., BPB Publication
6. D.A. Tauber, B. Kienan; Microsoft From Page 2000, BPB Publications.
7. Joel Sklar: Principles of Web Design BPB Publication

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Computer Animation : Design of Animation Sequence, General computer Animation Function- Raster animations, Key Frame system, Morphing, Simulating Accelerations, Motion Specifications, Kinematics and Dynamics.

Recommended Books:

1. Hearn D., Baker P.D.: Computer Graphics; 2<sup>nd</sup> editions; Pearson.2003.
2. Foley J.D.; Van D.A. : Fundamentals of Interactive Computer Graphics; 2<sup>nd</sup> Edition; Addison-Wiley,2000
3. Ronger D.F. ; Elements of Computer Graphics;
4. Giloi W.K. ; Interactive Computer Graphics; PHI
5. Mewman W, Sproul R.F. ; Principles of Interactive Computer Graphics; Mc Graw Hill.

**MCA 211: Computer Oriented Numerical Methods Lab**

Practical Lab

Examination: Practical Examination-  
Exercises based on the Theory paper MCA 203.

**MCA 212: Programming in C++ Lab**

Practical Lab

Examination: Practical Examination-  
Exercises based on the Theory paper MCA 201.

**MCA 213: Web authoring Tools Lab**

Practical Lab :

Examination: Practical Examination-  
Exercises based on the Theory paper MCA 205.

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## Syllabus of MCA III Semester-2015-16

### MCA-301 : Programming in Java

**Theory & Tutorial: 4 hours per week ( 4 Credits)**

**Examination: Theory Paper – 3 hours; Max. Marks – 100**

**Note:**

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

#### Unit-I

**Introduction to OOP :** Paradigms of Programming Languages – Basic concepts of Object Oriented Programming , Objects and Classes, Data abstraction and Encapsulation; Inheritance, Polymorphism, Dynamic binding, Message communication: Benefits of OOP; application of OOPs.

**Introduction to Java :** History, Java features, Java Environment- JDK, API. Types of Java program, Creating and Executing a Java program; Java tokens: Keywords, Character set, Identifiers, Literals, Separator; Java Virtual Machine (JVM); Command Line Arguments; Comments in Java program.

**Elements:** Constants Variables, Data types, Scope of variables, Type casting. Operators- Arithmetic, Logical, Bit wise operator, Increment and Decrement, Relational, Assignment , Conditional ,Special operator, Expressions, Evaluation of expressions.

#### Unit-II

**Decision Making and Branching:** If statement and its types, switch statement; Decision making and looping -while loop, do While, for loop, break labeled loop, continue statement.

**Arrays:** One Dimensional Array, Multidimensional Array, Vectors, Wrapper classes; String Array, String Methods, String Buffer Class.

**Class and Objects :** Defining a class, Methods, Creating objects, Accessing class members, Constructors, Method overloading, Static members, Nesting of Methods, this keyword, command line input.

**Inheritance :** Define a subclass, deriving a sub class, Single Inheritance, Multilevel Inheritance, Hierarchical Inheritance, Overriding methods, Final variables and methods, final classes, Finalizer methods, Abstract methods and classes, Visibility Control- Public access. Private access, friend, protected. Interface-Multiple Inheritance, Defining interface, Extending interface, Implementing Interface, Accessing interface variables.

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### Unit-III

**Packages:** Java API Packages-System Packages, Naming Conventions, Creating & Accessing a Packages, Finding Packages and CLASSPATH, Adding Class to a Packages, Hiding Classes.

**JAVA Streams :** Data Flow with Java Streams, Input Streams, Output Streams.

**Exception Handling;** Limitations of Error handling, Advantages of Exception Handling, Types of Errors, Basics of Exception Handling, try blocks, throwing an exception, catching an exception, finally statement. declaring and throwing custom Exceptions.

**Multithreading:** creating threads, life of a thread, defining & running thread, thread methods, thread priority, synchronization, implementing run-able interface, thread scheduling.

### Unit-IV

**Collections ;** The Collection Framework, The Collection Classes, implementation of List, Set and Map interface, Accessing a Collection via an Iterator, object Ordering, The SortedSet and SortedMap Interface, Comparators.

**GUI in Java :** applet and it uses; Abstract window tool kit, Event Handlers, Event Listeners. AWT Controls and Event Handling- Labels, Text Component, ActionEvent, Buttons, CheckBoxes, ItemEvent, Choice, Scrollbars, Layout Managers, Input Events, Menus; Introduction to Swing

**Networking:** Java utility for networking, Manipulating URLs, reading a file on a Web server. Establishing simple Client Server.

Recommend Reference /Text Books:

1. Patrick Naughton, Herbert Schildt :, Java, The Complete Reference : 7<sup>th</sup> Edition.
2. E. Balagurusamy: Programming with Java- Tata McGrawHill Publishers, II Edition.
3. Khalid A. Mughal, Rolf W. Rasmussen; A Programmer's Guide to Java Certification (2<sup>nd</sup> Edn.).
4. Cay. S Horstmann, Gary Cornell; Core Java Vol I & II; The Sun Micro Systems Press.
5. Ken Arnold, James Gosling: Core Java Fundamentals( Volume I and Volume 2). 2<sup>nd</sup> Edition-, Addison Wesley.
6. Kathy Sierra, Head first Java, 2<sup>nd</sup> Edition, Orielly.
7. Bruce Eckel: Thinking in Java, 4<sup>th</sup> Edition.

### MCA-302: System Analysis and Design Concepts

**Theory & Tutorial:** 4 hours per week ( 4 Credits)

**Examination:** Theory Paper – 3 hours; Max. Marks – 100

**Note:**

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.

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3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

#### Unit-I

System Concepts and the information systems Environment: The System concept Definition, System Central Objectives, Elements of a system, Environment, Boundaries and interfaces. Types of systems- Physical or Abstract systems, Open or Closed systems, Role, Need and Responsibility of System Analyst, Introduction to system Development approaches- Data Oriented and Object Oriented.

System Development Life Cycle : Linear or Waterfall Cycle, Linear cycle, phases of SW Development Life Cycle.

System planning and Analysis : Strategies for determining information requirement, Problem definition & Project initiation, Background analysis, Data and Fact Gathering Techniques, Feasibility Studies- Technical, Operational, economic, cost benefit analysis, Interface design tools, user interface evaluations.

#### Unit-II

System Design: Process modeling, Physical and logical design. Conceptual Data modeling, Entity Relationship analysis, ER modeling, Context diagram. Tools of structured analysis ( DFD, Data dictionary, Decision Tree, Decision tables, Structured English). Structure Charts, Modules, Parameter passing. Execution sequence, Structured Design, Conversion from Data Flow Diagrams to Structure Charts.

Input/Output Forms Design : Requirement of forms design, User Interface Design, Input design, CRT Screen forms design, Output design.

Files organization and Database Design techniques and CASE tools.

System Implementation, Maintenance and documentation, testing, evaluation, maintenance Activities, Documentation, Document configuration, maintaining a configuration.

#### Unit-III

MIS : Meaning and Role of MIS, Different Approaches to MIS, Concept of Balanced MIS, effectiveness and efficiency criteria, MIS structure and planning.

Design of MIS : Definition of problem, system objectives and system constraints, Analysis of information source, alternative system design and selection optimal system.

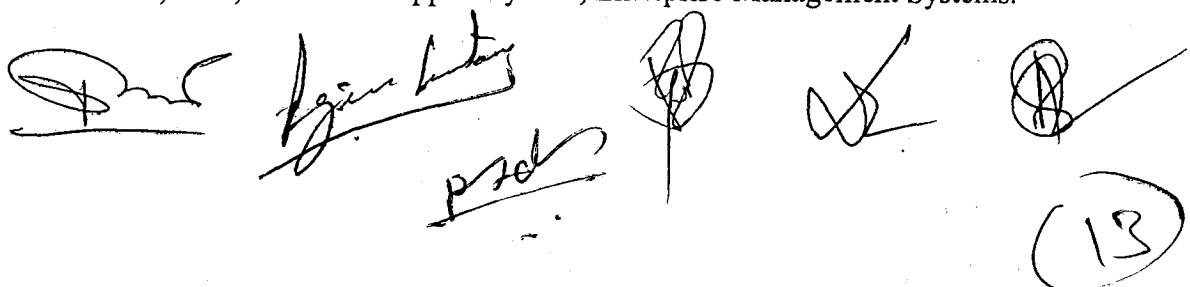
Detailed System Design and Implementation; Application of basic design concepts of MIS, Involvement of end-user and role of MIS department, Role of Top Management during design and implementation.

#### Unit-IV

System Evaluation : System evaluation review and update, Management and control of MIS function, Advanced MIS concept, Pitfalls in MIS development.

Decision Support System:- DSS Definition, Characteristics, Application Case Study. Expert System : Concept Structure, Application and Case Study.

Applications of MIS : Applications of MIS to E-Business, Applications in Manufacturing sector, Service sector, DSS, Decision Support System, Enterprise Management Systems.

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### Recommended Books

1. Awad E.M.; System Analysis and Design; Second Edition; Galgotia Publication.
2. Igor Hawryzkiewyez, Introduction to System Analysis and Design, 4<sup>th</sup> edition. Prentice-Hall
3. Jain Mdhulika, Jain Satish; Structured system Analysis and Design; 2<sup>nd</sup> Edition, 2007.
4. Jeffrey L. Whittren, and Lonnie D. Bentley, Systems analysis and Design Methods 4<sup>th</sup> edition, Tata McGraw-Hill.
5. Philip L Weaver, Practical SSADM ver 4+A Complete Tutorial Guider, Pitman Publishing.
6. Don Yeates, Maura Shields and David Helmy. System Analysis and Design Longman group limited.
7. Robert Mudrick; Management Information System; PHI.
8. W.S. Jawadkar; Management Information System; McGraw-Hill.

### MCA 303 : Linux and Shell Programming

**Theory & Tutorial: 4 hours per week ( 4 Credits)**

**Examination: Theory Paper – 3 hours; Max. Marks – 100**

**Note:**

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

#### Unit-I

**The Operating System:** Linux history, Linux features, Linux distributions, Linux's relationship to Unix, Overview of Linux architecture, Installation, Booting, Login and Shutdown Process, Start up scripts, controlling processes, system processes ( an overview), Linux Security, Networking on Linux User Management: Types of users, the powers of Root, managing users (adding and deleting); using the command line, shell scripts and GUI tools.

#### Unit-II

**The Linux File System;** Basic Principals, Pathnames, Mounting and Un-mounting File Systems, Different File Types, File permissions, Disk Usage Limits, Directory Structure, Check and Repair File Systems Security and file permissions. Shell in Linux; Available shells under Linux, different.

#### Unit-III

Filter-The grep family, advanced filters-sed and awk vi editor: General startup of vi editor and it modes, Creating and editing files, features of vi, screen movement, cursor movement

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insertion, deletion searching, submitting operations, yank put, delete commands reading & writing files, advance editing techniques vim (improved vi).

Shell: meaning and purpose of shell, introduction to types of shell. the command line, standard input and standard output, redirection pipes, filters special characters for searching files and pathnames.

#### Unit-IV

Shell programming shell Meta character local and global shell variables- interactive shell scripts – shell script arguments- looping and making choice- for loop, case, while and until, shell functions eval.

Networking : Networking tools, E-mail Remote login, FTP, Network and Server setup LAN, Connection with Internet Setting-up routers; Proxy Servers, Print-Server, File server, mail Server, Web server and Database server.

#### Recommended reference/Text Books:

1. Beginning Linux Programming N, Mathew, R. Stones, Wrox, Wiley India Ed.
2. Peterson Richard, " The Complete Reference Linux " Tata McGraw Hill.
3. Simitabha Das, "Unix/Linux Concepts & Applications". Tata McGraw Hill
4. Yshavant P, Kanetkar, Shell Programming
5. Linux System Programming, Robert Love, O" Reilly SPD.
6. Vijay Shekhar; Red hat Linux study guide firewall media.
7. Richard Petersen: The Complete Reference ; Linux; TMH

### MCA 304 : Application Development Using, NET Frame Work

Theory & Tutorial: 4 hours per week ( 4 Credits)

Examination: Theory Paper – 3 hours; Max. Marks – 100

#### Note:

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

#### Unit-I

Introduction to .Net framework: Managed Code and the CLR, Intermediate Language, Metadata and JIT Compilation, Automatic Memory Management

The image shows five handwritten signatures or initials in black ink. From left to right: a stylized signature, a signature that appears to be 'Ajay Kumar', a signature with a large loop, a signature that looks like 'AK', and a signature with a large loop. Below the last signature is a circled number '14'.

## Language Concepts and the CLR: Visual Studios .Net, Using the .Net Framework

**The Framework Class Library:** .Net objects- ASP .NET, .NET web services, Windows Forms.

**Elements :** Variable and constants, data types, declaration. Operators, types, precedence, Expressions. Program flow, Decision statements, if...then..else,select..case, Loop statements, while... and while, do...loop, for...next, for...each...next.

**Types:** Value data types, Structures, Enumerations, Reference data types, Single-dimensional, Multi-dimensional arrays, jagged arrays and dynamic arrays.

### Unit-II

**Windows Programming:** Creating windows forms, windows controls, Button, Check box, Combo box, Label, List box, Radio Button, Text box, Events, Click, close deactivate, Load, mousemove, mousedown, mouseup.

**Menus and Dialog Boxes :** Creating menus, menu items, context menu, Using dialog boxes, show dialog() method.

**ADO.NET :** Architecture of ADO.NET, ADO.NET providers, Connection, Command, Data Adapter, Dataset, Connecting to Data Source, Accessing Data with Data set and Data reader, Create an ADO.NET application, Using Stored Procedures.

### Unit-III

**ASP.NET Features:** Application of States and Structure; Change the Home Directory in IIS- Add a Virtual Directory in IIS- Set a Default Document for IIS – Change Log File Properties for IIS-Stop, Start, or Pause a Web Site.

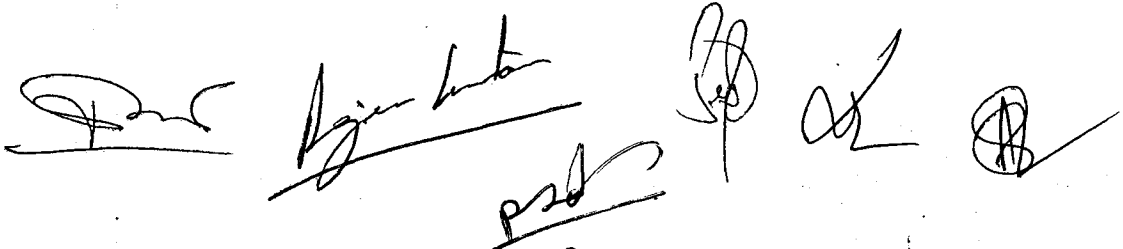
**Creating Web Controls:** Web Controls, HTML Controls, Using Internist Control, Using Input Validation Controls, Selecting Controls for Applications, Data Controls and Adding web controls to a page.

**Creating Web Forms:** Server Controls, Types of Server Controls, Adding ASP.NET Code to a page.

### Unit-IV

**Overview of XML :** XML Serialization in the .NET Framework-SOAP Fundamental-Using SOAP with the .NET Framework.

**Web Services and WCF :** Web Services protocol and standards – WSDL Documents-Overview of UDDI – Calling a Web Service from a Browser-Calling a Web Service by Using a proxy –

The bottom of the page features several handwritten signatures and initials. From left to right, there is a signature that appears to be 'Ravi', a signature that appears to be 'Ajay Kumar', a signature that appears to be 'PSD', a signature that appears to be 'S', a signature that appears to be 'A', and a signature that appears to be 'S'.

Creating a simple web service – Creating and Calling a Web Service by Using Visual Studio.NET Architecture of WCF, WCF Client

**Reference Books:**

1. Mathew Mac Donald: Beginning ASP.NET 4.0 in C# 2010, 3<sup>rd</sup> Edition, A Pres.
2. Bill Evjen Scott Hanselman, Devin Rader: Professional ASP.NET4, 2010, Willey.
3. George Shepherd: Microsoft ASP.NET Step by step, 2010 Microsoft Press.
4. Imar Spaanjaars: Beginning ASP.NET 4: in C# and VB (Wrox Programming to Programmer) , 2010 Wiely Publishing.
5. Steven Holzner; ASP.NET 4.0 (Cover C# & VB ) Black Book; Dreamtech Press.
6. Steven Holzner; .NET Programming Black Book; Dreamtech Press.

**MCA 305 : Data Warehousing & Data Mining**

**Theory & Tutorial: 4 hours per week ( 4 Credits)**

**Examination: Theory Paper – 3 hours; Max. Marks – 100**

**Note:**

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

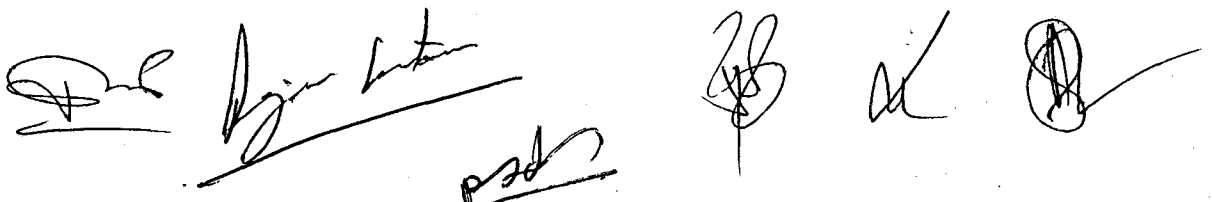

**Unit-I**

**Introduction to Data Warehousing :** Introduction, Data Warehouse importance and functions, Multidimensional Data Model, Data Matting and it's usage, Cost of data marting, Metadata, Data warehouse Architecture, Building a Data warehouse, Implementation, Further Development, Planning and Project Management of Data Warehouse.

**Unit-II**

**Data Mining :** Data Warehousing to Data Mining, Evolution Analysis, Classification of Data Mining Systems, Architecture of data mining system, Major Issues in Data Mining. Data preprocessing : Needs preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Dieselization and Concept Hierarchy Generation; Analysis of Attributes Relevance. Discriminating between Different Classes. Data Warehouse and OLAP Technology for Data Mining.

**Unit-III**

**Association Rules :** Association Rule Mining, Single- Dimensional Boolean Association Rules from Transactional Databases. Multi-Level Association Rules from Transaction Databases. Issues regarding classification & prediction. Different Classification Methods, Prediction.

#### Unit-IV

**Clustering and Applications of Data Mining :** Cluster Analysis, Types of Data Categorization of Major Clustering Methods, Kmeans, Partitioning Methods, Hierarchical Methods, Density Based Methods, Grid Based Methods, Model-Based Clustering Methods, Clustering High Dimensional Data, Constraint Based Cluster Analysis, Outlier Analysis, Data Mining Applications.

**Feature Trends :** Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Databases, Multimedia Databases, Time Series and Sequence Data, Text Databases, Web Mining, Spatial mining, Temporal Mining, Applications and Trends in Data Mining.

Text/Reference Books :

1. Data Warehousing in the Real World – SAM ANAHORY & Dennis MURRAY. Pearson Edn Asia.
2. Data Mining – Concepts and Techniques- JIA WEI HAN & MICHELINE KAMBER Harecourt India.
3. Data Warehousing ; Reema Thareja; Oxford
4. Data Mining Introductory and advanced topics MARGARET H DUNHAM PEARSON EDUCATION.
5. Data Warehousing in Real World Anahory, Pearson Education.
6. Data Mining Techniques- ARUN K PUJARI, University Press.
7. Bulding the Data Warehouse- W. H. Inmon, 3<sup>rd</sup> Edition, Wiley, 2003.
8. Data Warehousing Fundamentals- PAULRAJ PONNAIAH WILLEY STUDENT EDITION.

#### MCA 306 : THEORY OF COMPUTATION

**Theory & Tutorial: 4 hours per week ( 4 Credits)**

**Examination: Theory Paper – 3 hours; Max. Marks – 100**

Note:

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

#### UNIT-I

Introduction of automata, computability, and complexity; mathematical notations and terminology; finding proofs and types of proofs.



Automata and Languages: Regular languages, finite automata, formal definition of a finite automaton, formal definition of computation, designing finite automata.

### UNIT-II

Non-deterministic finite automata: Equivalence of NFAs and DFAs, closure under the regular operations, Regular Expressions: formal definition of a regular expression, equivalence with finite automata, nonregular languages: pumping lemma for regular languages.

### UNIT-III

Push down Automata and Context free languages: Context free grammars, designing context free grammar, ambiguity in CFG and its removal, Chomsky normal form push down automata: formal definition, graphical notations, Languages accepted by PDA, Equivalence of PDA and CFG, Non-context free languages.

### UNIT-IV

Turing Machines and Computability: Formal definition of turing machines with examples, graphical notations, variants of turing machines, church-turing thesis, Hubert's problem.

Decidability, undecidability and reducibility: Decidable languages; decidable problems concerning regular languages and context free languages, the halting problem, undecidable problems, mapping reducibility, decidability of logical theories, turing reducibility.

Text/Reference Books:

1. Michael Sipser, "Introduction to the Theory of Computation", Second Edition, 2007, CENGAGE learning India Pvt. Ltd., New Delhi.
2. John E. Hopcroft, Rajeev Motwani & Jeffrey D. Ullman, "Introduction to Automata Theory, Languages, and Computation", Third Edition, 2007, Pearson Education Inc

#### MCA 311 : Programming in Java Lab

Practical Lab :

Examination : Practical Examination

Lab Exercise based on Theory Paper MCA 301

#### MCA 312 : Linux OS and Shell Programming Lab

Practical Lab :

Examination : Practical Examination

Lab Exercise based on Theory Paper MCA 303

#### MCA 313 : . Net Lab

Practical Lab :

Examination : Practical Examination

Lab Exercise based on Theory Paper MCA 304.

# Syllabus of MCA IV Semester: 2015-16

## MCA 401:- Computer Based Optimization Techniques

**Theory & Tutorial: 4 hours per week ( 4 Credits)**

**Examination: Theory Paper – 3 hours; Max. Marks – 100**

**Note:**

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

### Unit-I

**Linear Programming Problems (LPP);** formulation of an LPP, Solution of an LPP using graphics method and simplex method, Slack, Surplus & Artificial Variables, Two-phase and big-M method.

**Special cases in LPP:** alternate optimum solution, an unbounded solution, infeasible Solution, Duality in LPP, Revised Simplex method.

### Unit-II

**Transportation Problem** Definition, methods for finding initial basic feasible solutions – North West corner rule, least cost cell entry method, Vogel’s approximation method, methods for finding optional solution – MODI Method.

**Assignment Problems;** Definition & concept, solution of an assignment problem for optimum solution – Hungarian Method.

**Sequencing:** Job – problems for processing N Jobs on 2 machines, processing N jobs on 3 machines, processing N jobs on processing M machines, processing 2 jobs on M machines ( Graphic Method).

### Unit-III

**Inventory Models:** What is inventory? Types of Inventories, Inventory Decisions, Cost involved in inventory problems, Controlled & Uncontrolled variables, deterministic inventory control system, concept of an average inventories, concept of economic order quantity (EOQ) . (In short Model-I, II and Model III).

**Replacement Models; introduction** – The replacement problem, replacement of items that deteriorate (with money value), replacement of items that fail completely (Mortality theorem).

## Unit-IV

**Project Management by PERT & CPM: Introduction** – Historical Development of CPM/PERT, Application of PERT – CPM techniques network diagram representation, rules for drawing network, time estimation & critical path in network analysis

**Queuing theory:** Introduction queuing system, queering problem, transient & steady states, traffic intensity, distribution of queuing system ( Birth & Death Process), Queuing Models – I, II & III.

### Recommended Books:

1. Gillette B.E.: Introduction to Operations Research – A Computer Oriented Algorithmic approach, Tat McGraw Hill Pub.Co, New Delhi.
2. Taha Hatndy: A Operation Research- An Introduction, Fifth Edn. PHI, New Delhi.
3. Metal K.V. & Mohan C: Optimization Methods in Operations Research and system Analysis, 3<sup>rd</sup> Edn. New age international Publishers, New Delhi.
4. Hiller, F.S. & Limrman, G.L. : Introduction to Operations research, 2<sup>nd</sup> Edn. Holden day inc., London, 1974.
5. Sharma S.D. Operations Research, Kedar Nat R. & Com. Meerut, 2003
6. Kapoor V.K.: Operations Research, Sultan Chand & Sons, 1999.
7. P.K. Gupta & D.S. Hira : Operation Research, S.Chand & Company Ltd. New Delhi 2000

## MCA 402 Advanced Java Programming & Technology

**Theory & Tutorial: 4 hours per week ( 4 Credits)**

**Examination: Theory Paper – 3 hours; Max. Marks – 100**

### Note:

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

## Unit-I

**Introduction to Advance Java Application:** Networking with Java- Networking basics, Socket, port, Proxy servers, Internet addressing and URL, java.net-networking classes and interfaces, Implementing TCP/IP based Server and Client. Classes to be covered Socket, Server-Socket, IP Address, URL connections.

**Java Applets:** Introduction Applet Architecture: The java applet. Applet Class; The Five Stages of an Applier's Life Cycle, Methods for Adding UI Components, Methods for Drawing and Event Handling.

The image shows several handwritten signatures and initials in black ink. There are approximately seven distinct marks, including a large signature on the left, a signature in the middle, and several smaller initials or signatures on the right. A circled number '17' is visible at the bottom right.

### Unit-II

**Application in distributed environment:** Remote method invocation-activation models- RMI custom sockets- Object Serialization-RMI-IIOP implementation- CORBA IDL. Technology- Naming Services- CORBA programming Models- JAR file creation.

**Database Application:** the JDBC Connectivity Model, Database Programming, Connecting to the Database Types of JDBC Drivers, Writing JDBC applications using select, insert ,delete ,update; Types of Statement objects ( Statement, Prepared-Statement and Callable-Statement); Resultset, ResultsetMetaData; Insterting and updating records, Connection Pooling.

### Unit-III

**Introduction to J2EE:** J2EE Overview, Need of J2EE; J2EE Architecture, J2EE APIs, J2EE Containers, Overview of J2ME and its Features-Building MIDlets, User Interface, Event Handling, Screens, List and Forms, J2ME-Overview, MIDlets, Create User Interface, Event Handling with Command Tickers, Screen, Text Box, List and Forms.

**Servlet :** Web Application Basics, Architecture and challenges of Web Application, servlet life cycle, Development and Deploying Servlets, Exploring Deployment Descriptor (web.xml), Handling Request and Response, Initializing a Servlet, Accessing Database, Servlet Chaining Session Tracking & Management Dealing with cookies, Transferring Request, Accessing Web Context, Passing INIT and CONTEXT Parameter, Sharing information using scope object, Controlling concurrent access, user Authentication, Filtering Request and Response- Programming filter, Filter Mapping, Servlet Listeners.

Java Server Pages Technology; Basic JSP Architecture, Life Cycle of JSP ( Translation, Compilation), JSP Tags and Expressions, Role of JSP in MVC-2, JSP with Database, JSP Implicit Objects, Tag Libraries, JSP Expression Language ( EL). Using Custom Tag, JSP Capabilities – Exception Handling, Session Management, Directives, JSP with Java Bean.

### Unit-IV

**Java Beans :** Introduction to Java Bean, Rules for writing a Simple Bean, Java Naming Directory Interface API , Java Naming Directory Interface concept.

**Enterprise JAVA Beans ;** Enterprise Bean overview, Types of enterprise beans, Advantages of enterprise beans, The Life Cycles of Enterprise Beans, Working with Session Beans, Statefull vs. Stateless Session Beans, Working with Entity Beans, Message Driven Beans.

**Introduction to Struts :** ( A Web Application Framework) Struts-confix.xml; Understanding MVC architecture; Action Servlet, Action Form ,Action Mapping, Action classes.

#### Referecen /Text Books:

1. Cay S Horsmann and Gary Cornell, “ Core Java 2, Volume I – fundamentals”, Pearson Education, USA,2005.

The bottom of the page contains several handwritten signatures and initials. From left to right, there is a signature that appears to be 'R. S.', a signature that looks like 'Ajay Kumar', a signature that is partially obscured and looks like 'P. S.', a signature that looks like 'S. P.', and a signature that looks like 'A. K.'. There is also a circular stamp or mark on the far right.

2. Cay S Horsmann and Gary Comell "Core Java2, Volume II- Advanced Features", Pearson Education, USA-2005.
3. Kathy Sierra and Bryan Basham,"Head First Servlets and JSP",Shroff publishers and Distributers, Mumbai,2007.
4. Marty Hall and Larry Brown,"Core Servlets and java server pages: volume I: core technologies ",pearson Education ,USA,2008.
5. Marty Hall and Larry Brown,"Core Servlets and java server pages: volume II: core technologies ",pearson Education ,USA,2008.
6. Enterprise JavaBeans (3<sup>rd</sup> edition),O'Reilly' by Richard Monson-Haefel.

### MCA 403 : Advance Database Systems

**Theory & Tutorial: 4 hours per week ( 4 Credits)**

**Examination: Theory Paper – 3 hours; Max. Marks – 100**

**Note:**

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

#### Unit-I

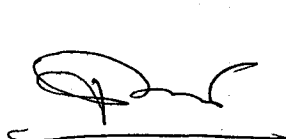
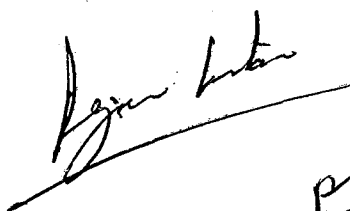
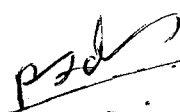
**Transaction Management and Concurrency Control** : Transaction-Evaluating Transaction Results, Transaction properties, transaction Management with SQL, the Transaction Log ; Concurrency Controls; with Locking Methods; Concurrency Control with Time Stamping Methods-Wait/Die and Wound/Wait Schemes, Concurrency Control with Optimistic Methods, Database Recovery Management.

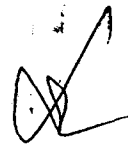
**Parallel database Systems**: Concepts, Architecture of Parallel Databases, Inter-Query and Intra-Query Parallelism, Inter-Operational and Intra-Operational Parallelism, Design of Parallel Database Systems.

#### Unit-II

**Introduction to Object-Based Databases** : Object Oriented Database concepts, Advantages, OODBMS Features, Groups and Languages; Object Relational Database Concepts and Design. Database Performance Tuning and Query Optimization: Database Performance and tuning; Statistics; Query Processing; Indexes and Query Optimization; Optimizer Choices; SQL Performance Tuning.

**PL/SQL** : Concepts of Embedded SQL, Dynamic SQL,SQLJ. PL/SQL Concepts, Elements, Structures, Cursors, Triggers, Database Stored Procedures and SQL/PSM.





### Unit-III

**Distributed Database Management Systems** : Evolution Characteristics, DDBMS Components; Levels of Data and Process Distribution ( i.e. SPSD,MPSD, MPMD); Distributed Database Transparency Features; DDBMS Design-Data Fragmentation, Data Replication Data Allocation; Client/Server vs. DDBMS.

Introductions to Data Warehousing and Data Mining: Data Warehouse- Decision Support Architectural Styles; Twelve Rules that Define a Data Warehouse; Data Mining Concepts . OLAP- Concepts, Architecture relation, OLAP V/s OLTP, Star V/s Clouding Architecture.

### Unit-IV

**Database Connectivity and Web Technologies** : Database Connectivity, – Native SQL Connectivity, ODBC, DAO, and RDO, OLE-DB, ADO.NET, Java Database Connectivity (JDBC); Internet Databases – Web-to-Database Middleware; Server-Side Extensions, Web Server Interfaces, the Web Browser, Client-Side Extensions, Web Application Servers.

**Database Administration and Security** : the Need for and Role of a Database in an Organizations; The Evolution of the Database Administration Function; The Database Environment's Human Component-The DBA's Managerial Role, The DBA's Technical Role; Security – Security Policies, Security Vulnerabilities, Database Security; Database Administration Tools-the Data Dictionary; Developing a Data Administration Strategy.

#### Text/Reference Books :

1. Prescribed : Hoffer, J.A. Prescott, M. & Topi, H. (2008) Modern database management ( 9<sup>th</sup> ed.). NJ; Prentice Hall.
2. Silberschatz A, Korath H. Sudarshan S. : Database System Concepts; McGraw Hill.
3. Recommended:Date,C.J.(2003) An introduction to database systems.(8<sup>th</sup> ed.).NJ: Addison Wesley.
4. Shah,N.(2004) Database systems using oracle(2<sup>nd</sup> ed.).NJ.:prentice Hall.
5. Elmasri R., Navathe S.B; Fundamentals of Database Systems;Pearson edu.
6. Singh S.K; Database Systems;Pearson Education.
7. Leao A. Leao M; Database Management Systems;Leao Press.
8. Thomas M. Colnolly,Begg C.E.;Database Systems; Pearson.

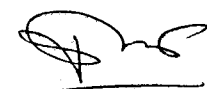
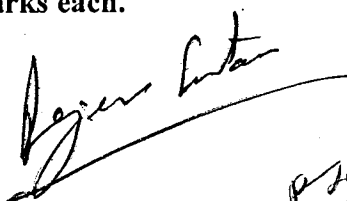
### MCA 404 : Software Engineering

**Theory & Tutorial: 4 hours per week ( 4 Credits)**

**Examination: Theory Paper – 3 hours; Max. Marks – 100**

#### Note:

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.





3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

### Unit-I

**Systems concepts and definitions:** System's theory, Definition of System, System Characteristics/ features, System Components, System, Thinking Introduction to Software Engineering.

Information System – Types of information Systems, Information Systems Development Methodologies; System Project Planning, Management; Application of Engineering Approach to Computer Software Design and Development.

### Unit-II

Information systems Models and Planning : Brief Evolution of Software engineering; Role of Software Engineer; Software Life Cycle ; Types of Software Life Cycle Activities: Typical Documents; Software Life Cycle.

Life Cycle Model, Boehm's Spiral Model.

Software equipments and specifications-Object models, Data Flow Model, Behavioral Modeling, Data Dictionary, System Diagram, IEEE standards for Software Requirement specifications (SRS).

Software Planning and Cost Estimation- Project Planning; WBS – Work Break Down Structure; PERT; Software Cost Estimation .

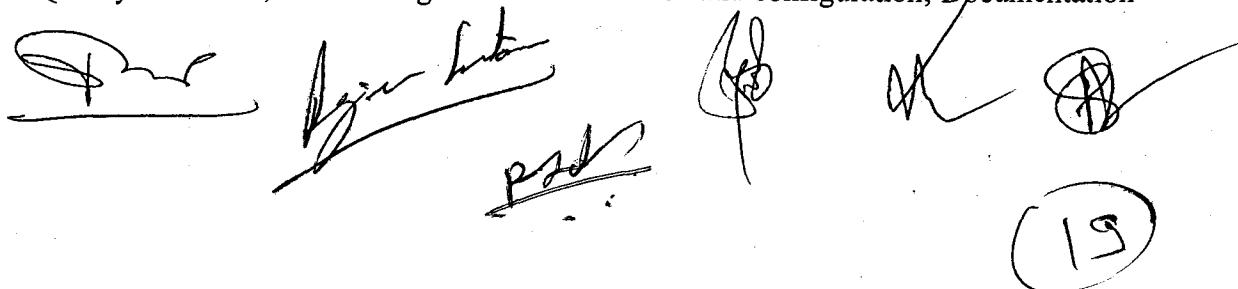
### Unit-III

Software Design Methodologies : Software Design Methodologies – Phase of the Design Process, Design Concept, Measuring Cohesion, Measuring Coupling, Requirement Traceability, Structured Analysis and modeling techniques; Process modeling; Logic modeling; Data modeling etc. User Interface and Database Design; Principal of User Interface Design. Object Oriented design process and evaluation.

Validation and Verification- Verification and validation; Software testing- Strategic approach to software testing , System testing, Component testing, Test case design, Critical system validation.

### Unit-IV

Software Project Management, Quality assurance and Maintenance: Software Project Management – Management Approach, Team Approach, Critical Practices, Capability Maturity Model; Metrics for Process and Project – Metrics for process, Project, software measurement , software Quality and Integrity. Earned Value Analysis, Error Tracking, Postmortem Review. Software Quality Assurance – Formal Inspection and Technical Review, Software reliability, Statistical Quality assurance; Risk management. Maintenance and configuration; Documentation

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of System and Project using structured Approaches, Emerging technologies- Introduction to Security engineering, Service- Oriented s/w engineering, Aspect-Oriented s/w engineering and S/W Reengineering. CMM level-5(concept and advantages).

### Reference /Text Books

1. Jalote, Pankaj (1997) An integrated Approach to Software Engineering 2<sup>nd</sup> Ed.
2. Pressman, Roger (2001) Software Engineering; A Practitioner's Approach, 5<sup>th</sup> ed. M Graw-Hill
3. Sommerville Ian; Software Engineering, 8<sup>th</sup> Ed. Pearson Education
4. Schach, Stephen R.(2002) Classical and Object Oriented Software Engineering , 5<sup>th</sup> ed. IRWIN.
5. Hoffer, Jefferey A. Joey F. George; and Joseph S. Valacich(1999) Modern Systems Analysis and Design. Massachusetts: Addison-Wesley.

## MCA 405 : E-Commerce

**Theory & Tutorial: 4 hours per week ( 4 Credits)**

**Examination: Theory Paper – 3 hours; Max. Marks – 100**

### Note:

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

### Unit-I

**Basic Concepts:** Introduction, Definition, Objectives, Advantages and disadvantages, Forces driving E-Commerce, Traditional commerce Vs, E-Commerce, E-Commerce opportunities for industries, Growth of E-Commerce.

**Electronic Data Interchange :** Concepts of EDI and Limitation, Application of EDI, Disadvantages of EDI, EDI model; EDI Implementation, MIME and Value- Added Network, Internet-based EDI.

### Unit-II

**E-Commerce Models:** B2C,B2B, C2C, C2B other models- Brokerage Model aggregator Model, Info-mediary Model, Community Model and value chain model Advertise Model.

**Electronic Payment Systems:** Special features required in payment systems, types of E-payment systems, E Cash, E-cheque , credit card, Smart Card, Electronic purses, e-billing, E-e-Micro payments, point of Sales System ( POS) – meaning uses structures.



### Unit-III

Customer Relationship Management & Technologies : E-Transition Challenges in Indian Corporate, E-Commerce and WWW, e. Marketing, E-Customer Relationship Management, ECRM Problems and Solutions, CRM Capabilities and Customer life cycle, E-Supply Chain Management , E-Strategy- Planning the E-Commerce Project, E-Commerce Strategy and Knowledge Management, E-Business Strategy and Data Warehousing & Mining. ERP for E-Commerce, Customer effective Web Design – Requirement Strategy and Model.

### Unit-IV

**m-Commerce** : Overview of mobile-commerce, Mobile delivery Technology & Switching Methods, Attributes of m-Commerce, Drivers of m-Commerce, m-Commerce Security issues, model ATM(ICICI Bank Case Study), Application of m-Commerce, Mobile Financial Applications, m-wallet, Mobile Shopping, Advertising and Content provision. Case-Study

Security Issues in E-Commerce: Security risk of E-Commerce, Type of Threats, Security tools and risk management approach, Cyber laws, Business Ethics, IT Acts.

#### Suggested Books:

1. Bharat Bhaskar , Electronic Commerce – Framework Technologies and Application Tata McGraw Hill.
2. Ravi Kalakota & A.B. Whinston, Frontiers of electronic Commerce Pearson Education,
3. Ravi Kalakota & A.B. Whinston, electronic Commerce-A Manager's Guide, Pearson Education,
4. Agarwala Kamlesh, N and Agarwala Deeksha, Business on the Net \_introduction to the E-com., Macmillan India.
5. P.T. Joseph, E-Commerce: A Managerial Perspective, PHI, 2002.

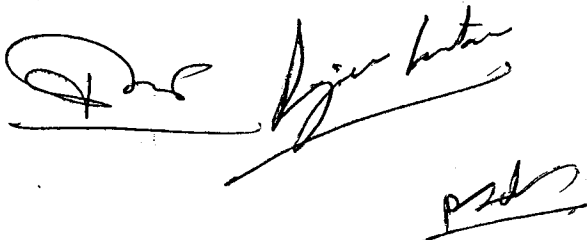
### MCA 406 A01: Network Management

Theory & Tutorial : 4 hours per week (4 credits)

Examination: Theory Paper - 3 Hours ; Max. Marks- 100

#### Note:

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question no. 1 covering whole syllabus will consist of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.











**Unit—I**

Basic Concepts : Data Communications and Network Management Overview, Basic Foundations, Standards, Models, and Language of Network Management. Network Management Technologies: SGMP, CMIP, SNMP Network Implementation and Management Strategies, Review of Computer Network Technology, SNMP, Broadband, and TMN Management, Performance Management, Fault Management, Configuration Management, Security Managements, Accounting Managements. Network Management Configuration: Centralized Configuration, Distributed Configuration. Selected Management Strategy. SONET-introduction.

**Unit—II**

Management Information Base (MIB): Structure of Management Information, NMS Presentation of the SMI, NMS Meter-ware Network View. Remote Monitoring (RMON), RMON Group. Desktop Management: Desktop Management Interface(DMI), DMI Architecture, DMI Browser, DMI/SNMP Mapping, Desktop SNMP Extension Agents. Setting up LAN Access, SNMP Configuration.

SNMP Technology : SNMPv1 Network Management - Organization and Information Models. SNMPv1 Network Management- Communication and Functional Models. SNMPv2, SNMPv3, RMON SNMP Management.

**Unit—III**

Delivery and Routing of IP Packets: Routing Methods, Routing Module, Classless, Interi and Exterior Routing, Routing information protocol(RIP), Open shortest path first protocol (OSPF), BGP, GGP. Private Networks. Virtual Private Network (VPN), Network Address Translation.

Internet Control Message Protocols (ICMP): ICMP Package, Messaging, Transmission Operations and Protocols; Services.

**Unit—IV**

Management Tools, Systems, and Applications: Network Management Tools and Systems Network Management Applications, Web-Based Management.

Security Management: Secure Network Management and Network Security Management, Organizational Realities. Protocol Capabilities. Tool Capabilities. Secure Management Design Options. Network Security Management, Firewalls, Trusted systems, IT act and cyber laws.

Reference Books:

- 1. Mani Subramanian, "Network Management: Principles and Practice ' Addison Wesley.

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## MCA 406(A02) Artificial Intelligence

**Theory & Tutorial: 4 hours per week ( 4 Credits)**

**Examination: Theory Paper – 3 hours; Max. Marks – 100**

**Note:**

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

### Unit-I

**Basic Concept:** Foundations of AI, scope problems and approaches of AI Intelligent agents, reactive, deliberative, goal- driven, utility driven, and learning agents, Artificial Intelligence programming techniques

Problem-solving through Search : forward and backward state space, blind heuristic, problem-reduction A,A\*, AO\*, minimax ,constraint propagation ,neural stochastic and evolutionary search algorithms, sample applications .

### Unit-II

**Knowledge Representation and Reasoning:** Ontologies, foundations of knowledge representation and reasoning, representing and reasoning about objects, relations ,events, actions, time, and space; predicate logic, situation calculus, description logics, reasoning with defaults; reasoning about knowledge, sample applications.

**Planning :** planning as search, partial order planning ,construction and use of planning graphs.

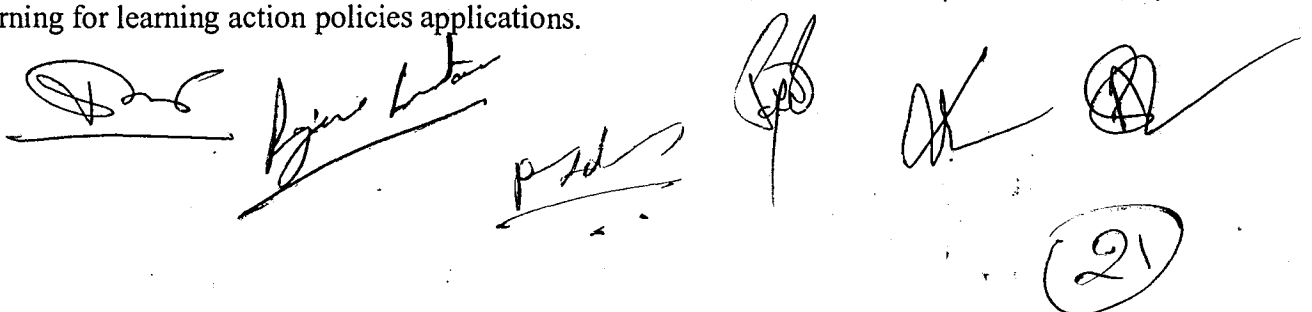
### Unit-III

**Representing and Reasoning with Uncertain Knowledge :** probability, connection to logic. Independence ,bypass rule ,Bayesian networks, probabilistic inference, sample applications.

**Decision-Making:** basics of utility theory, decision theory, sequential decision problems ,elementary game theory, sample application. Expert System-need ,components, Categories, Stages of Expert System Development.

### Unit-IV

**Machine Learning and Knowledge Acquisition :** learning from memorization examples, explanation and exploration. learning nearest neighbor, naïve Bayes, and decision tree classifiers, Q-learning for learning action policies applications.


  
 A series of handwritten signatures and initials are present at the bottom of the page. From left to right, there are: a signature that appears to be 'D. S.', a signature that appears to be 'Ajay Kumar', a signature that appears to be 'psd', a signature that appears to be 'S. S.', a signature that appears to be 'A. K.', and a signature that appears to be 'S. S.'. Below these signatures, there is a circled number '21'.

**Brief Survey of selected additional topics:** Perception, communication, Interaction, and action; multi-agent systems, Sample Applications of AI, student project presentations.

Reference/Text Books:

1. Artificial Intelligence: A Modern Approach, 3<sup>rd</sup> Edition, By Stuart Russell And Peter Norvig. ISBN-13:978-0-13-604259-4.
2. Artificial Intelligence, Rich & Knight, TMH.
3. Introduction to AI & Expert Systems, Patterson, PHI.
4. Neural Networks, Fuzzy Logic & Genetic Algorithms, Rajsekharan, PHI.

### MCA 406 A03 : Compiler Design

Theory & Tutorial : 4 hours per week (4 credits)

Examination: Theory Paper - 3 Hours ; Max. Marks- 100

Note :

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question no. 1 covering whole syllabus will consist of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

#### Unit — I

Overview of Compilation : Phases of Compilation — Lexical Analysis, Regular Grammar and regular expression for common programming language features, pass and Phases of translation, interpretation, bootstrapping, data structures in compilation — LEX lexical analyzer generator.

#### Unit—II

Parsing : Context free grammars, Top down parsing — Backtracking, LL (I), recursive descent parsing, Predictive parsing, Pre-processing steps required for predictive parsing. Shift Reduce parsing, LR and LALR parsing, Error recovery in parsing , handling ambiguous grammar, YACC — automatic parser generator.

#### Unit—III

Symbol Tables Symbol table format, organization for block structures languages, hashin tree structures representation of scope information. Block structures and non block structure storage allocation: static, Runtime stack and heap storage allocation, storage allocation, for arrays, strings and records

#### Unit—IV

Code optimization & Generation : Consideration for Optimization, Scope of Optimization, local optimization, loop optimization, frequency reduction, folding, DAG representation. Flow graph,

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data flow equation, global optimization, redundant sub expression elimination, Induction variable elements, Live variable analysis, Copy propagation. Object code forms, machine-dependent code optimization, register allocation and assignment generic code generation algorithms, DAG for register allocation.

**Recommended reference/text books:**

1. Principles of compiler design -A.V. Aho . J.D.Ullman; Pearson Education.
2. Holub, Compiler Design in C, P
3. Engineering a Compiler-Cooper & Linda, Elsevier.

**MCA 406 A04 : Multimedia Systems**

Theory & Tutorial : 4 hours per week ( 4 credits)

Examination: Theory Paper - 3 Hours; Max. Marks- 100

**Note :**

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question no. 1 covering whole syllabus will consist of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

**Unit—I**

Multimedia System Basics : Multimedia System Elements; Multimedia System Architecture; Multimedia technologies; Video/Audio Fundamentals, Multimedia Authoring, and Tools raphics and Image Data Representations, Color in Image and Video, Fundamental Concepts in Video, Basics of Digital Audio. Multimedia I/O Technologies- Key Technology Issues, Standard Multimedia Devices, Multimedia Output Devices.

**Unit—II**

Compression and Decompression: Type of Compressions, Binary Image Compression Schemes, Image Compression, Video image Compression, Audio Compression, Lossless Compression Algorithms, Lossy Compression Algorithms, Image Compression Standards, Basic Video Compression Techniques, MPEG Video Coding I - MPEG-I and 2, MPEG Video Coding II - MPEG-4, DVI and Beyond.

**Unit—III**

Audio Compression : Audio Compression Techniques, MIDI, MPEG Audio Compression, Speech Reorganization and Generation, Video Images and Animation. File Formats and Standards — Rich Text, TIFF, RIFF, MIDI, JPEG, AVI, MPEG, TWAIN formats and its uses.

Multimedia Communication Multimedia Communication and Retrieval, Multimedia Network Fundamentals, Multimedia Protocols for the Internet, Multimedia Network Communications and Applications, Multimedia Networking Services, Multimedia OS design and Implementation.

#### Unit— IV

Trends in Multimedia — Multimedia in Wireless Networks; Content-Based Retrieval in Digital Libraries; Multimedia Storage Systems, User Interface; Multimedia Synchronization, Multimedia Presentation and Web Technologies(Documents, Hypertext, MHEG), Multimedia Databases, P2P Multimedia Systems.

Multimedia Applications : Media Preparation, Media Composition, Image Processing & Image Reorganization, Animation, Media Integration, Media Communication, Media Consumption; Education & Training, Media Entertainment and Full Motion Digital Video Applications.

#### Reference/Text Books:

1. Prabhat K. Adrleigh, Kiran Thakrar; Multimedia System Design; P1-It
2. RalfSteinmetz, Klara Nahrstedt; Multimedia : Computing, Communication & Applications; Pearson Education;
3. Fundamentals of Multimedia, Ze-Nian Li, and Mark S. Drew, Pearson Prentice Hall, October 2003.
4. Multimedia Communication Systems, K. Rammohanarao, Z. S. Bolzkovic, D. A. Milanovic, 1st edition, Prentice Hall, May 2002.
5. Video Processing and Communications, Yao Wang, Joem Ostermann, and YaQin Zhang, Prentice Hall, 2002.'
6. Web Caching and Replication, Michael Rabinovich and Oliver Spatscheck, Addison-Wesley, 2002.
7. Multimedia Communications: Applications, Networks, Protocols and Standards, Fred Hatsall, Addison-Wesley, 2001.

#### MCA 411: Advanced Java Lab

Practical Lab:

Examination : Practical Examination

Lab Exercise based on Theory paper MCA 402

#### MCA 412: Advanced DBMS Lab

Practical Lab:

Examination : Practical Examination

Lab Exercise based on Theory paper MCA 403.

#### MCA 423: Mini Project

Practical Lab:

Examination : Practical Examination

Technology : Use .Net/ Java/ C/ Web Technology.

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# Syllabus of MCA V Semester 2016-17

## MCA 501: Information Security And Cryptography

Theory & Tutorial: 4 hours per week ( 4 Credits)

Examination: Theory Paper – 3 hours; Max. Marks – 100

- Note: 1. Candidate has to attempt five questions in all. All questions carry equal marks.
4. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
5. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

### Unit I

Introduction to Computer Security and Cryptography, Security Attacks, Security Services and Mechanism.

**Classical Encryption Techniques :** Classical Techniques, Conventional Encryption Model, Classical Encryption Techniques.

**Modern Techniques:** Simplified DES, Block Ciphers Principles, DES Standards, DES Strength, Differential & Linear Cryptanalysis, Block Cipher Design Principles, Block cipher Modes of Operation.

### Unit II

**Conventional Encryption Algorithms:** Triples DES, International Data Encryption Algorithm, RC5, RC2 placement & Encryption Function, Key Distribution, Random Number generation, Placement of Encryption Function.

**Public Key Encryption:** Public Key Cryptography: Principle of public key Cryptosystems, RSA algorithm, Key Management, Fermat's Theorem & Euler's Theorem, The Chinese remainder theorem.

### Unit III

**Hash Functions:** Message Authentication & Hash Function: Authentication Requirements, Authentication Function, Message Authentication Codes, Hash Function, Birthday Attacks, Security of Hash Function & MAC's, MD5 Message Digest Algorithm, Secure Hash Algorithm(SHA).

**Digital Signatures:** Digital Signature, Authentication Protocol, Digital Signature Standard(DSS), proof of digital signature algorithm.

### Unit IV

**Network and System Security:** Authentication Application- Kerberos x.509, Dictionary Authentication Services, Electronic Mail Security, Pretty Good Privacy (PGP), S/mime. Security: Architecture, Authentication Header, Encapsulation security payloads, combining security association, Key Management. **Web Security:** Secure socket layer & Transport layer

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security, Secure electronic transaction (SET). System Security: Intruders, viruses, firewal  
Design principle, Trusted Systems.

**Reference Books:**

1. Willium Stalling; Cryptography and Network Security, Fifth Edn, Pearson.;
2. Atul Kahate; Cryptography and network Security; Tata McgrawHill.
3. V.K. Pachghare; Cryptography and Information Security; PHI.
4. Matt Bishop, Sathyanarayana; Introduction to Computer Security; Pearson.

**MCA 502: Wireless Technology**

Theory & Tutorial: 4 hours per week ( 4 Credits)

Examination: Theory Paper – 3 hours; Max. Marks – 100

- Note:
1. Candidate has to attempt five questions in all. All questions carry equal marks.
  2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
  3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

**Unit I**

**Introduction of wireless communication:** Overview, Frequencies for Radio transmission, Evolution of Cellular System, Cellular System Architecture & Operation, Performance criteria. Multiple access schemes for wireless communication- TDMA, FDMA, CDMA, CSMA, SDMA.

**Unit II**

**Wireless Network Planning And Operation:** Frequencies Management, Channel assignments, Frequency reuse, System Capacity & its improvement, Handoffs & its types, roaming, Co-Channel & Adjacent Channel Interference.

**Digital Cellular Networks:** GSM Architecture & Interfaces, Signal processing in GSM, Frame Structure of GSM, Channels used in GSM.

**Unit III**

**Wireless LAN Technology:** Overview, WLAN Technologies, Infrared LANs, Spread Spectrum LANs Narrowband, Microwave LANs IEEE 802.11- Architecture, Protocols, MAC layer, MAC frame, MAC Management.

**Bluetooth :** Overview, Architecture of Bluetooth Systems, Radio Specifications, Base Band Specification, Link Manager specification, Logical Link Control & Adaptation Protocol.

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## Unit IV

**Mobile Data Networks:** Introduction, Data oriented CDPD Networks, GPRS.

**Wireless Access Protocol:** WAP Architecture, Wireless Datagram, Wireless Transport Layer Security, Wireless Transaction, Wireless Session, Wireless Application Environment, WML.

### Text/ Reference Books:

1. Mobile communication Engg- Lee W.C.Y
2. Wireless Communication, Principles & Practice-T.S.Rappaport
3. Mobile Communication, Pearson Education- Schiller
4. Wireless Communication & Networking-William Stalling
5. Mobile communication –Rampantly
6. Wireless digital communication”, PHI, 1999- KamiloFeher
7. Principles of Wireless Networks-Kaveshpahlavan&P.Krishna Murthy

## MCA 503: Analysis and Design of Algorithms

Theory & Tutorial: 4 hours per week (4 Credits)

Examination: Theory Paper – 3 hours; Max. Marks – 100

- Note:
1. Candidate has to attempt five questions in all. All questions carry equal marks.
  2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
  3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

### Unit I

**Introduction:** Algorithm Definition and Specifications, Design of Algorithms and Complexity of Algorithms, Asymptotic Notations, Growth function, Recurrences and Performance Analysis.

**Divide and Conquer Algorithms:** General method, Binary search, Merge sort, Quick Sort.

### Unit II

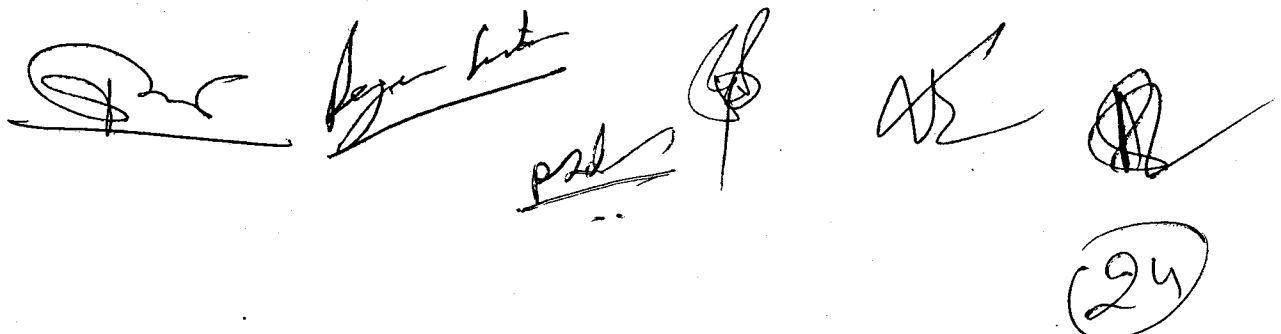
**Greedy Methods:** General method, Knapsack Problem, Activity scheduling problem, Minimum Cost Spanning Tree, Single Source Shortest Path.

**Dynamic Programming:** General method, Multistage graphs, All Shortest Path, Optimal Scheduling.

### Unit III

**Advanced data structure:** B-trees, Fibonacci Heaps, Data Structure for Disjoint Sets.

**Backtracking:** General method, 8 Queens Problem, Sum of Subsets, Graph Colouring, Hamiltonian Cycles, Knapsack Problem.


  
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### Unit IV

**Branch and Bound:** 0/1 Knapsack Problem, Travel Salesman Problem.

**Parallel Models:** Basic concepts, Performance measures, Parallel algorithms, Parallel Complexity, Analysis of Parallel Addition, Multiplications and Divisions, Parallel Evaluation of Arithmetic Expressions.

**Reference Books:**

1. Thomas H Cormen, C.E. Leiserson, R.L. Rivest, C. Stein; Introduction to Algorithms, third edition; PHI.
2. E. Horowitz, S. Sahni, S. Raja Sekaran ; Fundamentals of computer Algorithms;

### MCA 504 : SIMULATION & MODELLING

Theory & Tutorial: 4 hours per week (4 Credits)

Examination: Theory Paper – 3 hours; Max. Marks – 100

**Note:**

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consist of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

#### Unit I

System Models: Concept, Environment, Continuous and Discrete systems, Types of Models; Subsystems, System Analysis, System design; System Simulation Technique, Monte Carlo method, Types of System Simulation.

#### Unit II

Continuous System Simulation – Continuous System Models, Methods, Digital-Analog Simulators and Feedback systems.

Dynamic System – Concepts, Elements of System Dynamic Modeling; Exponential Growth, Decay & Modified models; Generalization of Growth models. System Dynamic Diagrams, Multi-Segment Models; Feedback in Socio-Economic System; Dynamo Language.

#### Unit III

Probability concepts in simulation: Stochastic variables and probability functions; Discrete system simulation; fixed time step v/s event-to-event model, Generation of Random numbers, Monte Carlo Computation V/S Stochastic simulation.

Simulation of Queuing system, Simulation of single and two server queue, Network Model of a project.

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## Unit IV

Introduction to GPSS- Elements, Events; Control Statements , Programs.  
Case study: Simulation of an autopilot, Telephone system, Inventory system & Supermarket.

### References:

1. G.Gordon "System Simulation" PHI.
2. Narsingh Deo "System Simulation with Digital Computers" PHI.
3. Mahapatra P.K.J, Mandal P, Bora M.C.; Introduction to System Dynamics Modeling;Univ. Press.

## MCA 505 B01: Bio-Informatics

Theory & Tutorial: 4 hours per week ( 4 Credits)  
Examination: Theory Paper – 3 hours; Max. Marks – 100

### Note:

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

## Unit I

**Introduction to Bioinformatics:** Definition and History of Bioinformatics, Internet and Bio-Informatics, Introduction to Data Mining, Applications of Data Mining to Bio-informatics, Problems and Applications of Bio-informatics.

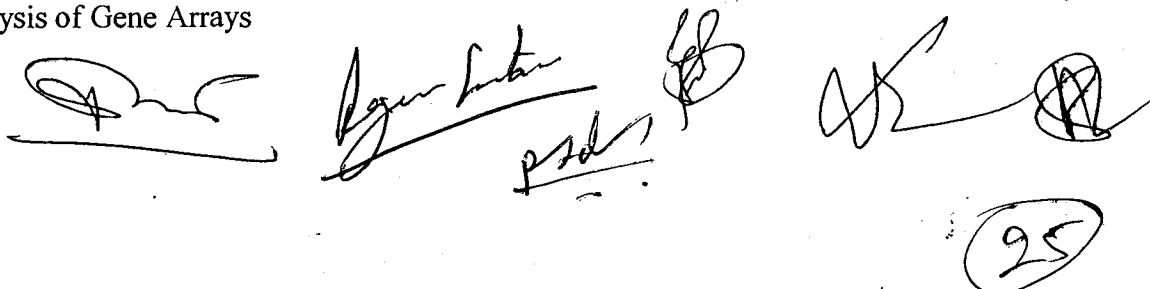
## Unit II

**Bioinformatics Resource and Software's:** Introduction to Primary Sequence Databases & Secondary Composite Databases. Genome Information Resource-DNA Sequence database & Analysis, CDNA Libraries and ESTs.

**Bio-Informatic S/W-**Clustal V, Clustal W 1.7, RasMol, Oligo, Molscript, Treeview, Alscript, Genetic Analysis Software, Phylip.

## Unit III

**Biocomputing:** Introduction to String Matching Algorithms, Database Search Techniques, Sequence Comparison and Alignment Techniques, Use of Biochemical Scoring Matrices, Introduction to Graph Matching Algorithms, Automated Genome Comparison and its Implication, Automated Gene Prediction, Automated Identification of Bacterial Operons and Pathways; Introduction to Signaling Pathways and Pathway Regulation. Gene Arrays, Analysis of Gene Arrays

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## Unit IV

**Markov chains and applications:** Machine Learning Methods, Hidden Markov models, Applications of HMM in gene identification and Profiles HMMs, Neural Networks and Support Vector machines

### Text /Reference Books :

1. Lesk, A.M. 2002 Introduction to Bioinformatics. Oxford University Press.
2. Claverie, J.M. and Notredame C. 2003 Bioinformatics for Dummies. Wiley Editor.
3. Mont, D.W., Bioinformatics: Sequence and Genome Analysis.
4. Pierre Baldi and Soren Brunak, Bioinformatics: The Machine Learning Approach.
5. Letovsky, S.I. 1999 Bioinformatics. Kluwer Academic Publishers.
6. Baldi, P. and Brunak, S. 1998 Bioinformatics. The MIT Press.
7. Rastogi, S.C., Mendiratta, N. and Rastogi, P. 2004 Bioinformatics: Concepts, Skills & Applications. CBS Publishers & Distributors, New Delhi.
8. Vyas, S.P. and Kohli, D.V., Methods in Biotechnology and Bioengineering.
9. Fogel, G.B. and Corne, D.W., Evolutionary Computation in Bioinformatics.
10. Genetic Library Construction and Screening: Advanced Techniques and Applications: Lab Manual
11. Patterson, B.K., Techniques in Quantification and Localization of Gene Expression.
12. Evens, W.J. and Grant, G.R., Statistical Methods in Bioinformatics: An Introduction.
13. Jae K. Lee, Statistical Bioinformatics, John Wiley & Sons Inc

### MCA 505 B02 : Geo-Informatics

Theory & Tutorial : 4 hours per week ( 4 Credits)

Examination : Theory Paper – 3 hours; Max. Marks – 100

Note :

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

### Unit I

Basic concepts about Special information, Definition, Historical evaluation and need for spatially based resource information system, objectives of GIS-Manual v/s automated GIS. Geo-informatics technologies and the technologies used in Geographical Studies; Geoinformatics-Spatial and Non –Spatial data Management.

## Unit II

Data structure types of data structure, Raster and Vector formats, advantages and disadvantage of various data structures and data formats. Geo Spatial DBMS.

Data input: Data Pre-processing, methods of data capture, digitization and scanning methods, commonly used map projections and ellipsoids.

## Unit III

The format of GIS- Handling digital Geographical Information Data- Analysis of single data planes in Raster format- Analysis of multiple data planes in Rater format- Uses of topographic data in Raster format- Data structures for thematic maps.

## Unit IV

Digital Elevation Model (DEM): need, methods, data sources and products of DEM- Digital Terrain Modeling (DTM)- Input verification, storage and methods of data analysis for Spatial modeling-Methods of GIS and Spatial interpolation. Web GIS Technology and Geo-informatics-MISDBMS. Applications of Geo-Informatics System.

### Text /Reference Books :

1. Goodchild M.F. and Kemp K – ‘Developing a curriculum in GIS: The NCGIA Core Curriculum Project’, University of California, Santa, Barbara.
2. Ivan Haywood Cornelius and Steve Carver – An introduction to GIS, Longman, New York.
3. Misra HC – A Handbook on GIS, GIS India, Hyderabad.
4. Smith T.R. and Piquet, GIS, London Press, London.
5. Taylor DRF – GIS: The Micro computer and Modern Cartography, Pergamon Press, Oxford.
6. Heywood I, et al, An Introduction to Geographical Information System, Longman, New Delhi.
7. Lo CP & Young AKW, Concepts & Techniques of Geographical Information System, Prentice Hall of India, New Delhi – 2003.

## MCA 505 B03 : ERP Systems

Theory & Tutorial : 4 hours per week ( 4 Credits)

Examination : Theory Paper – 3 hours; Max. Marks – 100

### Note :

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.


  
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**Unit I**

**Introduction:** Enterprise wide information system, Custom built and packaged approaches, Needs and Evolution of ERP System, Common myths and evolving realities.

**ERP Technologies :** ERP and Related Technologies, Business Process Reengineering and Information Technology, Supply Chain Management, Relevance to Data Warehousing, Data Mining and OLAP, ERP Drivers, Decision support system.

**Unit II**

**ERP System :** ERP Domain, ERP Benefits classification, Present global and Indian market scenario, milestones and pitfalls, Forecast, Market players and profiles, Evaluation criterion for ERP products.

**ERP Life Cycle:** Adoption decision, Acquisition, Implementation, Use & Maintenance, Evaluation and Retirement phases, ERP Modules.

**Unit III**

**ERP Framework :** Framework for evaluating ERP, Analytical Hierarchy Processes (AHP), Applications of AHP in evaluating ERP, Selection of Weights, Role of consultants, vendors and users in ERP implementation; Implementation strategies, ERP Customization, ERP-A manufacturing Perspective.

**Evaluation of ERP System :** Critical success and failure factors for implementation, Model for improving ERP effectiveness, ROI of ERP implementation, Hidden costs ERP success inhibitors and accelerators, Management concern for ERP success, Strategic Grid- Useful guidelines for ERP Implementations.

**Unit IV**

**Analysis of ERP Implementations:** Technologies in ERP System and Extended ERP, Case Studies Development and Analysis of ERP Implementations in focusing the various issues discussed in above units through Soft System approaches or qualitative Analysis tools, Learning and Emerging Issues, ERP and E-Commerce.

**Concept of E-governance :** Concept, E- Governance frame work, area of application like public sector, service industry.

**Reference Books :**

1. Lexis Leon; Enterprise Resource Planning; TMH
2. Brady, Manu, Wegner; Enterprise Resource Planning; TMH
3. N. K. Venkitakrishnan, Vinod Kumar Garg; Enterprise Resource Planning : Concepts and Practice; PHI Learning.
4. Dimpi Srivastava, Arti batra; ERP Systems; I K International Publishing House

# MCA 505 B04 : Embedded Systems

Theory & Tutorial : 4 hours per week ( 4 Credits)  
Examination : Theory Paper – 3 hours; Max. Marks – 100

Note :

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

## Unit I

**Introduction :** An Overview of Embedded system, Requirement, Challenges issues, and trends software development.

**Applications of Embedded Systems :** Application market segments, control system and industrial automation, Data communication, Networked Information Appliances, Telecommunications.

## Unit II

**Hardware Architecture:** Processor, Memory, Latches and Buffers, ADC and DAC, Application specific control, Display units, Keypads, DSP.

**Microcontroller and their applications, Communication interfaces:** Serial interface, IEEE 1394, USB Infra red, Ethernet and PCI bus.

## Unit III

Embedded system development process: requirement, system architecture, opening system and processes: Development platform and tools, HLL support Cross compilers, Linux and Windows CE based development Tools. Mobile/handheld systems.

## Unit IV

**Basic idea of embedded system applications :** mobile networks, GPS , Real time system, Database application, Networked and JAVA – enabled information appliances, Mobile JAVA applications.

**Reference Books :**

5. Frank Vahid, Tony Givargis; Embedded System Design, 2006; John Wiley.
6. David E. Simon; An Embedded Software Primer; 4<sup>th</sup> 2007; Pearson Education.
7. ValVano, Thomson; Embedded Microcomputer Systems.
8. Making Embedded Systems, Elecia White, O’Rielly

**MCA 506 C01 : Mobile Communication & Networks**

Theory & Tutorial : 4 hours per week ( 4 Credits)  
Examination : Theory Paper – 3 hours; Max. Marks – 100

**Note :**

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

**Unit I**

**Wireless communication :** Cellular systems- Frequency Management and Channel Assignment- Types of Handoff and their characteristics, dropped call rates & their evaluation; MAC, SDMA, FDMA, TDMA, CDMA, Cellular Wireless Networks.

**Unit II**

**Wireless Networks:** Wireless Sensor Networks- Principles and Characteristics, Constraints, Distributed Processing, Wireless LAN, IEEE 802.11 Standards, Architecture, Services, Mobile Adhoc Networks- WiFi and WiMAX, Wireless Local Loop.

**Unit III**

**Mobile Communication Systems :** GSM-Architecture-Location Tracking and Call setup, Mobility Management, Handover-Security; GSM & SMS, International Roaming for GSM, Call Recording functions, Subscriber and Service Data Management; Mobile Number Portability; VoIP Service for Mobile Networks; GPRS –Architecture, GPRS Procedures-attach and detach Procedures-PDP Context Procedure-Combined RA/LA update procedures-Billing.

**Unit IV**

**Mobile Network and Transport Layers:** Mobile IP, Dynamic Host Configuration Protocol, Mobile Ad Hoc Routing Protocols, Multicast routing, TCP over Wireless Networks, Indirect TCP, Snooping TCP, Mobile TCP, Fast Retransmit / Fast Recovery, Transmission/Timeout Freezing, Selective Retransmission, Transaction Oriented TCP, TCP over 2.5 / 3G wireless Networks.

**Application Layer :** WAP Model, Mobile Location based services, WAP Gateway, WAP protocols, WAP user Agent Profile, Caching Model, Wireless Bearers for WAP, WML – WMLScripts- WTA- iMode- SyncML.

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**TEXT/ REFERENCES BOOKS:**

1. Jochen Schiller, "Mobile Communications", Second Edition, Pearson Education, 2003.
2. William Stallings, "Wireless Communications and Networks", Pearson Education, 2002.
3. Kaveh Pahlavan, Prasanth Krishnamoorthy, "Principles of Wireless Networks", First Edition, Pearson Education, 2003.
4. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer, 2003.
5. CSR Prabhu Editor; "Mobile Computing- A Book of Readings"; Univ. Press.
6. C.K. Toh, "AdHoc Mobile Wireless Networks", First Edition, Pearson Education, 2002.

**MCA 506 C02 : Object Oriented Software Engineering**

Theory & Tutorial : 4 hours per week ( 4 Credits)

Examination : Theory Paper – 3 hours; Max. Marks – 100

Note :

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consist of 10 short answer questions carrying marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

**Unit I**

Introduction : Scope and Need of OO Software Engineering, Evaluation of Object Model, Elements of Objects Model. Unified Modeling Language, Basic Structures and Modeling Classes, Common Modeling Techniques, Relationship, Common Mechanism, Class Diagrams.

**Unit II**

Advanced Structured Modeling, Advanced Classes and Relationship, Interfaces Types and Roles, Instance and Object Diagram. Basic Idea of Behavioral Modeling. Object-Oriented Concepts and Principles, Identifying Elements of Object Model. Object Oriented Projects Metrics and Estimation.

**Unit III**

Design for Object-Oriented SYSTEMS, The System Design Process.

Object Oriented Testing : Testing of OOA and OOD models, Object-Oriented testing Strategies, Inter class testing.

Technical Metrics for OO Systems, Class Oriented Metrics, Metrics for OO Projects.

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## Unit IV

Advanced Topics in Software Engineering : Software Reuse, Component based Software Engineering and Development. Classifying and Retrieving Components.  
Introduction to Distributed Software Engineering, Service Oriented Architecture, Aspect Oriented Software Engineering

### Reference/Text Books :

1. Designing Flexible Object Oriented Systems with UML. By Charls Richter Techmedia.
2. UML users guide by Booch. Rumbaugh, Jacobson –Addison Wesley
3. Object Oriented Modeling and Design by Rumbaugh.
4. Object Oriented Analysis & Design – Practical Applications By Booch – Addison Wesley.

## MCA 506 C03 : Web Information System

Theory & Tutorial : 4 hours per week ( 4 Credits)

Examination : Theory Paper – 3 hours; Max. Marks – 100

- Note :
1. Candidate has to attempt five questions in all. All questions carry equal marks.
  2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
  3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

## Unit I

**Internet foundations:** Fundamentals of network and hardware architecture for the Internet.

Network protocols for the web, HTTP, DNS, and DHCP, client – server and peer- to- peer architectures.

**Introduction to Web designing:** Hypertext Markup Language (HTML), Cascading Style Sheet(CSS), forms, and tables. XML and JavaScript.

## Unit II

**Advanced Web Application Development:** Development of web application using JDBC, Triggers, stored procedures, Use of Oracle DBMS through JDBC, Java servelets, Java Server Pages, and Java Database Connectivity (JDBC). Client-side scripting with JavaScript, Packaging and deployment of web applications.

## Unit III

**Search and Design:** Web Wide Search, Web Searching Overview, How Users Search, Search Engine Promotion, Optimizing Search Engine, The need for Local Search, The process of adding a search facility, Designing the search Interface, Advance Search-Form Design, Result-Page Design.

## Unit IV

**Site Maps and Indexes:** Site Map, Designing Site Map showing Scope and Destination Choice, Producing Site Map. Benefits of Geographical Navigation: Site Indexes, Tours.

**The Features of Web Design:** The Near Feature, Rise Of Broadband, Effects of Community, Contents Overloads Issue, The Web Life Style.

### Reference/Text Books :

1. Thomas A. Powell, "*The Complete Reference Web Designing*", TMH.
2. Jamel Jawarski, "*Java 2 Unlimited*".
3. Allumaraju, "*Professional Java Server Programming*".

## MCA 506 C04 : Pattern Recognition Systems

Theory & Tutorial : 4 hours per week ( 4 Credits)

Examination : Theory Paper – 3 hours; Max. Marks – 100

### Note :

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

## Unit I

Introduction to pattern recognition, feature detection, classification. Review of probability theory, conditional probability and Bayes rule.

Random vectors, expectation, correlation, covariance. Review of linear algebra, linear transformations; Decision theory, ROC curves, Likelihood ratio test.

## Unit II

Linear and quadratic discriminants, Fisher discriminant Sufficient statistics, coping with missing or noisy features.

Template-based recognition, eigenvector analysis, feature extraction, Training methods.

Maximum likelihood and Bayesian parameter estimation, Linear discriminant/Perception learning.

## Unit III

Optimization by gradient descent, SVM, k-nearest-neighbor classification, Non-parametric classification, density estimation, parzen estimation, Unsupervised learning, clustering, vector quantization, k-means.

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Mixture modeling, optimization by Expectation-Maximization, Hidden Markov models, Viterbi algorithm, Baum-Welch algorithm.

Linear dynamical system; Kalman filtering and smoothing, Bayesian networks, independence diagrams, Decision trees, Multi-layer Perceptrons.

**Reference Books:**

1. Richard O. Duda, Peter E. Hart and David G. Sotrk, "Pattern Classification" Wiley.
- 2.

**MCA 511 : ADA Lab**

Practical Lab : 6 Hours per Week (4 Credits)

Examination : Practical examination : 4 Hours

Max. Marks : 100

Lab Exercise based on Theory Paper MCA 503

**MCA 522: Mini Project**

Practical Lab : 6 Hours per Week (4 Credits)

Examination : Practical examination : 4 Hours

Max. Marks : 100

Technology : Use .NET/JAVA/JSP/PHP/Android/Web Technology.

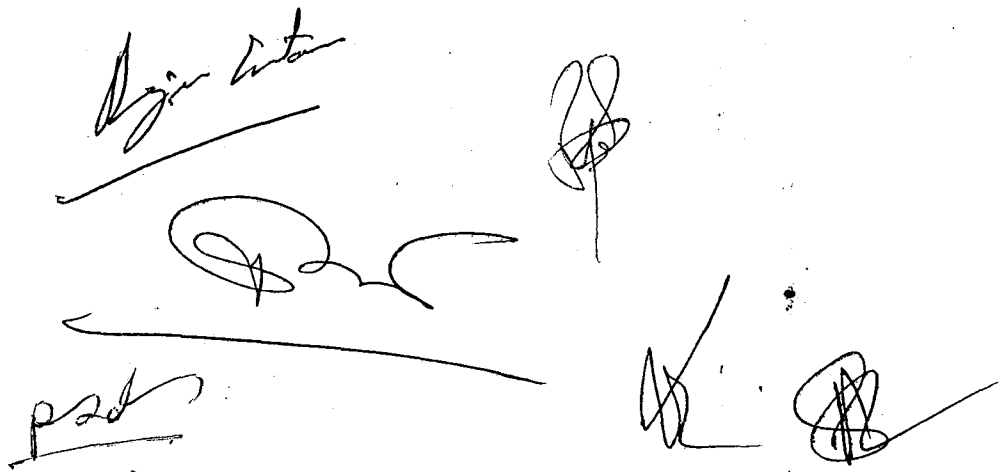
**MCA 523: Seminar**

Practical Lab : 6 Hours per Week (4 Credits)

Examination : Practical examination : 4 Hours

Max. Marks : 100

Each candidate have to give a Seminar (Power Point Presentation and its Report) on any topic of interest related to latest IT/Computer Sc. /Mobile Technology in the presence of Assessment Committee.

The bottom section of the page contains several handwritten signatures and marks. On the left, there is a signature that appears to be 'D. J. ...' with a horizontal line underneath. Below this is another signature, possibly 'P. S. ...', also with a horizontal line. To the right of these, there are several other signatures and initials, including a large, stylized signature in the center and several smaller, more compact signatures on the right side. The marks are scattered across the lower half of the page.