



# R.K.D.F. UNIVERSITY, BHOPAL

## Master of Computer Application (MCA)

### SCHEME First Semester

S.No	Subject Code	Subject Name	Marks Distribution						
			Assignment Marks		Theory Marks		Practical Marks		Total Marks
			Max	Min	Max	Min	Max	Min	
1	MCA-101	Computer Organization	20	8	80	32	-	-	100
2	MCA-102	Problem Solving in and Programming & C++	20	8	80	32	-	-	100
3	MCA-103	Mathematical Foundation of Computer Science	20	8	80	32	-	-	100
4	MCA-104	Communication Skills	20	8	80	32	-	-	100
5	MCA-105	Data Structure	20	8	80	32	-	-	100
6	MCA-106	Programming Lab with C++ & Data Structures Lab	-	-	-	-	200	100	200
7	MCA-107	Language Lab	-	-	-	-	50	25	50
<b>Total</b>			<b>100</b>	<b>40</b>	<b>400</b>	<b>160</b>	<b>250</b>	<b>125</b>	<b>750</b>



# R.K.D.F. UNIVERSITY, BHOPAL

## MASTER OF COMPUTER APPLICATION

### FIRST YEAR

#### Semester – I

Course	Subject Title	Subject Code
MCA	Computer Organization	MCA-101

#### UNIT-I

Representation of Information: Number systems, integer and floating-point representation, character codes(ASCII, EBCDIC), Error detection and correction codes : parity check code, cyclic redundancy code, Hamming code . Basic Building Blocks: Boolean Algebra, Simplification of Boolean Function. Combinational blocks: gates, multiplexers, decoders, Implementation of Boolean Function in form of gates etc. Sequential building blocks: flip-flops, Registers: Buffer register, Right &Left Shift register, Bidirectional Shift register. Counters : Ripple counter, Binary Counter,MOD-10 Counter, Ring Counter.

#### UNIT-II

Register Transfer Language and Micro-operations: concept of bus, data movement among registers, a language to represent conditional data transfer, data movement from/to memory. Design of simple Arithmetic & Logic Unit & Control Unit, arithmetic and logical operations Along with register transfer, timing in register transfer. Functional units – Basic operational concepts – Bus structures – Performance and metrics – Instruction and instruction sequencing – Hardware – Software Interface – Addressing modes – Instructions – Sets – RISC and CISC – ALU design – Fixed point and Floating point operation.

#### UNIT-III

Architecture of a simple processor: A simple computer organization and instruction set, instruction formats, addressing modes, instruction cycle, instruction execution in terms of microinstructions, interrupt cycle, concepts of interrupt and simple I/O organization, Synchronous & Asynchronous data transfer, Data Transfer Mode : Program Controlled, Interrupt driven, DMA(Direct Memory Access). implementation of processor using the building blocks.

#### UNIT-IV

Assembly Language programming: Pin Diagram of 8086, Architecture of 8086,Addressing Mode of 8086,detailed study of 8086/8088 assembly language, instruction set of 8086, loops and Comparisons, conditions and procedures, arithmetic operations in assembly language. Simple Assembly Language program of 8086. illustrations using typical programs like: table search, subroutines, symbolic and numerical manipulations and I/O.

#### UNIT-V

Memory organization: Secondary Memory, Primary Memory :Random access memory, Read Only memory basic cell of static and dynamic RAM, Building large memories using chips, Concept of segmentation & Paging, Associative memory, cache memory organization, virtual memory organization.

**TEXT BOOKS:**

1. Morris Mano, "Digital Design", Prentice Hall of India, 1997.
2. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, Firth Edition, "Computer Organization", Tata McGraw Hill, 2002.

**REFERENCES:**

1. Charles H. Roth, Jr., "Fundamentals of Logic Design", Jaico Publishing House, Mumbai, Fourth Edition, 1992.
2. William Stallings, "Computer Organization and Architecture – Designing for Performance", Sixth Edition, Pearson Education, 2003.
3. David A. Patterson and John L. Hennessy, "Computer Organization and Design:



# R.K.D.F. UNIVERSITY, BHOPAL

## MASTER OF COMPUTER APPLICATION

### FIRST YEAR

#### Semester – I

Course	Subject Title	Subject Code
MCA	Problem Solving in and Programming & C++	MCA-102

#### UNIT-I

An overview: Problem identification, analysis, design, coding, testing & debugging, implementation, modification & maintenance; algorithms & flowcharts; Characteristics of a good program - accuracy, simplicity, robustness, portability, minimum resource & time requirement, modularization; Rules/conventions of coding, documentation, naming variables; Top down design; Bottom-up design.

#### UNIT-II

Fundamentals of C ++Programming: History of C++, Structure of a C++ Program; Data types; Constant Variable, naming variables; Operators & expressions; Control Constructs – if-else, for, while, do-while; Case switch statement; Arrays; Formatted & unformatted I/O; Type modifiers & storage classes; Ternary operator; Type conversion & type casting; Priority & associativity of operators.

#### UNIT-III

Modular Programming: Functions; Arguments; Return value; Parameter passing – call by value, call by reference; Return statement; Scope, visibility and life-time rules for various types of variable, static variable; Calling a function; Recursion – basics, comparison with iteration, types of recursion- direct, indirect, tree and tail recursion, when to avoid recursion, examples.

#### UNIT-IV

Advanced Programming Techniques: Special constructs – Break, continue, exit(), goto & labels; Function returning pointers; Pointer to function, Function as parameter; Structure – basic, declaration, membership operator, pointer to structure, referential operator, self referential structures, structure within structure, array in structure, array of structures; Union – basic, declaration; Enumerated data type; Typedef; command line arguments.

#### UNIT-V

Abstract data types, Objects and classes, Attributes and Methods, Objects as software units, Encapsulation and Information hiding, Objects instantiations and interactions, Object lifetime, Static and dynamic objects, global and local objects, Metaclass, Modeling the real world objects.

#### **TEXT BOOKS:**

1. Balagurusamy; Object oriented programming with C++; TMH
2. David Parsons Object oriented programming with C++; BPB publication

#### **References:**

1. David Parsons; Object oriented programming with C++; BPB publication
2. Object oriented programming in C++ by Robert Lafore: Galgotia
3. Balagurusamy; Object oriented programming with C++; TMH
4. Hubbard; Programming in C++ (Schaum); TMH
5. Mastering C++ by Venugopal, TMH



# R.K.D.F. UNIVERSITY, BHOPAL

## MASTER OF COMPUTER APPLICATION

### FIRST YEAR

#### Semester – I

Course	Subject Title	Subject Code
MCA	Mathematical Foundation of Computer Science	MCA-103

#### UNIT-I

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

#### UNIT-II

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

#### UNIT-III

**Groups and Fields :** Group axioms, permutation group, sub group, co-sets, normal subgroup, semi group, Lagrange theorem, fields, minimal polynomials, reducible polynomials, primitive polynomial, polynomial roots, applications.

#### UNIT-IV

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

#### UNIT-V

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

#### REFERENCES

1. Kenneth H. Rosen, "Discrete Mathematics and Its Applications", Tata McGraw Hill, Fourth Edition, 2002 (Unit 1, 2 & 3).
2. Hopcroft and Ullman, "Introduction to Automata Theory, Languages and Computation", Narosa Publishing House, Delhi, 2002. (Unit 4, 5)
3. A. Tamarasi & A. M. Natarajan, "Discrete Mathematics and its Application", Khanna Publishers, 2nd Edition 2005.
4. M. K. Venkataraman "Engineering Mathematics", Volume II, National Publishing Company, 2nd Edition, 1989.



# R.K.D.F. UNIVERSITY, BHOPAL

## MASTER OF COMPUTER APPLICATION

### FIRST YEAR

#### Semester – I

Course	Subject Title	Subject Code
MCA	Communication Skills	MCA-104

#### UNIT-I

**Communication** Meaning and process of communication, importance of effective communication, communication situation, barriers to communication. Objectives of communication, types of communication, principles of communication, essentials of effective communication.

#### UNIT-II

**Media of Communication** Written, oral, face-to-face, visual, audio-Visual, merits and demerits of written and oral communication.

#### UNIT-III

**Communication Skills:** Developing communication skills; Listening; Speaking; Reading-Writing (Oral & Written). Body language; Utility of aids in Communication.

#### UNIT-IV

**Spoken Skills** Preparing for oral presentation, conducting presentations; Debates; Seminar; Speeches; Lectures; Interviews; Telephonic Conversation; Negotiations; Group Discussions.

#### UNIT-V

**Written Skills:** Preparing of bio-data, seminar, paper, bibliography, and official correspondence; Mechanics of writing; Formal & Informal writings, letters; paragraphing, precise, report writing, technical reports, length of written reports, organizing reports, writing technical reports; Creative writing; Common Errors in Language.

#### **REFERENCES:**

1. Rajendra Pal and J.S. Korlahalli “Essentials of Business Communication” , Sultan Chand & Sons Publishers, New Delhi.
2. U.S.Rai & S.M. Rai “Business Communications” , Himalaya Publishing House.
3. Menzal and D.H. Jones “Writing a technical Paper”, Mc Graw Hill, 1961.
4. Strategy and Skill “Business Communication”, Prentice Hall New Jersey, 1987
5. Scot Ober “Contemporary Business Communication”, Wiley India.



# R.K.D.F. UNIVERSITY, BHOPAL

## MASTER OF COMPUTER APPLICATION

### FIRST YEAR

#### Semester – I

Course	Subject Title	Subject Code
MCA	Data Structure	MCA-105

#### UNIT-I

**Stack and Queue:** contiguous implementations of stack, various operations on stack, various polish notations-infix, prefix, postfix, conversion from one to another-using stack; evaluation of post and prefix expressions. Contiguous implementation of queue: Linear queue, its drawback; circular queue; various operations on queue; linked implementation of stack and queue- operations.

#### UNIT-II

**General List:** list and it's contiguous implementation, it's drawback; singly linked list-operations on it; doubly linked list-operations on it; circular linked list; linked list using arrays.

#### UNIT-III

**Trees:** definitions-height, depth, order, degree, parent and child relationship etc; Binary Trees- various theorems, complete binary tree, almost complete binary tree; Tree traversals-preorder, in order and post order traversals, their recursive and non recursive implementations; expression tree- evaluation; linked representation of binary tree-operations. Threaded binary trees; forests, conversion of forest into tree. Heap-definition.

#### UNIT-IV

**Searching, Hashing and Sorting:** requirements of a search algorithm; sequential search, binary search, indexed sequential search, interpolation search; hashing-basics, methods, collision, resolution of collision, chaining; Internal sorting- Bubble sort, selection sort, insertion sort, quick sort, merge sort on linked and contiguous list, shell sort, heap sort, tree sort.

#### UNIT-V

**Graphs:** related definitions: graph representations- adjacency matrix, adjacency lists, adjacency multilist; traversal schemes- depth first search, breadth first search; Minimum spanning tree; shortest path algorithm; kruskals & dijkstras algorithm. Miscellaneous features Basic idea of AVL tree- definition, insertion & deletion operations; basic idea of B-tree- definition, order, degree, insertion & deletion operations; B+-Tree-definitions, comparison with B-tree; basic idea of string processing.

#### REFERNCES

1. Robert Kruse & Clovis L. Tondo “ Data Structures and Program Design in C”,Prentice Hall , 2nd edition.,1991.
2. Weiss “Data Structures and Algorithm Analysis in C ” ,Addison Wesley , Second Edition, 1997.
3. Trembly “Introduction to Data Structure with Applications”.
4. Tennenbaum A.M. & others: Data Structures using C & C++; PHI
5. Horowitz & Sawhaney: Fundamentals of Data Structures, Galgotia Publishers.
6. Yashwant Kanetkar, Understanding Pointers in C, BPB.



# R.K.D.F. UNIVERSITY, BHOPAL

MASTER OF COMPUTER APPLICATION

FIRST YEAR

Semester – I

Course	Subject Title	Subject Code
MCA	<b>Programming Lab with C++ &amp; Data Structures Lab</b>	<b>MCA-106</b>

**Outline:** Exercises to implement various Programming using C ++ .

**Outline:** Exercises to implement various data structures and algorithms using C ++ .

Course	Subject Title	Subject Code
MCA	<b>Language Programming Lab</b>	<b>MCA-107</b>

**Outline:** Exercises to implement various experiments.





# R.K.D.F. UNIVERSITY, BHOPAL

## Master of Computer Application (MCA)

### SCHEME

#### Second Semester

S.No	Subject Code	Subject Name	Marks Distribution						
			Assignment Marks		Theory Marks		Practical Marks		Total Marks
			Max	Min	Max	Min	Max	Min	
1	MCA-201	Core Java Program	20	8	80	32	-	-	100
2	MCA-202	Database Management Systems	20	8	80	32	-	-	100
3	MCA-203	Operating System	20	8	80	32	-	-	100
4	MCA-204	Design And Analysis of Algorithm	20	8	80	32	-	-	100
5	MCA-205	System Software	20	8	80	32	-	-	100
6	MCA-206	Core Java Programming Lab	-	-	-	-	200	100	200
7	MCA-207	Database Management System	-	-	-	-	50	25	50
<b>Total</b>			<b>100</b>	<b>40</b>	<b>400</b>	<b>160</b>	<b>250</b>	<b>125</b>	<b>750</b>



# R.K.D.F. UNIVERSITY, BHOPAL

## MASTER OF COMPUTER APPLICATION

### FIRST YEAR

#### Semester – II

Course	Subject Title	Subject Code
MCA	Core Java Program	MCA-201

#### UNIT I

**FUNDAMENTALS:** Object–Oriented Programming concepts – Encapsulation – Programming Elements – Program Structure – Enumeration Types — Functions and Pointers – FunctionInvocation – Overloading Functions – Scope and Storage Class – Pointer Types –Arrays and Pointers – Call–by–Reference – Assertions – Standard template library.

#### UNIT II

**IMPLEMENTING ADTS AND ENCAPSULATION:** Aggregate Type struct – Structure Pointer Operators – Unions – Bit Fields – Data Handling and Member Functions – Classes – Constructors and Destructors – Static Member – this Pointer – reference semantics – implementation of simple ADTs.

#### UNIT III

**POLYMORPHISM:** ADT Conversions – Overloading – Overloading Operators – Unary Operator Overloading , Binary Operator Overloading , Function Selection , Pointer Operators, Visitation , Iterators – containers – List – List Iterators.

#### UNIT IV

**TEMPLATES:** Template Class – Function Templates – Class Templates – Parameterizing – STL – Algorithms – Function Adaptors.

#### UNIT V

**INHERITANCE:** Derived Class – Typing Conversions and Visibility – Code Reuse – Virtual Functions – Templates and Inheritance – Run–Time Type Identifications – Exceptions – Handlers –Standard Exceptions.

#### **REFERENCES:**

1. Ira Pohl, “Object–Oriented Programming Using C++”, Pearson Education, Second Edition, 2003.
2. Stanley B.Lippman, Josee Lajoie, “C++ Primer”, Pearson Education, Third Edition, 2004.
3. Kamthane,” Object Oriented Programming with ANSI and Turbo C++”, Person Education, 2002.
4. Bhave , “ Object Oriented Programming With C++” , Pearson Education , 2004.



# R.K.D.F. UNIVERSITY, BHOPAL

## MASTER OF COMPUTER APPLICATION

### FIRST YEAR

#### Semester – II

Course	Subject Title	Subject Code
MCA	Database Management Systems	MCA-202

#### UNIT-I

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

#### UNIT-II

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

#### UNIT-III

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

#### UNIT-IV

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

#### UNIT-V

**Emerging Fields in DBMS:** object oriented Databases-basic idea and the model, object structure, object class, inheritance, multiple inheritance, object identity, data warehousing- terminology, definitions, characteristics, data mining and its overview, Database on www, multimedia Databases-difference with conventional DBMS, issues, similarity based retrieval, continuous media data, multimedia data formats, video servers. **Storage structure and file organizations:** overview of physical storage media, magnetic disks performance and optimization, basic idea of RAID, file organization, organization of records in files,

asic concepts of indexing, ordered indices, basic idea of B-tree and B+-tree organization **Network and hierarchical models:** basic idea, data structure diagrams, DBTG model, implementations, tree structure diagram, implementation techniques, comparison of the three model.

**REFERENCES:**

1. A Silberschatz, H.F Korth, Sudersan “Database System Concepts” –, MGH Publication.
2. C.J Date “An introduction to Database Systems” –6th ed.
3. Elmasri & Navathe “Fundamentals of Database systems” – III ed.



# R.K.D.F. UNIVERSITY, BHOPAL

## MASTER OF COMPUTER APPLICATION

### FIRST YEAR

#### Semester – II

Course	Subject Title	Subject Code
MCA	Operating System	MCA-203

#### UNIT-I

**Introduction:** Evolution of operating systems (History of evolution of OS with the generations of computers), Types of operating systems, Multitasking, Timesharing, Multithreading, Multiprogramming and, Real time operating systems, Different views of the operating system, System Programmer's view, User's view, Operating system concepts and structure, Layered Operating Systems, Monolithic Systems. **Processes:** The Process concept, The process control block, Systems programmer's view of processes, Operating system services for process management, Scheduling algorithms, First come first serve, Round Robin, Shortest run time next, Highest response ratio next, Multilevel Feedback Queues, Performance evaluation of scheduling algorithms stated above

#### UNIT-II

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

#### UNIT-III

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

#### UNIT-IV

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

#### UNIT-V

**Processes and Processors in Distributed Systems:** Threads, System models, processor allocation, scheduling. Distributed File Systems: Design, Implementation, and trends. Performance Measurement,

monitoring and evaluation Introduction, important trends affecting performance issues, why performance monitoring and evaluation are needed, performance measures, evaluation techniques, bottlenecks and saturation, feedback loops.

**REFERENCES:**

1. Deitel, H.M. "An Introduction to Operating Systems". Addison Wesley Publishing Company 1984.
2. Milenkovic, M., "Operating Systems - concepts and Design" McGraw Hill International Edition-Computer Science series 1992.
3. Abraham Silberschatz Peter B. Galvin, G. Gagne, "Operating System Concepts", Sixth Edition, Addison Wesley Publishing Co., 2003.
4. Tanenbaum, A.S. "Modern Operating System", Prentice Hall of India Pvt. Ltd.1995.



# R.K.D.F. UNIVERSITY, BHOPAL

## MASTER OF COMPUTER APPLICATION

### FIRST YEAR

#### Semester – II

Course	Subject Title	Subject Code
MCA	Design And Analysis of Algorithm	MCA-204

#### UNIT – I

**Pre-requisites:** Data structure & Discrete structures, models of computation, algorithm analysis, order architecture, time space complexities average and worst case analysis.

#### UNIT-II

**Divide and conquer:** Structure of divide-and-conquer algorithms: examples; Binary search, quick sort, Strassen Multiplication; Analysis of divide and conquer run time recurrence relations.

**Graph searching and Traversal:** Overview, Traversal methods (depth first and breadth first search).

#### UNIT-III

**Greedy Method:** Overview of the greedy paradigm examples of exact optimization solution (minimum cost spanning tree), Approximate solution (Knapsack problem), Single source shortest paths.

**Branch and bound:** LC searching Bounding, FIFO branch and bound, LC branch and bound application: 0/1 Knapsack problem, Traveling Salesman Problem, searching & sorting algorithms.

#### UNIT-IV

**Dynamic programming:** Overview, difference between dynamic programming and divide and conquer, Applications: Shortest path in graph, Matrix multiplication, Traveling salesman Problem, longest Common sequence. **Back tracking:** Overview, 8-queen problem, and Knapsack problem.

#### UNIT-V

**Computational Complexity:** Complexity measures, Polynomial Vs non-polynomial time complexity; NP-hard and NP-complete classes, examples. Combinational algorithms, string processing algorithm, Algebraic algorithms, set algorithms.

#### REFERENCES:

1. Ullman "Analysis and Design of Algorithm" TMH
2. Goodman "Introduction to the Design & Analysis of Algorithms, TMH-2002.
3. Sara Basse, A. V. Gelder, " Computer Algorithms," Addison Wesley
4. T. H. Cormen, Leiserson, Rivest and Stein, "Introduction of Computer algorithm," PHI
5. E. Horowitz, S. Sahni, and S. Rajsekaran, "Fundamentals of Computer Algorithms," Galgotia



# R.K.D.F. UNIVERSITY, BHOPAL

## MASTER OF COMPUTER APPLICATION

### FIRST YEAR

#### Semester – II

Course	Subject Title	Subject Code
MCA	System Software	MCA-205

#### UNIT I

**INTRODUCTION :** Introduction – System software and machine architecture – The Simplified Instructional Computer (SIC) – Machine Architectures (SIC and SIC/XE) – Data and Instruction Formats – Addressing Modes – Instruction sets – I/O Programming.

#### UNIT II

**ASSEMBLERS :** Basic assembler functions – A simple SIC assembler – Assembler algorithms and data structures – Machine dependent assembler features, Instruction formats and addressing modes – Program relocation – Machine independent assembler features – Literals – Symbol-defining statements – Expressions – Program Blocks – Control Sections and Program Linking – One Pass Assembler and Multipass Assemblers – Implementation examples MASM assembler.

#### UNIT III

**LOADERS AND LINKERS:** Basic loader functions: Design of an Absolute Loader – A Simple Bootstrap Loader Machine dependent loader features Relocation – Program Linking – Algorithm and Data Structures for Linking Loader. Machine-independent loader features – Automatic Library Search – Loader Options Loader design options – Linkage Editors – Dynamic Linking – Bootstrap Loaders. Implementation examples: MSDOS linker.

#### UNIT IV

**MACRO PROCESSORS :** Basic macro processor functions – Macro Definition and Expansion – Macro Processor Algorithm and data structures – Machine – independent macro processor features – Concatenation of Macro Parameters – Generation of Unique Labels – Conditional Macro Expansion – Keyword Macro Parameters – Macro Processor Design Options Recursive Macro Expansion – Algorithm – General Purpose macro Processors – Macro Processing within Language Translators - Implementation examples: MASM Macro Processor – ANSI C macro language.

#### UNIT V

**OTHER SYSTEM SOFTWARE :** Text editors – Overview of Editing Process - User Interface – Editor Structure – Interactive Debugging Systems – Debugging functions and capabilities – Relationships with Other parts of the system – User Interface Criteria.

#### **REFERENCES:**

1. Leland Beck - "System Software – An Introduction to Systems Programming", Third Edition, Pearson Education, Inc., 1999.
2. D. M. Dhamdhare, " Systems Programming and Operating Systems", Tata McGraw Hill Company, 1999.
3. John J. Donovan, "Systems Programming", Tata McGraw Hill Company, 1991.





# **R.K.D.F. UNIVERSITY, BHOPAL**

## **MASTER OF COMPUTER APPLICATION**

### **FIRST YEAR**

#### **Semester – II**

Course	Subject Title	Subject Code
<b>MCA</b>	<b>Core Java Programming Lab</b>	<b>MCA-206</b>

**Outline:** Exercises / case studies that require object-oriented programming in JAVA.

Course	Subject Title	Subject Code
<b>MCA</b>	<b>Database Management System Lab</b>	<b>MCA-207</b>

**Outline:** Exercises / case studies that require table design, normalization and query building.



# R.K.D.F. UNIVERSITY, BHOPAL

## Master of Computer Application (MCA)

### SCHEME

#### Third Semester

S.No	Subject Code	Subject Name	Marks Distribution						
			Assignment Marks		Theory Marks		Practical Marks		Total Marks
			Max	Min	Max	Min	Max	Min	
1	MCA-301	Computer Networks	20	8	80	32	-	-	100
2	MCA-302	Web Technology	20	8	80	32	-	-	100
3	MCA-303	Artificial Intelligence	20	8	80	32	-	-	100
4	MCA-304	Software Engineering	20	8	80	32	-	-	100
5	MCA-305	Computer Graphics & Multimedia	20	8	80	32	-	-	100
6	MCA-306	Computer Networks Lab & Web Programming Lab	-	-	-	-	200	100	200
7	MCA-307	Computer Graphics Lab	-	-	-	-	50	25	50
<b>Total</b>			<b>100</b>	<b>40</b>	<b>400</b>	<b>160</b>	<b>250</b>	<b>125</b>	<b>750</b>



# R.K.D.F. UNIVERSITY, BHOPAL

## MASTER OF COMPUTER APPLICATION

### SECOND YEAR

#### Semester – III

Course	Subject Title	Subject Code
MCA	Computer Networks	MCA-301

#### UNIT-1

**Introduction:** Computer Network, Layered Network Architecture-Review of ISO-OSI Model., Transmission Fundamentals-, Communication Media-Conductive Metal (Wired Cable), Optical Fiber links, Wireless Communication-Radio links, Setellite Links, Communication Services & Devices, Telephone System., Integrated Service Digital Network (ISDN)., Cellular Phone., ATM, Modulation & Demodulation-, Digital to Analog Conversion-Frequency Modulation (FM), Amplitude, Modulation (AM), Phase Modulation (PM)., Analog to Digital Conversion-Pulse Amplitude Modulation(PAM), Pulse Code Modulation (PCM), Differential Pulse Code Modulation, (DPCM)., Modem & Modem Types., Multiplexing-, Frequency Division Multiplexing (FDM)., Time Division Multiplexing (TDM), Statistical Time Division Multiplexing (STDM)., Contention Protocol-, Stop-Go-Access Protocol, Aloha Protocol- Pure aloha & Slotted aloha, Carrier sense multiple access with collision detection (CSMA/CD).

#### UNIT-II

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

#### UNIT-III

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

#### UNIT-IV

**Wide Area Network:** Introduction, Network routing, Routing Tables, Types of routing, Dijkstra's Algorithm, Bellman-Ford Algorithm, Link state routing, Open shortest path first, Flooding, Broadcasting, Multicasting, Congestion & Dead Lock, Internet Protocols, Overview of TCP/IP, Transport protocols, Elements of Transport Protocol, Transmission control protocol (TCP), User data-gram protocol (UDP).

#### UNIT-V

Network Security, Virtual Terminal Protocol, Overview of DNS, SNMP, email, WWW, Multimedia.

#### **REFERENCES:**

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



# R.K.D.F. UNIVERSITY, BHOPAL

## MASTER OF COMPUTER APPLICATION

### SECOND YEAR

#### Semester – III

Course	Subject Title	Subject Code
MCA	Web Technology	MCA-302

#### UNIT I

**BASIC INTERNET CONCEPTS** : Connecting to the Internet – Domain Name System - Exchanging E-mail – Sending and Receiving Files - Fighting Spam, Sorting Mail and avoiding e-mail viruses – Chatting and Conferencing on the Internet – Online Chatting - Messaging – Usenet Newsgroup ,Internet Relay chat (IRC) – Instant Messaging - Voice and Video Conferencing.

#### UNIT II

**WORLD WIDE WEB** : Overview – Web Security, Privacy, and site-blocking – Audio and Video on the web ,Creating and Maintaining the Web – Web site creation concepts – Web Page Editors ,Optimizing Web Graphics – Web Audio Files – Forms, Interactivity, and Database- Driven Web sites – File Transfer and downloading – FTP – Peer to Peer – Downloading and Installing software.

#### UNIT III

Static and dynamic web pages, tiers, plug-ins, frames and forms. Exposure to Markup languages, HTML, DHTML, VRML, SGML, XML etc. CGI, Applets & Serve-lets, JSP & JAVA Beans, active X control, ASP cookies creating and reading cookies, semantic web, semantic web service ontology Comparative case study of Microsoft and JAVA technologies, web server scalability,.Distributed objects, object request brokers, component technology, Web services, Web application architectures, Browsers, Search engines.

#### UNIT-IV

Introduction to building blocks of electronic commerce: Internet and networking. Technologies,IP addressing, ARP, RARP, BOOTP, DHCP, ICMP, DNS, TFTP, TELNET.

#### UNIT-V

Advanced technologies for e-commerce: Introduction to mobile agents. WAP: the enabling technology : The WAP model, WAP Architecture, Benefit of WAP to e-commerce. Web Security, Encryption Schemes, secure Web documents, Digital signatures and firewalls.

#### **References:**

1. Web Technology, Achyut Godbole, Atul Kahate, TMH
2. Henry Chan, Raymond Lee, Tharam Dillon , E-Commerce Fundamental and Applications, Willey Publication.
3. Minoli & Minoli, Web Commerce Technology Hand Book, TMH
4. Satyanarayana, E-Government, PHI
5. Uttam K: Web Technologies, Oxford University Press.



# R.K.D.F. UNIVERSITY, BHOPAL

## MASTER OF COMPUTER APPLICATION

### SECOND YEAR

#### Semester – III

Course	Subject Title	Subject Code
MCA	Artificial Intelligence	MCA-303

#### UNIT-I

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

#### UNIT-II

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

#### UNIT-III

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

#### UNIT-IV

**Natural Language processing:** Parsing techniques, context free grammar, recursive transitions nets (RNT), augmented transition nets (ATN), case and logic grammars, syntactic analysis.

Game playing Minimax search procedure, alpha-beta cutoffs, additional refinements.

**Planning** Overview an example domain the block world, component of planning systems, goal stack planning, non linear planning.

#### UNIT-V

**Probabilistic Reasoning and Uncertainty:** Probability theory, bayes theorem and bayesian networks, certainty factor. **Expert Systems** Introduction to expert system and application of expert systems, various expert system shells, vidwan frame work, knowledge acquisition, case studies, MYCIN. **Learning** Rote learning, learning by induction, explanation based learning.

#### **REFERENCES:**

1. Nils J. Nilson "Principles of Artificial Intelligence", Narosa Publishing House.
2. Clocksin & C.S.Melish "Programming in PROLOG", Narosa Publishing House.
3. M.Sasikumar,S.Ramani etc. "Rule based Expert System", Narosa Publishing House.



# **R.K.D.F. UNIVERSITY, BHOPAL**

## **MASTER OF COMPUTER APPLICATION**

### **SECOND YEAR**

#### **Semester – III**

Course	Subject Title	Subject Code
<b>MCA</b>	<b>Software Engineering</b>	<b>MCA-304</b>

#### **UNIT I**

**INTRODUCTION** Software Engineering paradigms – Waterfall Life cycle model – Spiral Model – Prototype Model – fourth Generation Techniques – Planning – Cost Estimation Organization Structure – Software Project Scheduling, – Risk analysis and management – Requirements and Specification – Rapid Prototyping.

#### **UNIT II**

**SOFTWARE DESIGN** Abstraction – Modularity – Software Architecture – Cohesion – Coupling – Various Design Concepts and notations – Real time and Distributed System Design – Documentation – Dataflow Oriented design – Jackson System development – Designing for reuse – Programming standards.

#### **UNIT III**

**SOFTWARE METRICS** Scope – Classification of metrics – Measuring Process and Product attributes – Direct and Indirect measures – Reliability – Software Quality Assurance – Standards.

#### **UNIT IV**

**SOFTWARE TESTING AND MAINTENANCE** :Software Testing Fundamentals – Software testing strategies – Black Box Testing –White Box Testing – System Testing – Testing Tools – Test Case Management –Software Maintenance Organization – Maintenance Report – Types of Maintenance.

#### **UNIT V**

**SOFTWARE CONFIGURATION MANAGEMENT (SCM) & CASE TOOLS** :Need for SCM – Version Control – SCM process – Software Configuration Items – Taxonomy – Case Repository – Features.

#### **REFERENCES:**

1. Roger S. Pressman, “Software Engineering: A Practitioner Approach”, Sixth edition, McGrawHill, 2005.
2. I. Sommerville, “Software Engineering”, Sixth Edition, Addison Wesley-Longman, 2004.
3. Pankaj Jalote, “An Integrated approach to Software Engineering”, Second Edition, Springer Verlag, 1997.



# **R.K.D.F. UNIVERSITY, BHOPAL**

## **MASTER OF COMPUTER APPLICATION**

### **SECOND YEAR**

#### **Semester – III**

Course	Subject Title	Subject Code
<b>MCA</b>	<b>Computer Graphics &amp; Multimedia</b>	<b>MCA-305</b>

#### **UNIT-I**

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

#### **UNIT-II**

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

#### **UNIT-III**

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

#### **UNIT-IV**

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

#### **UNIT-V**

Introduction to multimedia, multimedia components, multimedia hardware, SCSI, IDE, MCI, Multimedia data and file formats, RTF, TIFF, MIDI, JPEG, DIB, MPEG, Multimedia tools, presentations tools, Authoring tools, presentations.

#### **REFERENCES:**

1. Donald Hearn and M. Pauline Baker, "Computer Graphics in C Version", Second Edition, Pearson Education.
2. Raf Steinmetz and Klara Nahrstedt, "Multimedia: Computing, Communication and applications", Pearson Education.
3. John Villamil Casanova and Leony Fernandez-Elias, " Multimedia Graphics", Prentice Hall India.



# **R.K.D.F. UNIVERSITY, BHOPAL**

## **MASTER OF COMPUTER APPLICATION**

### **SECOND YEAR**

#### **Semester – III**

Course	Subject Title	Subject Code
<b>MCA</b>	<b>Computer Networks Lab &amp; Web Programming Lab</b>	<b>MCA-306</b>

**Outline:** Exercises to implement the various experiment .

**Outline:** Exercises to implement the various Program with C++ .

Course	Subject Title	Subject Code
<b>MCA</b>	<b>Computer Graphics Lab</b>	<b>MCA-307</b>

**Outline:** Exercises to learn implementing various graphics algorithms using C++ and Exercises to learn multimedia concepts.





# R.K.D.F. UNIVERSITY, BHOPAL

## Master of Computer Application (MCA)

### SCHEME

#### Fourth Semester

S.No	Subject Code	Subject Name	Marks Distribution						
			Assignment Marks		Theory Marks		Practical Marks		Total Marks
			Max	Min	Max	Min	Max	Min	
1	MCA-401	Advance Java Programming	20	8	80	32	-	-	100
2	MCA-402	Mobile Computing	20	8	80	32	-	-	100
3	MCA-403	Object Oriented Analysis And Design	20	8	80	32	-	-	100
4	MCA-404	Compiler Design	20	8	80	32	-	-	100
5	MCA-405	Data Mining & Data Warehouse	20	8	80	32	-	-	100
6	MCA-410	Minor Project Lab-I	-	-	-	-	200	100	200
7	MCA-411	Advanced Java Programming Lab	-	-	-	-	50	25	50
<b>Total</b>			<b>100</b>	<b>40</b>	<b>400</b>	<b>160</b>	<b>250</b>	<b>125</b>	<b>750</b>



# R.K.D.F. UNIVERSITY, BHOPAL

## MASTER OF COMPUTER APPLICATION

### SECOND YEAR

#### Semester – IV

Course	Subject Title	Subject Code
MCA	Advance Java Programming	MCA-401

#### UNIT-I

**Java Database Connectivity:** JDBC Product, Types of Drivers, Two-Tier Client/Server Model, Three-Tier Client/Server Model, Basic Steps of JDBC, Creating and Executing SQL Statement, Set Object, Working with Database Meta Data, Interface.

**Servlets:** Servlet Interaction & Advanced Servlets, Life cycle of Servlet, Java Servlet development Kit, Javax. servlet package. **JavaServer Pages:** JSP, Understanding the Client-Server Model, Understanding Web server software, Configuring the JSP Server.

#### UNIT-II

**RMI:** Designing RMI application, Executing RMI application, **EJB:** Types of Enterprise Java beans, Session Bean & Entity Bean, Features of Session Bean, Life-cycle of Stateful Session Bean, Features of Entity Bean, Life-cycle of Entity Bean, Container-managed Transactions & Bean-managed Transactions, Implementing a container-managed Entity Bean.

#### UNIT-III

**XML:** What is XML, XML Syntax Rules, **Struts: Introduction to the :** Apache Struts, MVC Architecture, Struts Architecture, Introduction to the Struts Controller, Introduction to the Struts Action Class, Using Struts ActionFrom Class, Using Struts HTML Tags, Introduction to Struts. **Hibernate:** Introduction to Hibernate 3.0, Hibernate Architecture, First Hibernate Application

#### UNIT-IV

**Applets:** Applet security restrictions; the class hierarchy for applets; Life cycle of applet; HTML Tags for applet. **The AWT:** The class hierarchy of window fundamentals; The basic user interface components Label, Button, Check Box, Radio Button, Choice menu, Text area, Scroll list, Scroll bar; Frame; Layout managers flowlayout, Grid layout, Border layout, Card layout. **The Java Event Handling Model:** Java's event delegation model – Ignoring the event, Self contained events, Delegating events; The event class hierarchy; The relationship between interface, methods called, parameters and event source; Adapter classes; Event classes action Event, Adjustment Event, Container Event, Focus Event, Item Event, Eey Event, Mouse Event, Text Event, Window Event.

#### UNIT-V

**Input/Output :** Exploring Java i.o., Directories, stream classes The Byte stream : Input stream, output stream, file input stream, file output stream, print stream, Random access file, the character streams, Buffered reader, buffered writer, print writer, serialization. **JDBC:** JDBC-ODBC bridge; The connectivity model; The driver manager; Navigating the resultset object contents; java.sql Package; The JDBC exception classes; Connecting to Remote database.

**Networking & RMI:** Java Networking : Networking Basics : Socket, Client server, reserved sockets, proxy servers, Inet address, TCP sockets, UDP sockets.;

**REFERENCES:**

1. Ed Roman, "Enterprise Java Beans", Third Edition , Wiley , 2004.
2. Deitel "Java- How to Program:" Pearson Education, Asia



# R.K.D.F. UNIVERSITY, BHOPAL

## MASTER OF COMPUTER APPLICATION

### SECOND YEAR

#### Semester – IV

Course	Subject Title	Subject Code
MCA	Mobile Computing	MCA-402

#### UNIT-I

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

#### UNIT-II

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

#### UNIT-III

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

#### UNIT-IV

WLAN : Components and working of Wireless LAN, Transmission Media for WLAN, Infrastructure & types of WLAN, IEEE 802.11 Standards , Protocols for WLAN ,MACA,MACAW, Infrared technology. **I INTRODUCTION TO SOFT COMPUTING AND NEURAL NETWORKS** Evolution of Computing - Soft Computing Constituents ,From Conventional AI to Computational Intelligence - Machine Learning Basics **GENETIC ALGORITHMS** Introduction to Genetic Algorithms (GA) ,Applications of GA in Machine Learning ,Machine Learning Approach to Knowledge Acquisition.

#### UNIT-V

**NEURAL NETWORKS** :Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks ,Supervised Learning Neural Networks , Radial Basis Function Networks - Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance architectures – Advances in Neural networks.**FUZZY LOGIC** Fuzzy Sets –Operations on Fuzzy Sets ,Fuzzy Relations Membership Functions,Fuzzy Rules and Fuzzy Reasoning ,Fuzzy Inference Systems ,Fuzzy Expert Systems, Fuzzy Decision Making.**NEURO-FUZZY MODELING**

Adaptive Neuro-Fuzzy Inference Systems ,Coactive Neuro-Fuzzy Modeling ,Classification and Regression Trees – Data Clustering Algorithms , Rulebase Structure Identification – Neuro Fuzzy Control – Case studies.

**REFERENCES:**

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, “Neuro-Fuzzy and Soft Computing”, Prentice-Hall of India, 2003.
2. George J. Klir and Bo Yuan, “Fuzzy Sets and Fuzzy Logic-Theory and Applications”, 3. Lee Mobile Cellular Telecom” 1995 Mc Graw Hill.
4. Mitchell Melanie, “An Introduction to Genetic Algorithm”, Prentice Hall, 1998.
5. David E. Goldberg, “Genetic Algorithms in Search, Optimization and Machine Learning”, Addison Wesley, 1997.



# R.K.D.F. UNIVERSITY, BHOPAL

## MASTER OF COMPUTER APPLICATION

### SECOND YEAR

#### Semester – IV

Course	Subject Title	Subject Code
MCA	Object Oriented Analysis And Design	MCA-403

#### UNIT - I

INTRODUCTION :An overview – Object basics – Object state and properties ,Behavior – Methods ,Messages – Information hiding , Class hierarchy ,Relationships ,Associations – Aggregations- Identity – Dynamic binding – Persistence , Metaclasses – Object oriented system development life cycle.

#### UNIT - II

METHODOLOGY AND UML :Introduction ,Survey , Rumbugh, Booch, Jacobson methods – Patterns, Frameworks , Unified approach – Unified modeling language – Static and Dynamic models –,UML diagrams – Class diagram ,Usecase diagrams ,Dynamic modeling – Model organization ,Extensibility.

#### UNIT - III

OBJECT ORIENTED ANALYSIS: Identifying Usecase, Business object analysis Usecase driven object oriented analysis – Usecase model – Documentation – Classification – Identifying object,relationships, attributes, methods – Super-sub class – A part of relationships Identifying attributes and methods – Object responsibility

#### UNIT - IV

**OBJECT ORIENTED DESIGN** :Design process – Axioms – Colollaries – Designing classes – Class visibility – Refining attributes – Methods and protocols – Object storage and object interoperability – Databases – Object relational systems – Designing interface objects – Macro and Micro level processes – The purpose of a view layer interface.

#### UNIT - V

**SOFTWARE QUALITY** :Quality assurance – Testing strategies – Object orientation testing – Test cases – Test Plan – Debugging principles – Usability – Satisfaction – Usability testing – Satisfaction testing.

#### **REFERENCES:**

1. Ali Bahrami, “Object Oriented System Development”, McGraw Hill International Edition, 1999.
2. Craig Larman, Applying UML and Patterns, 2nd Edition, Pearson, 2002.
3. Grady Booch, James Rumbaugh, Ivar Jacobson, “The Unified Modeling Language User Guide”, Addison Wesley Long man, 1999.
4. Bernd Bruegge, Allen H. Dutoit, Object Oriented Software Engineering using UML, Patterns and Java, Pearson 2004



# R.K.D.F. UNIVERSITY, BHOPAL

## MASTER OF COMPUTER APPLICATION

### SECOND YEAR

#### Semester – IV

Course	Subject Title	Subject Code
MCA	Compiler Design	MCA-404

#### UNIT-I

**Introduction to Compiling and one pass compiler :** Compilers and translators, phases of compilers, Structure of a compiler, compiler writing tools, bootstrapping, overview of one pass compiler, Error handling.

**Finite Automata & Lexical Analysis :** Role of lexical analyser, specification of tokens, recognition of tokens, regular expression, finite automata, form regular expression to finite automata, DFA and NFA, implementation of lexical analyser, tools for lexical analyser, only introduction to LEX.

#### UNIT-II

**Syntax Analysis & Parsing Techniques :** Context free grammars, Parse tree, ambiguity of parse tree, bottom up parsing and top down parsing, shift reduce parsing, operator precedence parsing, elimination of left recursion, recursive descent parsing, predictive parser construction, Transition diagram.

#### UNIT-III

LR parsers, constructing SLR and canonical LR parsing tables, using ambiguous grammar, Introduction to YACC, LR(1) & LALR Parsers. **Syntax Directed Translation :** Syntax directed translation scheme, construction of syntax trees, SDT with inherited and synthesized attributes, symbol tables.

#### UNIT-IV

**Intermediate code generation :** Intermediate languages, prefix notation, three address code, quadruples and triples, translation of assignment statements, boolean expression, procedural calls and iterative statements. **Run time Environment :** Source language issues, storage organisation and allocation strategies, parameter passing, implementation of block structured languages.

#### UNIT-V

**Error Detection and Recovery :** Errors, sources of errors, Lexical & syntactic phase error, semantic errors: panic mode error recovery & phrase level error recovery mechanisms.

**Code Optimization :** Optimization of basic blocks, loop optimization, global data flow analysis, loop invariant computations and other related optimization techniques. **Code Generation :** Issues in design of code generation, simple code generation techniques.

#### REFERENCES:

1. Alfred V. Aho, Ravi Sethi and J.D. Ullman “Compilers- Principles, Techniques and tools” Addison Wesley. A
2. Alfred V. Aho and J.D. Ullman “Principles of Compiler Design” Narosa Publishing House.
3. Tremblay, “Theory and Practice of compiler writing”, Mc Graw Hill.
4. Holuv, “Compiler Design in C”, PHI.
5. Dhamdhare D.M., “Compiler Construction Principles and Practice”, Macmillan India.



# R.K.D.F. UNIVERSITY, BHOPAL

## MASTER OF COMPUTER APPLICATION

### SECOND YEAR

#### Semester – IV

#### Elective - I

Course	Subject Title	Subject Code
MCA	Data Mining & Data Warehouse	MCA-405

#### UNIT - I

Data Warehousing and Business Analysis: - Data warehousing Components –Building a Data warehouse – Mapping the Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata – reporting – Query tools and Applications – Online Analytical Processing (OLAP) – OLAP and Multidimensional Data Analysis.

#### UNIT - II

Data Mining: - Data Mining Functionalities – Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation. Association Rule Mining: - Efficient and Scalable Frequent Item set Mining Methods – Mining Various Kinds of Association Rules – Association Mining to Correlation Analysis – Constraint-Based Association Mining.

#### UNIT - III

Classification and Prediction: - Issues Regarding Classification and Prediction – Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor – Ensemble Methods – Model Selection.

#### UNIT - IV

Cluster Analysis: - Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods – Clustering High- Dimensional Data – Constraint-Based Cluster Analysis – Outlier Analysis.

#### UNIT - V

Mining Object, Spatial, Multimedia, Text and Web Data: Multidimensional Analysis and Descriptive Mining of Complex Data Objects – Spatial Data Mining – Multimedia Data Mining – Text Mining – Mining the World Wide Web.

#### REFERENCES

1. Jiawei Han and Micheline Kamber “Data Mining Concepts and Techniques” Second Edition, Elsevier, Reprinted 2008.
2. Alex Berson and Stephen J. Smith “Data Warehousing, Data Mining & OLAP”, Tata McGraw – Hill Edition, Tenth Reprint 2007.





# **R.K.D.F. UNIVERSITY, BHOPAL**

## **MASTER OF COMPUTER APPLICATION**

### **SECOND YEAR**

#### **Semester – IV**

#### **Elective - I**

Course	Subject Title	Subject Code
<b>MCA</b>	<b>Soft Computing</b>	<b>MCA-406</b>

#### **UNIT-I**

Introduction, Soft Computing concept explanation, brief description of separate theories. Neural Networks and Probabilistic Reasoning; Biological and artificial neuron, neural networks and their classification. Adaline Perceptron, Madaline and BP (Back Propagation) neural networks. Adaptive feedforward multilayer networks. Algorithms: Marchand, Upstart, Cascade correlation, Tilling. RBF and RCE neural networks. Topologic organized neural network, competitive learning, Kohonen maps.

#### **UNIT-II**

CPN , LVQ, ART, SDM and Neocognitron neural networks. Neural networks as associative memories (Hopfield, BAM). Solving optimization problems using neural networks. Stochastic neural networks, Boltzmann machine.

#### **UNIT-III**

Fundamentals of fuzzy sets and fuzzy logic theory, fuzzy inference principle. Examples of use of fuzzy logic in control of real-world systems.

#### **UNIT-IV**

Fundamentals of genetic programming, examples of its using in practice. Genetic Algorithms Applications of GA's – Class.

#### **UNIT-V**

Fundamentals of rough sets and chaos theory. Hybrid approaches (neural networks, fuzzy logic, genetic algorithms, rough sets).

#### **REFERENCES:**

1. Munakata, T.: Fundamentals of the New Artificial Intelligence, Springer-Verlag New York, Inc., 1998. ISBN 0-387-98302-3
- 2.. Goldberg : Introduction to Genetic Algorithms
3. Jang, “ Nero-Fuzzy & Soft Computing”, Pearsons
4. Cordón, O., Herrera, F., Hoffman, F., Magdalena, L.: Genetic Fuzzy systems, World Scientific Publishing Co. Pte. Ltd., 2001, ISBN 981-02-4016-3
5. Kecman, V.: Learning and Soft Computing, The MIT Press, 2001, ISBN 0-262-11255-8



# **R.K.D.F. UNIVERSITY, BHOPAL**

## **MASTER OF COMPUTER APPLICATION**

### **SECOND YEAR**

#### **Elective - I**

#### **Semester – IV**

Course	Subject Title	Subject Code
<b>MCA</b>	<b>Expert Systems</b>	<b>MCA-407</b>

#### **UNIT-I**

Problem formulation, Problem Definition – Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics – Specialized production systems.

#### **UNIT-II**

Problem solving methods – Problem graphs, Matching, Indexing and Heuristic functions – Measure of performance and analysis of search algorithms - Game playing.

#### **UNIT-III**

Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic.

#### **UNIT-IV**

Structured representation of knowledge - Basic plan generation systems – Strips – Advanced plan generation systems – K strips – D Comp. Expert systems – Architecture – Roles. Knowledge Acquisition – Meta knowledge, Heuristics - Knowledge representation – Production based system, Frame based system.

#### **UNIT-V**

Inference – Backward chaining, Forward chaining, Rule value approach, Fuzzy reasoning – Certainty factors, Bayesian probability - Strategic explanations – Why, Why not and how explanations. Learning – Machine learning, adaptive learning - Typical expert systems.

#### **Reference Books**

1. Elaine Rich, "Artificial Intelligence", 1985, McGraw Hill.
2. Nilsson N.J., "Principles of Artificial Intelligence", 1992, Narosa



# R.K.D.F. UNIVERSITY, BHOPAL

## MASTER OF COMPUTER APPLICATION

### SECOND YEAR

#### Semester – IV

#### Elective - I

Course	Subject Title	Subject Code
MCA	Microprocessors And Its Application	MCA-408

#### UNIT - I

**THE 8086 PROCESSOR - SOFTWARE ASPECTS** :Evolution of Microprocessors - 8086 architecture – Addressing modes- Instruction set and assembler directives – Assembly language programming – Interrupts and interrupt service routines.

#### UNIT - II

**8086 SYSTEM DESIGN** :8086 signals description – Basic configurations - System bus timing –System design using 8086 – Minimum mode /Maximum modes 8086 system and timings.

#### UNIT - III

**INTERFACING CONCEPTS** Memory Interfacing and I/O interfacing - Parallel communication interface – Serial communication interface – Timer – Keyboard /display controller – Interrupt controller –DMA controller – Programming and applications.

#### UNIT - IV

**ADVANCED PROCESSORS** :Intel 80286 – Internal Architectural – Register Organization – Internal Block Diagram –Modes of operation – Real Address Mode – Protected Virtual Address mode – Privilege – Protection - Architectural features and Register Organization of i386, i486 and Pentium processors.

#### UNIT - V

**BUILDING SYSTEMS** Bus Concepts – Bus Standards –The Peripheral Component Interconnect (PCI) Bus –Universal Serial Bus (USB) – Platform Architectures.

#### REFERENCES:

1. A. K. Ray & K. M. Bhurchandi, “Advanced Microprocessors and peripherals- Architectures, Programming and Interfacing”, TMH, 2002 reprint.
2. Barry B. Brey, “The Intel Microprocessors, 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium,
3. Yu-cheng Liu, Glenn A. Gibson, “Microcomputer systems: The 8086/8088 Family architecture, Programming and Design”, PHI 2003.
4. Peter Abel, “IBM PC Assembly language and programming”, Prentice Hall of India Pvt. Ltd.



# **R.K.D.F. UNIVERSITY, BHOPAL**

## **MASTER OF COMPUTER APPLICATION**

### **SECOND YEAR**

#### **Semester – IV**

#### **Elective - I**

Course	Subject Title	Subject Code
<b>MCA</b>	<b>Distributed System</b>	<b>MCA-409</b>

#### **UNIT - I**

**COMMUNICATION IN DISTRIBUTED ENVIRONMENT** :Introduction – Various Paradigms in Distributed Applications – Remote Procedure Call –Remote Object Invocation – Message-Oriented Communication – Unicasting, Multicasting and Broadcasting – Group Communication.

#### **UNIT - II**

**DISTRIBUTED OPERATING SYSTEMS** :Issues in Distributed Operating System – Threads in Distributed Systems – Clock Synchronization – Causal Ordering – Global States – Election Algorithms –Distributed Mutual Exclusion – Distributed Transactions – Distributed Deadlock – Agreement Protocols .

#### **UNIT - III**

**DISTRIBUTED RESOURCE MANAGEMENT** :Distributed Shared Memory – Data-Centric Consistency Models – Client-Centric Consistency Models – Ivy – Munin – Distributed Scheduling – Distributed File Systems –Sun NFS.

#### **UNIT - IV**

**FAULT TOLERANCE AND CONSENSUS** :Introduction to Fault Tolerance – Distributed Commit Protocols – Byzantine Fault Tolerance – Impossibilities in Fault Tolerance.

#### **UNIT - V**

**CASE STUDIES** :Distributed Object-Based System – CORBA – COM+ – Distributed Coordination-Based System – JINI.

#### **REFERENCES:**

1. George Coulouris, Jean Dollimore, Tim Kindberg, “Distributed Systems Concepts and Design”, Third Edition, Pearson Education Asia, 2002.
2. Hagit Attiya and Jennifer Welch, “Distributed Computing: Fundamentals, Simulations and Advanced Topics”, Wiley, 2004.
3. Mukesh Singhal, “Advanced Concepts In Operating Systems”, McGrawHill Series in Computer Science, 1994.
4. A.S.Tanenbaum, M.Van Steen, “Distributed Systems”, Pearson Education, 2004.
5. M.L.Liu, “Distributed Computing Principles and Applications”, Pearson Addison Wesley, 2004.s



# **R.K.D.F. UNIVERSITY, BHOPAL**

**MASTER OF COMPUTER APPLICATION**

**SECOND YEAR**

**Semester – IV**

Course	Subject Title	Subject Code
<b>MCA</b>	<b>Minor Project Lab-I</b>	<b>MCA-410</b>

Course	Subject Title	Subject Code
<b>MCA</b>	<b>Advanced Java Programming Lab</b>	<b>MCA-411</b>

**Outline:** Exercises / case studies that require Advanced programming in JAVA



# R.K.D.F. UNIVERSITY, BHOPAL

## Master of Computer Application (MCA)

### SCHEME

#### Fifth Semester

S.No	Subject Code	Subject Name	Marks Distribution						
			Assignment Marks		Theory Marks		Practical Marks		Total Marks
			Max	Min	Max	Min	Max	Min	
1	MCA-501	Unix & Shell Programming	20	8	80	32	-	-	100
2	MCA-502	Software Project Management	20	8	80	32	-	-	100
3	MCA-503	.Net Framework Technology	20	8	80	32	-	-	100
4	MCA-504 (optional)	Advanced Computer Architecture	20	8	80	32	-	-	100
5	MCA-505 (optional)	TCP/IP Design and Implementation	20	8	80	32	-	-	100
6	MCA-514	Unix Programming Lab & .Net Programming Lab	-	-	-	-	200	100	200
7	MCA-515	Software Development Lab	-	-	-	-	50	25	50
<b>Total</b>			<b>100</b>	<b>40</b>	<b>400</b>	<b>160</b>	<b>250</b>	<b>125</b>	<b>750</b>



# R.K.D.F. UNIVERSITY, BHOPAL

## MASTER OF COMPUTER APPLICATION

### THIRD YEAR

#### Semester – V

Course	Subject Title	Subject Code
MCA	Unix & Shell Programming	MCA-501

#### UNIT-I

**General Overview of the System:** System structure, user perspective, O/S services assumption about Hardware The Kernel and buffer cache architecture of Unix O/S, System concepts, Kernel data Structure, System administration, Buffer headers, Structure of the buffer pool, Scenarios for retrieval of the buffer Reading and writing disk block, Advantage and disadvantage of buffer cache.

#### UNIT-II

**Internal Representation of Files:** INODES, Structure of regular, Directories conversions of a path name to an inode, Super block, Inode assignment to a new file, Allocation of disk blocks.

**System Calls for the System:** Open read write file and record close, File creation, Operation of special files change directory and change root, change owner and change mode, STAT and FSTAT, PIPES Mounting and unmounting files system, Link Unlink.

#### UNIT-III

**Structures of Processes and process control:** Process states and transitions layout of system memory, the context of a process, manipulation of process address space, Sleep process creation/termination. The user Id of a process, changing the size of a process. The SHELL

**Interprocess Communication and multiprocessor system:** Process tracing system V IPO network communication sockets problem of multiprocessors systems, solution with master and hare process, and solution with semaphores.

#### UNIT-IV

Introduction to shell scripts: shell Bourne shell, C shell, Unix commands, permissions, editors, filters sed, grep family, shell variables, scripts, meta characters and environment, if and case statements, for while and until loops. Shell programming.

#### UNIT-V

Awk and perl Programming: Awk pattern scanning and processing language, BEGIN and END patterns, Awk arithmetic and variables, Awk built in variable names and operators, arrays, strings, functions, perl; the chop() function, variable and operators, \$\_ and \$. , Lists, arrays, regular expression and substitution, file handling, subroutines, formatted printing.

**Linux:**History & Features of Linux, Linux structure, various flavours of linux.

#### **REFERENCES:**

1. M.J. Bach “Design of UNIX O.S. “, Prentice Hall of India.
2. Y.Kanetkar “Unix shell programming”, BPB Pub.
3. B.W. Kernighan & R. Pike, “The UNIX Programming Environment”, Prentice Hall of India, 1995.
4. S. Prata “Advanced UNIX: A Programming’s Guide”, BPB Publications, New Delhi.
5. Vikas/Thomsaon “Jack Dent Tony Gaddis “Guide to UNIX using LINUX” Pub. House Pvt. Ltd.



# **R.K.D.F. UNIVERSITY, BHOPAL**

## **MASTER OF COMPUTER APPLICATION**

### **THIRD YEAR**

#### **Semester – V**

Course	Subject Title	Subject Code
<b>MCA</b>	<b>Software Project Management</b>	<b>MCA-502</b>

#### **UNIT - I**

**INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT** :Project Definition – Contract Management – Activities Covered By Software Project Management – Overview Of Project Planning – Stepwise Project Planning.

#### **UNIT – II**

**PROJECT EVALUATION** :Strategic Assessment – Technical Assessment – Cost Benefit Analysis – Cash Flow Forecasting – Cost Benefit Evaluation Techniques – Risk Evaluation.

#### **UNIT – III**

**ACTIVITY PLANNING** :Objectives – Project Schedule – Sequencing And Scheduling Activities – Network Planning Models – Forward Pass – Backward Pass – Activity Float – Shortening Project Duration – Activity On Arrow Networks – Risk Management – Nature Of Risk – Types Of Risk – Managing Risk – Hazard Identification – Hazard Analysis – Risk Planning And Control.

#### **UNIT – IV**

**MONITORING AND CONTROL** :Creating Framework – Collecting The Data – Visualizing Progress – Cost Monitoring –Earned Value – Prioritizing Monitoring – Getting Project Back To Target – Change Control – Managing Contracts – Introduction – Types Of Contract – Stages In Contract Placement – Typical Terms Of A Contract – Contract Management – Acceptance.

#### **UNIT – V**

**MANAGING PEOPLE AND ORGANIZING TEAMS** :Introduction – Understanding Behavior – Organizational Behaviour: A Background –Selecting The Right Person For The Job – Instruction In The Best Methods – Motivation– The Oldman–Hackman Job Characteristics Model – Working In Groups – Becoming A Team – Decision Making – Leadership – Organizational Structures – Stress – Health And Safety – Case Studies.

#### **REFERENCES:**

1. Bob Hughes and MikeCotterell “Software Project Management”, Third Edition, TATA McGraw Hill Edition 2004.
2. Ramesh, Gopaldaswamy: "Managing Global Projects ", Tata McGraw Hill, 2001.
3. Royce.” Software Project Theory”, Pearson Education, 1999.
4. P.Jalote “Software Project Management In Practice”, Pearson Education, 2000.





# **R.K.D.F. UNIVERSITY, BHOPAL**

## **MASTER OF COMPUTER APPLICATION**

### **THIRD YEAR**

#### **Semester – V**

Course	Subject Title	Subject Code
<b>MCA</b>	<b>.Net Framework Technology</b>	<b>MCA-503</b>

#### **UNIT-I**

Introduction to VB.NET ,Event Driven Programming ,NET as better Programming Platform NET Framework, NET Architecture, The Just-In-Time Compiler,. NET Framework class library introduction VB.NET Development Environment ,Creating Applications, Building Projects Using simple components, Running VB.NET applications, Mastering VB Language. Data, Operators, Conditionals and Loops. Procedures, Error Handling, Classes and Objects.

#### **UNIT-II**

Windows Applications in VB .NET. Windows Forms, Text Boxes, Buttons, Labels, Check Boxes, and Radio Buttons. List Boxes, Combo Boxes. Picture Boxes, Scrollbars, Splitters, Timer Menus, Built-in Dialogs, Image List, Tree Views, List Views, Toolbars, Status Bar and Progress bars. Object Oriented Programming in VB .NET ,Class and Object, Properties, methods and events. Constructors and Destructors.

#### **UNIT-III**

Method overloading, Inheritance, Access modifiers: Public, Private, Protected, Friend. Overloading and Overriding. Interfaces, Polymorphism.

#### **UNIT-IV**

File handling ,File handling using File Stream, Stream Writer, Stream Reader, Binary Reader, Binary Writer classes, File and Directory Classes.

#### **UNIT-V**

Databases in VB .NET ,Database : Connections, Data adapters, and datasets, Data Reader, Connection to database with server explorer Multiple Table Connection Data binding with controls like Text Boxes, List Boxes, Data grid etc. Navigating data source ,Data Grid View, Data form wizard, Data validation Connection Objects, Command Objects, Data Adapters, Dataset Class, Working with formula fields, Parameter fields, Group, Special fields, Working with Multiple Tables, SQL in Crystal Report, Report Templates.

#### **REFERENCES:**

1. Programming Microsoft Visual Basic.NET – Francesco Balena
2. The Complete Reference -Visual Basic .NET – Jeffrey R. Shapiro
3. Visual Basic .NET 2003 in 21 Days. – Steven Holzner, SAMS Publications.
4. Crystal Report – The Complete Reference :-



# **R.K.D.F. UNIVERSITY, BHOPAL**

## **MASTER OF COMPUTER APPLICATION**

### **THIRD YEAR**

#### **Elective - II**

#### **Semester – V**

Course	Subject Title	Subject Code
<b>MCA</b>	<b>Natural Language Processing</b>	<b>MCA-507</b>

#### **UNIT - I**

**INTRODUCTION** :Natural Language Processing – Linguistic Background- Spoken language input and output Technologies – Written language Input - Mathematical Methods – Statistical Modeling and Classification Finite State methods Grammar for Natural Language Processing – Parsing – Semantic and Logic Form – Ambiguity Resolution – Semantic Interpretation.

#### **UNIT - II**

##### **INFORMATION RETRIEVAL :**

Information Retrieval architecture - Indexing- Storage – Compression Techniques –Retrieval Approaches – Evaluation - Search engines- commercial search engine features- comparison- performance measures – Document Processing - NLP based Information Retrieval – Information Extraction.

#### **UNIT – III**

**TEXT MINING** :Categorization – Extraction based Categorization- Clustering- Hierarchical Clustering- Document Classification and routing- finding and organizing answers from Text search –use of categories and clusters for organising retrieval results – Text Categorization and efficient Summarization using Lexical Chains – Pattern Extraction.

#### **UNIT - IV**

**GENERIC ISSUES** : Multilinguality – Multilingual Information Retrieval and Speech processing – Multimodality – Text and Images – Modality Integration - Transmission and Storage – Speech coding- Evaluation of systems – Human Factors and user Acceptability.

#### **UNIT – V**

**APPLICATIONS** : Machine Translation – Transfer Metaphor - Interlingua and Statistical Approaches - Discourse Processing – Dialog and Conversational Agents – Natural Language Generation – Surface Realization and Discourse Planning.

##### **REFERENCES:**

1. James Allen “ Natural Language Understanding “, Benjamin/ Cummings Publishing Co. 1995.
2. Gerald J. Kowalski and Mark.T. Maybury, “Information Storage and Retrieval systems”, Kluwer academic Publishers, 2000.
3. Tomek Strzalkowski “ Natural Language Information Retrieval “, Kluwer academic Publishers, 1999.
4. Christopher D.Manning and Hinrich Schutze, “ Foundations of Statistical Natural Language Processing “, MIT Press, 1999.



# R.K.D.F. UNIVERSITY, BHOPAL

## MASTER OF COMPUTER APPLICATION

### THIRD YEAR

#### Semester – V

Course	Subject Title	Subject Code
MCA	Embedded System	MCA-506

#### UNIT – I

COMPU EMBEDDED TING :Challenges of Embedded Systems – Embedded system design process. Embedded processors – 8051 Microcontroller, ARM processor – Architecture, Instruction sets and programming.

#### UNIT – II

MEMORY AND OPERATING SYSTEMS :Multiple tasks and processes – Context switching – Scheduling policies –Interprocesscommunication mechanisms – Performance issues.

#### UNIT – III

EMBEDDED SOFTWARE :Programming embedded systems in assembly and C Meeting realtimeconstraints Multi-state systems and function sequences. Embedded software development tools – Emulators and debuggers.

#### UNIT – IV

EMBEDDED SYSTEM DEVELOPMENT :Design issues and techniques – Case studies – Completedesign of example embedded systems.

#### UNIT-V

Programming Input and Output – Memory system mechanisms – Memory and I/Odevicesandinterfacing– Interruptshandling.

#### **REFERENCES:**

1. SteveHeath,“EmbeddedSystemDesign”,Elsevier,2005.
2. Muhammed Ali Mazidi, Janice Gillispie Mazidi and Rolin D. McKinlay, “The 8051 Microcontroller and Embedded Systems”, Pearson Education, Second edition, 2007.



# **R.K.D.F. UNIVERSITY, BHOPAL**

## **MASTER OF COMPUTER APPLICATION**

### **THIRD YEAR**

#### **Semester – V**

Course	Subject Title	Subject Code
<b>MCA</b>	<b>Advanced Computer Architecture</b>	<b>MCA-504</b>

#### **UNIT-I**

Memory, Internal Memory, External Memory, Memory Organization, Associative Memory, Virtual Memory, Cache Memory.

#### **UNIT-II**

CPU, Arithmetic and Logic Unit, Instruction Sets, Instruction cycle, Addressing Modes and formats, Instruction Pipeline, Processor organization, Register organization, Control Unit Operation.

#### **UNIT-III**

External Devices, I/O modules, Programmed I/O, Interrupt Driven I/O, Direct Memory Access, I/O Channels and processors, Asynchronous Data Transfer.

#### **UNIT-IV**

Reduced Instruction Set Computers, Complex Instruction Set Computers, Super Scalars, Vector, Parallel Cluster, Distributed, Embedded and MultiCore Processors.

#### **UNIT-V**

Memory technology – Memory systems – Virtual memory – Caches – Design methods – Associative memories – Input/Output system – Programmed I/O – DMA and Interrupts – I/O Devices and Interfaces..

#### **Reference Books:**

1. William Stallings, “Computer Organization and Architecture”, 7th Edn. 2006, PHI.
2. M. Moris Mano and Michael D. Ciletti, Digital Design, 4th Edn, 2007, Pearson.
3. Hayes, J.P. "Computer Architecture and Organisation", 3rd Edn., 1998, McGraw Hill
4. Morris Mano, “Digital Design”, Prentice Hall of India, 1997



# R.K.D.F. UNIVERSITY, BHOPAL

## MASTER OF COMPUTER APPLICATION

### THIRD YEAR

#### Semester – V

Course	Subject Title	Subject Code
<b>MCA</b>	<b>Advanced Software Engineering</b>	<b>MCA-508</b>

#### UNIT-I

Introductory concepts – The evolving role of software – Its characteristics, components and applications- A layered technology – the software process – Software process models -Software process and project metrics – Measures, Metrics and Indicators.

#### UNIT-II

Software Project Planning – Project planning objectives – Project estimation – Decomposition techniques – Empirical estimation models - System Engineering. Analysis and Design – Concepts, Principles, Methods for traditional, Real time of object oriented systems – Comparisons – Metrics.

#### UNIT-III

Testing fundamentals – Test case design – White box testing – Basis path testing – Control structure testing – Black box testing – Strategies: Unit testing integration testing – Validation.

#### UNIT-IV

Testing – System testing – Art of debugging – Metrics, Testing Tools - Formal Methods. Clean-room Software Engineering – Software reuse – Reengineering – Reverse Engineering. Software Reliability - Comparison of Software and Hardware Reliability- Development of Software Reliability Models- Parameter Estimation of Models and Prediction of Reliability Levels- Comparison of Models- Software Reliability and Software Testing Techniques-Application to Safety Critical Systems.

#### **Reference Books**

1. Roger S. Pressman, "Software Engineering-A practitioner's approach", Fourth Edition, 1997, McGraw Hill.
2. Fairley .R.E, "Software Engineering", 1985,McGraw Hill



# R.K.D.F. UNIVERSITY, BHOPAL

## MASTER OF COMPUTER APPLICATION

### THIRD YEAR

#### Semester – V

Course	Subject Title	Subject Code
MCA	Cloud Computing	MCA-509

#### Unit-I

Introduction to Cloud Computing, Definition, Characteristics, Components, Cloud provider, SAAS, PAAS, IAAS and Others, Organizational scenarios of clouds, Administering & Monitoring cloud services, benefits and limitations, Deploy application over cloud, Comparison among SAAS, PAAS, IAAS Cloud computing platforms: Infrastructure as service: Amazon EC2, Platform as Service: Google App Engine, Microsoft Azure, Utility Computing, Elastic Computing.

#### Unit - II

Introduction to Cloud Technologies, Study of Hypervisors Compare SOAP and REST Webservices, AJAX and mashups-Web services: SOAP and REST, SOAP versus REST, AJAX: asynchronous 'rich' interfaces, Mashups: user interface services Virtualization Technology: Virtual machine technology, virtualization applications in enterprises, Pitfalls of virtualization Multitenant software: Multi-entity support, Multi-schema approach, Multitenance using cloud data stores, Data access control for enterprise applications.

#### Unit - III

Data in the cloud: Relational databases, Cloud file systems: GFS and HDFS, BigTable, HBase and Dynamo. Map-Reduce and extensions: Parallel computing, The map-Reduce model, Parallel efficiency of Map-Reduce, Relational operations using Map-Reduce, Enterprise batch processing using Map-Reduce, Introduction to cloud development, Example/Application of Mapreduce, Features and comparisons among GFS, HDFS etc, Map-Reduce model

#### Unit - IV

Cloud security fundamentals, Vulnerability assessment tool for cloud, Privacy and Security in cloud Cloud computing security architecture: Architectural Considerations- General Issues, Trusted Cloud computing, Secure Execution Environments and Communications, Micro-architectures; Identity Management and Access control Identity management, Access control, Autonomic Security Cloud computing security challenges: Virtualization security management virtual threats, VM Security Recommendations, VM-Specific Security techniques, Secure Execution Environments and Communications in cloud.

#### Unit - V

Issues in cloud computing, Implementing real time application over cloud platform Issues in Intercloud environments, QOS Issues in Cloud, Dependability, data migration, streaming in Cloud. Quality of Service (QoS) monitoring in a Cloud

#### **Reference Book:**

1. Google Apps by Scott Granneman, Pearson
2. Cloud Security & Privacy by Tim Malhar, S.Kumaraswamy, S.Latif (SPD, O'REILLY)
3. Cloud Computing : A Practical Approach, Anthoy T Velte, et.al McGraw Hill,



# R.K.D.F. UNIVERSITY, BHOPAL

MASTER OF COMPUTER APPLICATION

THIRD YEAR

**Elective - III**

**Semester – V**

Course	Subject Title	Subject Code
<b>MCA</b>	<b>Digital Imaging</b>	<b>MCA-510</b>

## UNIT - I

**FUNDAMENTALS OF IMAGE PROCESSING** :Introduction – Steps in Image Processing Systems – Image Acquisition – Sampling and Quantization – Pixel Relationships – Colour Fundamentals and Models, File Formats, Image operations – Arithmetic, Geometric and Morphological.

## UNIT - II

**IMAGE ENHANCEMENT** :Spatial Domain Gray level Transformations Histogram Processing Spatial Filtering –Smoothing and Sharpening.Frequency Domain : Filtering in Frequency Domain – DFT,FFT, DCT – Smoothing and Sharpening filters Homomorphic Filtering.

## UNIT - III

**IMAGE SEGMENTATION AND FEATURE ANALYSIS** :Detection of Discontinuities – Edge Operators – Edge Linking and Boundary Detection –Thresholding – Region Based Segmentation – Morphological WaterSheds – Motion Segmentation, Feature Analysis and Extraction.

## UNIT - IV

**MULTI RESOLUTION ANALYSIS AND COMPRESSIONS** :Multi Resolution Analysis : Image Pyramids – Multi resolution expansion – Wavelet Transforms.Image Compression : Fundamentals – Models – Elements of Information Theory – Error Free Compression – Lossy Compression – Compression Standards.

## UNIT - V

**APPLICATIONS OF IMAGE PROCESSING** :Image Classification – Image Recognition – Image Understanding – Video Motion Analysis – Image Fusion – Steganography – Digital Compositing – Mosaics – ColourImage Processing.

### **REFERENCES:**

1. Rafael C.Gonzalez and Richard E.Woods, “Digital Image Processing” Second Edition, Pearson Education, 2003.
2. Milan Sonka, Vaclav Hlavac and Roger Boyle, “Image Processing, Analysis and Machine Vision”, Second Edition, Thomson Learning, 2001



# R.K.D.F. UNIVERSITY, BHOPAL

## MASTER OF COMPUTER APPLICATION

### THIRD YEAR

#### Semester – V

Course	Subject Title	Subject Code
MCA	Software Quality Management	MCA-511

#### UNIT – I

**FUNDAMENTALS OF SOFTWARE QUALITY ENGINEERING** Concepts Of Quality – Hierarchical Modeling – Quality Models – Quality Criteria And Its Interrelation – Fundamentals Of Software Quality Improvement – Concepts Of Quality Improvement – Concepts Of Process Maturity – Improving Process Maturity.

#### UNIT - II

**DEVELOPMENTS IN MEASURING QUALITY** ;Selecting Quality Goals And Measures – Principles Of Measurement – Measures And Metrics – Quality Function Deployment – Goal/Question/Measure Paradigm –Quality Characteristics Tree – The FURPS Model And FURPS+ – Gilb Approach –Quality Prompts.

#### UNIT - III

**QUALITY MANAGEMENT SYSTEM** ;Elements Of A Quality Engineering Program – Quality Control, Assurance And Engineering – Reliability, Maintainability, Verifiability, Testability, Safety And Supportability – Historical Perspective Elements Of QMS – Human Factors – Time Management – QMS For Software–Quality Assurance – ISO9000 Series–A Generic Quality Management Standard – Tools For Quality.

#### UNIT - IV

**PRINCIPLES AND PRACTICES IN QMS** :Process–Product–Project–People In Software Development And Management Spectrum – Principle And Critical Practices In QMS – ISO 9001 And Capability Maturity Models –Six Sigma, Zero Defects And Statistical Quality Control.

#### UNIT - V

**MEASURES AND METRICS IN PROCESS AND PROJECT DOMAINS** :Key Measures For Software Engineers – Defects – Productivity And Quality –Measuring And Improving The Development Process – Assigning Measures To Process Elements And Events – Isikawa Diagrams – Metrics For Software Quality – Integrating Metrics Within Software Engineering Process – Metrics For Small Organizations.

#### **REFERENCES:**

1. Brian Hambling, “Managing Software Quality”, Tata McGraw Hill.
2. Juran. J.M.Frank, M.Gyrna, “Quality Planning and Analysis (from product development through use)”, Tata McGraw Hill.





# **R.K.D.F. UNIVERSITY, BHOPAL**

## **MASTER OF COMPUTER APPLICATION**

### **THIRD YEAR**

#### **Semester – V**

Course	Subject Title	Subject Code
<b>MCA</b>	<b>Parallel And Distributed Computing</b>	<b>MCA-512</b>

#### **UNIT - I**

**INTRODUCTION TO DISTRIBUTED ENVIRONMENT** :Introduction – Client–Server Paradigm – Threads in Distributed Systems – Remote Procedure Call – Remote Object Invocation – Message-Oriented Communication -Unicasting – Group Communication – Reliable and Unreliable Multicasting.

#### **UNIT - II**

**INTRODUCTION TO PARALLEL COMPUTERS AND COMPUTATION** :Introduction to Parallelism and computing; Parallel machine model; Parallel programming model; HPC/HTC models.

#### **UNIT - III**

**DESIGNING PARALLEL ALGORITHMS** :Methodical design; Partitioning; Communication; Agglomeration; Mapping. Design and development of parallel processing systems. Unix workstation clusters. Master slave programming. Multi-threaded programming. Scheduling. Concurrency.

#### **UNIT - IV**

**TOLERANCE AND DISTRIBUTED FILE SYSTEMS** :Introduction to Fault Tolerance – Distributed Commit Protocol – Distributed File System Architecture – Issues in Distributed File Systems – Sun NFS.

#### **UNIT - V**

**CASE STUDIES** :Distributed Object-Based System – CORBA – COM – Distributed Coordination Based System – JINI – Matrix Vector Multiplication – Combinatorial Search.

#### **REFERENCES:**

1. An Introduction to Parallel Computing, Design and Analysis of Algorithms, 2<sup>nd</sup> edition, A. Grama, V. Kumar, A. Gupta, Addison Wesley, 2003
2. Parallel Computing: Theory and Practice, M J Quinn, McGraw Hill, 1996.



# R.K.D.F. UNIVERSITY, BHOPAL

## MASTER OF COMPUTER APPLICATION

### THIRD YEAR

#### Semester – V

Course	Subject Title	Subject Code
MCA	Information System	MCA-513

#### UNIT - I

**INFORMATION SYSTEM AND ORGANIZATION** : Matching the Information System Plan to the Organizational Strategic Plan – Identifying Key Organizational Objective and Processes and Developing an Information System Development – User role in Systems Development Process – Maintainability and Recoverability in System Design.

#### UNIT - II

**REPRESENTATION AND ANALYSIS OF SYSTEM STRUCTURE** : Models for Representing Systems: Mathematical, Graphical and Hierarchical (Organization Chart, Tree Diagram) – Information Flow – Process Flow – Methods and Heuristics – Decomposition and Aggregation – Information Architecture - Application of System Representation to Case Studies.

#### UNIT - III

**SYSTEMS, INFORMATION AND DECISION THEORY**: Information Theory – Information Content and Redundancy – Classification and Compression – Summarizing and Filtering – Inferences and Uncertainty – Identifying Information needed to Support Decision Making – Human Factors – Problem characteristics and Information System Capabilities in Decision Making.

#### UNIT - IV

**INFORMATION SYSTEM APPLICATION** : Transaction Processing Applications – Basic Accounting Application – Applications for Budgeting and Planning – Other use of Information Technology: Automation – Word Processing – Electronic Mail – Evaluation Remote Conferencing and Graphics – System and Selection – Cost Benefit – Centralized versus Decentralized Allocation Mechanism.

#### UNIT - V

**DEVELOPMENT AND MAINTENANCE OF INFORMATION SYSTEMS** : Systems analysis and design – System development life cycle – Limitation – End User Development – Managing End Users – off-the Shelf Software Packages – Outsourcing – Comparison of Different Methodologies.

#### **REFERENCES:**

1. E.F. Turban, R.K., R.E. Potter. “Introduction to Information Technology”, Wiley,2004.
2. M. E. Brabston, “Management Information Systems: Managing the Digital Firm”, Pearson Education, 2002.
3. Jeffrey A. Hoffer, Joey F. George, Joseph S. Valachich, “Modern Systems



# R.K.D.F. UNIVERSITY, BHOPAL

## MASTER OF COMPUTER APPLICATION

### THIRD YEAR

#### Semester – V

Course	Subject Title	Subject Code
MCA	TCP/IP Design and Implementation	MCA-505

#### UNIT - I

**INTRODUCTION** :Internetworking concepts and architectural model– classful Internet address – CIDR– Subnetting and Supernetting –ARP– RARP– IP – IP Routing –ICMP – Ipv6.

#### UNIT - II

**TCP** :Services – header – connection establishment and termination– interactive data flow–bulk data flow– timeout and retransmission – persist timer – keep alive timer– futures and performance.

#### UNIT - III

**IP IMPLEMENTATION** :IP global software organization – routing table– routing algorithms– fragmentation and reassembly– error processing (ICMP) –Multicast Processing (IGMP).

#### UNIT - IV

**TCP IMPLEMENTATION** :Data structure and input processing – transmission control blocks– segment format–comparison–finite state machine implementation–Output processing– mutual exclusion–computing the TCP data length.

#### UNIT - V

**TCP IMPLEMENTATION** :Timers–events and messages– timer process– deleting and inserting timer event– flowcontrol and adaptive retransmission–congestion avoidance and control – urgent data processing and push function.

#### **REFERENCES:**

1. Forouzan, “TCP/IP protocol suite” Second edition, Tata McGraw Hill, 2003.
2. W.Richard Stevens “TCP/IP illustrated” Volume 2, Pearson Education 2003.



# **R.K.D.F. UNIVERSITY, BHOPAL**

**MASTER OF COMPUTER APPLICATION**

**THIRD YEAR**

**Semester – V**

Course	Subject Title	Subject Code
<b>MCA</b>	<b>Unix Programming Lab &amp; .Net Programming Lab</b>	<b>MCA-514</b>

**Outline:** Exercises to implement the various Experiment.

**Outline:** Exercises to learn programming in C#, ASP, VB - .NET languages (etc.)

Course	Subject Title	Subject Code
<b>MCA</b>	<b>Software Development Lab</b>	<b>MCA-515</b>



# R.K.D.F. UNIVERSITY, BHOPAL

## Master of Computer Application (MCA)

### SCHEME

#### Sixth Semester

S.No	Subject Code	Subject Name	Marks Distribution						
			Assignment Marks		Theory Marks		Practical Marks		Total Marks
			Max	Min	Max	Min	Max	Min	
1	MCA-601	Major Project-II	-	-	-	-	500	250	500
<b>Total</b>			-	-	-	-	<b>500</b>	<b>250</b>	<b>500</b>