

**STUDY & EVALUATION SCHEME**  
**MCA (Master of computer Applications)**  
**(Effective from the session 2013-14)**  
**SEMESTER – I**

S.N.	Course Code	SUBJECT	PERIODS			Evaluation Scheme				Subject Total
						SESSIONAL EXAM.			ESE	
			L	T	P	CT	TA	Total		
<b>THEORY</b>										
1.	KAS- 104	Professional communication	3	1	0	30	20	50	100	150
2.	KMCA-112	Accounting & Financial Management	3	1	0	30	20	50	100	150
3.	KMCA-113	Computer concepts & programming	3	1	0	30	20	50	100	150
4.	KMCA-114	Discrete Mathematics	3	1	0	30	20	50	100	150
5.	KMCA-115	Digital Logic Design	3	1	0	30	20	50	100	150
<b>PRACTICAL/TRAINING/PROJECT</b>										
6.	KMCA-151	Programming Lab	0	0	3	30	20	50	50	100
7.	KAS- 154	Professional communication Lab	0	0	3	30	20	50	50	100
8.	GP-501	General Proficiency	0	0	0	0	0	50	-	50
<b>Total</b>										<b>1000</b>

**STUDY & EVALUATION SCHEME**  
**MCA (Master of computer Applications)**  
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**SEMESTER – II**

S.N.	Course Code	SUBJECT	PERIODS			Evaluation Scheme				Subject Total
						SESSIONAL EXAM.			ESE	
			L	T	P	CT	TA	Total		
<b>THEORY</b>										
1.	KAS-105/205	Environment & Ecology	3	1	0	30	20	50	100	150
2.	KMCA-212	Computer Based Numerical and Statistical Techniques	3	1	0	30	20	50	100	150
3.	KMCA-213	Data structures Using 'C'	3	1	0	30	20	50	100	150
4.	KMCA-214	Introduction to Automata Theory and Languages	3	1	0	30	20	50	100	150
5.	KMCA-215	Computer Organization	3	1	0	30	20	50	100	150
<b>PRACTICAL/TRAINING/PROJECT</b>										
6.	KMCA-251	Data structures Lab	0	0	3	30	20	50	50	100
7.	KMCA-252	Computer Based Numerical and Statistical Techniques Lab	0	0	3	30	20	50	50	100
8.	GP-501	General Proficiency	0	0	0	0	0	50	-	50
									<b>Total</b>	<b>1000</b>

**STUDY & EVALUATION SCHEME**  
**MCA (Master of computer Applications)**  
**(Effective from the session 2014-15)**  
**SEMESTER – III**

S. N.	Course Code	SUBJECT	PERIODS			Evaluation Scheme				Subject Total
						SESSIONAL EXAM.			ESE	
			L	T	P	CT	TA	Total		
<b>THEORY</b>										
1.	KMCA-311	Operating Systems	3	1	0	30	20	50	100	150
2.	KMCA-312	Design & Analysis of Algorithms	3	1	0	30	20	50	100	150
3.	KMCA-313	Data Base Management System	3	1	0	30	20	50	100	150
4.	KMCA-314	Internet & Java Programming	3	1	0	30	20	50	100	150
5.	KMCA- 315	Management Information System	3	1	0	30	20	50	100	150
<b>PRACTICAL/TRAINING/PROJECT</b>										
6.	KMCA- 351	DBMS Lab	0	0	3	30	20	50	50	100
7.	KMCA- 352	Java Programming Lab	0	0	3	30	20	50	50	100
8.	GP-301	General Proficiency	0	0	0	0	0	50	-	50
									<b>Total</b>	<b>1000</b>

**EVALUATION SCHEME**  
**MCA (Master of computer Applications)**  
**(Effective from the session 2014-15)**  
**SEMESTER – IV**

S.N	Course Code	SUBJECT	PERIODS			Evaluation Scheme				Subject Total
						SESSIONAL EXAM.			ESE	
			L	T	P	CT	TA	Total		
<b>THEORY</b>										
1.	KMCA-411	Software Engineering	3	1	0	30	20	50	100	150
2.	KMCA-412	Object Oriented System	3	1	0	30	20	50	100	150
3.		Department Elective -1	3	1	0	30	20	50	100	150
4.	KMCA-413	Web Technology	3	1	0	30	20	50	100	150
5.	KMCA-414	Computer networks	3	1	0	30	20	50	100	150
<b>PRACTICAL/TRAINING/PROJECT</b>										
6.	KMCA-451	Object oriented system Lab	0	0	3	30	20	50	50	100
7.	KMCA-452	Mini project based on WT Lab	0	0	3	30	20	50	50	100
8.	GP-401	General Proficiency	0	0	0	0	0	50	-	50
									<b>Total</b>	<b>1000</b>

## STUDY & EVALUATION SCHEME

### MCA (Master of computer Applications) (Effective from the session 2015-16) SEMESTER – V

S. N.	Course Code	SUBJECT	PERIODS			Evaluation Scheme				Subject Total
						SESSIONAL EXAM.			ESE	
			L	T	P	CT	TA	Total		
<b>THEORY</b>										
1.	KMCA-511	Fundamental of E-Commerce	3	1	0	30	20	50	100	150
2.		Department Elective-II	3	1	0	30	20	50	100	150
3.	KMCA-512	Dot Net Framework & C#	3	1	0	30	20	50	100	150
4.	KMCA-513	Mobile computing	3	1	0	30	20	50	100	150
5.		Department Elective-III	3	1	0	30	20	50	100	150
<b>PRACTICAL/TRAINING/PROJECT</b>										
6.	KMCA- 551	Unix Shell Lab	0	0	3	30	20	50	50	100
7.	KMCA-552	Dot Net Lab	0	0	3	30	20	50	50	100
8.	GP-501	General Proficiency	0	0	0	0	0	50	-	50
									<b>Total</b>	<b>1000</b>

## STUDY & EVALUATION SCHEME

### MCA (Master of computer Applications) (Effective from the session 2015-16) SEMESTER – VI

S. N.	Course Code	SUBJECT	PERIODS			Evaluation Scheme				Subject Total
						SESSIONAL EXAM.			ESE	
			L	T	P	CT	TA	Total		
<b>THEORY</b>										
1.	KMCA-611	Colloquim	0	0	3	-	200	200	-	200
2.	KMCA-612	Project	0	0	4	-	300	300	500	800
									Total	1000

#### DEPARTMENT ELECTIVE -I

KMCA 011	Compiler design
KMCA 012	Client server computing
KMCA 013	Data warehousing & Mining
KMCA 014	Cryptography & network security
KMCA 015	Theory of Automata and Formal Languages
KMCA 016	Distributed System

#### DEPARTMENT ELECTIVE -II

KMCA 021	Computer graphics & animation
KMCA 022	Simulation & modeling
KMCA 023	Advance database management systems
KMCA 024	Artificial Intelligence
KMCA 025	Information Security & cyber laws
KMCA 026	Information Storage & management

#### DEPARTMENT ELECTIVE -III

KMCA 031	ERP systems
KMCA 032	Software project management
KMCA 033	Real time systems
KMCA 034	Parallel algorithms
KMCA 035	Neural Networks
KMCA 036	Pattern Recognition

## **KMCA-113 Computer Concepts And Programming**

<b>L</b>	<b>T</b>	<b>P</b>
<b>3</b>	<b>1</b>	<b>0</b>

### **UNIT 1:**

Basics of Computer: Introduction to digital computer, basic operations of computer, functional components of computer, Classification of computers. Introduction to operating system: [DOS, windows, linux and android] purpose, function, services and types, Number system : Binary, octal and hexadecimal number systems, their mutual conversions, Binary arithmetic. Basics of programming: approaches to Problem solving, concept of algorithm and flow charts, types of computer languages: Machine language, assembly language and high level language, concept of assembler, compiler, loader and linker.

### **UNIT 2:**

Standard I/O in “C”, Fundamental Data Types and Storage Classes: Character types, Integer, short, long, unsigned, single and double-precision floating point, storage classes, automatic, register, static and external, Operators and Expressions: Using numeric and relational operators, mixed operands and type conversion, Logical operators, Bit operations, Operator precedence and associativity.

### **UNIT 3:**

Conditional Program Execution: Applying if and switch statements, nesting if and else, restrictions on switch values, use of break and default with switch, Program Loops and Iteration: Uses of while, do and for loops, multiple loop variables, assignment operators, using break and continue, Modular Programming: Passing arguments by value, scope rules and global variables, separate compilation, and linkage, building your own modules. Arrays: Array notation and representation, manipulating array elements, using multidimensional arrays, arrays of unknown or varying size,

### **UNIT 4:**

Arrays: Array notation and representation, manipulating array elements, using multi dimensional arrays. Structure, union, enumerated data types ,Functions: introduction, types of functions, functions with array, recursive functions, Pointers: introduction, declaration, applications File handling, standard C preprocessors, defining and calling macros, conditional compilation, passing values to the compiler.

### **UNIT 5:**

Concept of OOP: Abstraction, Encapsulation, Inheritance, and Polymorphism in C++.

#### **Text Books:**

1. Computer Concepts and Programming in C by Vikas Gupta, Wiley India Publication
2. Computer Concepts and Programming by Anami, Angadi and Manvi, PHI Publication
3. C programming by Kernighan and Ritchie, PHI
4. Computer Fundamentals and Programming in C. Reema Thareja, Oxford Publication
5. Computer Concepts and Programming in C, E Balaguruswami, McGraw Hill
6. Computer Concepts and Programming in C by D.S. Yadav and Rajeev Khanna, New Age International Publication
7. Programming in C A Practical approach by Ajay Mittal, Pearson Publication

8. Computer Fundamental and C programming by K K Gupta, Acme Learning Publication

**Reference:**

1. Problem Solving and Program Design in C, by Jeri R. Hanly, Elliot B. Koffman, Pearson Addison-Wesley, 2006.

2. Computer Science- A Structured Programming Approach Using C, by Behrouz A. Forouzan, Richard F. Gilberg, Thomson, Third Edition [India Edition], 2007.

3. Object- Oriented Programming In C++ by Rajesh K Shukla



## KMCA-114 Discrete Mathematics

L	T	P
3	1	0

### Unit-I

Set Theory: Introduction, Size of sets and cardinals, Venn diagrams, Combination of sets, Multisets, Ordered pairs and Set identities. Relations & Functions: Relations - Definition, Operations on relations, Composite relations, Properties of relations, Equality of relations, Partial order relation. Functions - Definition, Classification of functions, Operations on functions, Recursively defined functions. Notion of Proof: Introduction, Mathematical Induction, Strong Induction and Induction with Nonzero base cases.

### Unit-II

Algebraic Structures: Definition, Properties, Types: Semi Groups, Monoid, Groups, Abelian Groups. Subgroups and order, Cyclic Groups, Cosets, Normal Subgroups, Permutation and Symmetric groups, Homomorphisms and isomorphism of Groups, Definition and elementary properties of Rings and Fields: definition and standard results.

### Unit-III

Lattices: Introduction, Partial order sets, Combination of partial order sets, Hasse diagram, Introduction of lattices, Properties of lattices – Bounded, Complemented, Modular and Complete lattice. Boolean Algebra: Introduction, Axioms and Theorems of Boolean algebra, Boolean functions. Simplification of Boolean Functions, Karnaugh maps, Logic gates, Digital circuits and Boolean algebra.

### Unit-IV

Propositional & Predicate Logic: Propositions, Truth tables, Tautology, Contradiction, Algebra of propositions, Theory of Inference and Natural Deduction. Theory of predicates, First order predicate, Predicate formulas, quantifiers, Inference theory of predicate logic.

### Unit-V

Trees & Graphs: Trees - Definition, Binary trees, Binary tree traversal, Binary search trees. Graphs - Definition and terminology, Representation of graphs, Bipartite graphs, Planar graphs, Isomorphism and Homeomorphism of graphs, Multigraphs, Euler and Hamiltonian paths, Graph coloring. Recurrence Relations: Introduction, Growth of functions, Recurrences from algorithms, Methods of solving recurrences. Combinatorics: Introduction, Counting Techniques, Pigeonhole Principle, Pólya's Counting Theory.

### Text Books:

1. Discrete Mathematics and Its Applications, Kenneth H. Rosen, McGraw-Hill, 2006.
2. Discrete Mathematical Structures, B. Kolman, R. C. Busby, and S. C. Ross, Prentice Hall, 2004.
3. Discrete and Combinatorial Mathematics, R.P. Grimaldi, Addison Wesley, 2004.
4. Discrete Mathematical Structures, Y N Singh, Wiley-India, First Edition, 2010.

## KMCA-115 Digital Logic Design

L	T	P
3	1	0

### Unit-I

Digital system and binary numbers: : Signed binary numbers, binary codes, cyclic codes, error detecting and correcting codes, hamming codes. Floating point representation Gate-level minimization: The map method up to five variable, don't care conditions, POS simplification, NAND and NOR implementation, Quine McClusky method (Tabular method).

### Unit-II

Combinational Logic: Combinational circuits, analysis procedure, design procedure, binary addersubtractor, decimal adder, binary multiplier, magnitude comparator, decoders, encoders, multiplexers

### Unit-III

Synchronous Sequential logic: Sequential circuits, storage elements: latches, flip flops, analysis of clocked sequential circuits, state reduction and assignments, design procedure. Registers and counters: Shift registers, ripple counter, synchronous counter, other counters.

### Unit-IV

Memory and programmable logic: RAM, ROM, PLA, PAL. Design at the register transfer level: ASMs, design example, design with multiplexers.

### Unit-V

Asynchronous sequential logic: Analysis procedure, circuit with latches, design procedure, reduction of state and flow table, race free state assignment, hazards.

### References:

1. M. Morris Mano and M. D. Ciletti, "DigitalDesign", 4th Edition, Pearson Education
2. Hill & Peterson, "Switching Circuit & Logic Design", Wiley.

## KMCA-212 Computer Based Numerical And Statistical Techniques

L	T	P
3	1	0

### Unit-I

Floating point Arithmetic: Representation of floating point numbers, Operations, Normalization, Pitfalls of floating point representation, Errors in numerical computation  
Iterative Methods: Zeros of a single transcendental equation and zeros of polynomial using Bisection Method, Iteration Method, Regula-Falsi method, Newton Raphson method, Secant method, Rate of convergence of iterative methods.

### Unit-II

Simultaneous Linear Equations: Solutions of system of Linear equations, Gauss Elimination direct method and pivoting, Ill Conditioned system of equations, Refinement of solution. Gauss Seidal iterative method, Rate of Convergence  
Interpolation and approximation: Finite Differences, Difference tables  
Polynomial Interpolation: Newton's forward and backward formula  
Central Difference Formulae: Gauss forward and backward formula, Stirling's, Bessel's, Everett's formula. Interpolation with unequal intervals: Langrange's Interpolation, Newton Divided difference formula, Hermite's Interpolation  
Approximation of function by Taylor's series and Chebyshev polynomial

### Unit-III

Numerical Differentiation and Integration: Introduction, Numerical Differentiation, Numerical Integration, Trapezoidal rule, Simpson's rules, Boole's Rule, Weddle's Rule  
Euler- Maclaurin Formula  
Solution of differential equations: Picard's Method, Euler's Method, Taylor's Method, Runge-Kutta methods, Predictor-corrector method, Automatic error monitoring, stability of solution.

### Unit-IV

Curve fitting, Cubic Spline and Approximation: Method of least squares, fitting of straight lines, polynomials, exponential curves etc  
Frequency Chart: Different frequency chart like Histogram, Frequency curve, Pi-chart. Regression analysis: Linear and Non-linear regression, Multiple regression

### Unit-V

Time series and forecasting: Moving averages, smoothening of curves, forecasting models and methods. Statistical Quality Controls methods  
Testing of Hypothesis: Test of significance, Chi-square test, t-test, ANOVA, F-Test  
Application to medicine, agriculture etc.

### References:

1. Rajaraman V., "Computer Oriented Numerical Methods", PHI
2. Gerald & Wheatley, "Applied Numerical Analyses", AW
3. Jain, Iyengar and Jain, "Numerical Methods for Scientific and Engineering Computations", New Age Int.
4. Grewal B. S., "Numerical methods in Engineering and Science", Khanna Publishers, Delhi
5. T. Veerarajan, T Ramachandran, "Theory and Problems in Numerical Methods", TMH
6. Pradip Niyogi, "Numerical Analysis and Algorithms", TMH
7. Francis Scheld, "Numerical Analysis", TMH
8. Gupta S. P., "Statistical Methods", Sultan and Sons

## KMCA-213 Data Structures Using 'C'

L	T	P
3	1	0

### Unit –I

Introduction: Basic Terminology, Elementary Data Organization, Data Structure operations, Algorithm Complexity and Time-Space trade-off Arrays: Array Definition, Representation and Analysis, Single and Multidimensional Arrays, address calculation, application of arrays, Character String in C, Character string operation, Array as Parameters, Ordered List, Sparse Matrices, and Vectors. Stacks: Array Representation and Implementation of stack, Operations on Stacks: Push & Pop, Array Representation of Stack, Linked Representation of Stack, Operations Associated with Stacks, Application of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack. Recursion: Recursive definition and processes, recursion in C, example of recursion, Tower of Hanoi Problem, simulating recursion. Backtracking, recursive algorithms, principles of recursion, tail recursion, removal of recursion.

### Unit – II

Queues: Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty. Circular queue, Deque, and Priority Queue. Linked list: Representation and Implementation of Singly Linked Lists, Two-way Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to/from Linked Lists, Insertion and deletion Algorithms, Doubly linked list, Linked List in Array, Polynomial representation and addition, Generalized linked list, Garbage Collection and Compaction.

### Unit - III

Trees: Basic terminology, Binary Trees, Binary tree representation, algebraic Expressions, Complete Binary Tree. Extended Binary Trees, Array and Linked Representation of Binary trees, Traversing Binary trees, Threaded Binary trees. Traversing Threaded Binary trees, Huffman algorithm. Searching and Hashing: Sequential search, binary search, comparison and analysis, Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation.

### Unit - IV

Sorting: Insertion Sort, Bubble Sorting, Quick Sort, Two Way Merge Sort, Heap Sort, Sorting on Different Keys, Practical consideration for Internal Sorting. Binary Search Trees: Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of Search Algorithm, Path Length, AVL Trees, B-trees.

### Unit – V

Graphs: Terminology & Representations, Graphs & Multi-graphs, Directed Graphs, Sequential Representations of Graphs, Adjacency Matrices, Traversal, Connected Component and Spanning Trees, Minimum Cost Spanning Trees. File Structures: Physical Storage Media File Organization, Organization of records into Blocks, Sequential Files, Indexing and Hashing, Primary indices, Secondary indices, B+ Tree index Files, B Tree index Files, Indexing and Hashing Comparisons.

### Text Books

1. Y. Langsam, M. Augenstein and A. Tannenbaum, Data Structures using C and C++, Pearson Education Asia, 2nd Edition, 2002.
2. Ellis Horowitz, S. Sahni, D. Mehta Fundamentals of Data Structures in C++, Galgotia Book Source, New Delhi.

### **Reference Books**

1. S. Lipschutz, Data Structures Mc-Graw Hill International Editions, 1986.
2. Jean-Paul Tremblay, Paul. G. Soresan, An introduction to data structures with Applications, Tata Mc-Graw Hill International Editions, 2nd edition 1984.
3. A. Michael Berman, Data structures via C++, Oxford University Press, 2002.
4. M. Weiss, Data Structures and Algorithm Analysis in C++, Pearson Education, 2002, 2nd edition.

## KMCA - 214 Introduction To Automata Theory And Languages

L	T	P
3	1	0

### Unit-I

Basic concepts of Automata Theory: Alphabets, Strings and Languages, Deterministic Finite Automata (DFA) and Nondeterministic Finite Automata (NFA) – Definition, Representation using Transition Tables and State Diagrams, Language of DFA and NFA. NFA with  $\epsilon$ -transitions, Language of NFA with  $\epsilon$ -transitions, Equivalence of NFA and DFA.

### Unit – II

Regular Expressions and Languages: Introduction, Definition of regular expression, Kleen's Theorem, Equivalence of regular expression and Finite Automata, Pumping Lemma for regular Languages, Closure properties of Regular Languages, Decision properties of Regular Languages, Finite Automata with Output: Moore and Mealy Machine, Equivalence of Moore and Mealy Machines.

### Unit – III

Non-Regular Grammars: Definition of Grammar, Classification of Grammars, Chomsky's Hierarchy. Context Free Grammars (CFG) and Context Free Languages (CFL) - Definition, Examples, Derivation trees, Ambiguous Grammars, Simplification of Grammars, Normal forms of CFGs: CNF and GNF, Closure properties of CFLs, Decision Properties of CFLs, Pumping lemma for CFLs. Push Down Automata (PDA): Definition and Description, Language of PDA and its applications.

### Unit – IV

Turing Machines: Introduction, Basic Features of a Turing Machine, Language of a Turing Machine, Variants of Turing Machine: Multitapes, Nondeterministic Turing Machine, Universal Turing Machine. Turing Machine as Computer of Integer functions, Halting problem of Turing Machine, Church-Turing Thesis.

### Unit – V

Undecidability: Introduction, Undecidable problems about Turing Machines, Rice's Theorem, Post's Correspondence problem (PCP) and Modified PCP. Tractable and Intractable Problems: P and NP, NPComplete Problems, Introduction to recursive function theory.

### Reference Books:

1. Introduction to Automata theory, Languages and Computation, J.E.Hopcraft, R.Motwani, and Ullman. 2nd edition, Pearson Education Asia
2. Introduction to languages and the theory of computation, J Martin, 3rd Edition, Tata McGraw Hill
3. Elements and Theory of Computation, C Papadimitrou and C. L. Lewis, PHI
4. Mathematical Foundation of Computer Science, Y.N.Singh, New Age International

## KMCA-215 Computer Organization

L	T	P
3	1	0

### Unit-I

Register Transfer Language, Bus and Memory Transfers, Bus Architecture, Bus Arbitration, Arithmetic Logic, Shift Microoperation, Arithmetic Logic Shift Unit, Design of Fast address, Arithmetic Algorithms (addition, subtraction, Booth Multiplication), IEEE standard for Floating point numbers.

### Unit-II

Control Design: Hardwired & Micro Programmed (Control Unit): Fundamental Concepts (Register Transfers, Performing of arithmetic or logical operations, Fetching a word from memory, storing a word in memory), Execution of a complete instruction, Multiple-Bus organization, Hardwired Control, Micro programmed control(Microinstruction, Microprogram sequencing, Wide-Branch addressing, Microinstruction with Nextaddress field, Prefetching Microinstruction).

### Unit-III

Processor Design: Processor Organization: General register organization, Stack organization, Addressing mode, Instruction format, Data transfer & manipulations, Program Control, Reduced Instruction Set Computer.

### Unit –IV

Input-Output Organization: I/O Interface, Modes of transfer, Interrupts & Interrupt handling, Direct Memory access, Input-Output processor, Serial Communication.

### Unit-V

Memory Organization: Memory Hierarchy, Main Memory (RAM and ROM Chips), organization of 2D and 21/2D, Auxiliary memory, Cache memory, Virtual Memory, Memory management hardware.

### Text Book

1.Computer System Architecture, M. Mano(PHI)

### Reference Books

1. Computer Organization, Vravice, Zaky & Hamacher (TMH Publication)
2. Structured Computer Organization, Tannenbaum(PHI)
3. Computer Organization, Stallings(PHI) 4. Computer Organization, John P.Hayes (McGraw Hill)

## KMCA-311: Operating System

L	T	P
3	1	0

### Unit-I

Introduction:

Definition and types of operating systems, Batch Systems, multi programming, time-sharing parallel, distributed and real-time systems, Operating system structure, Operating system components and services, System calls, system programs, Virtual machines.

**Unit-II** scheduling, Cooperating processes, Threads, Inter-process communication, CPU scheduling criteria, Scheduling algorithms, Multiple-processor scheduling, Real-time scheduling and

Process Management: Process concept, Process Algorithm evaluation.

### Unit-III

Process Synchronization and Deadlocks: The Critical-Section problem, synchronization hardware, Semaphores, Classical problems of synchronization, Critical regions, Monitors, Deadlocks-System model, Characterization, Deadlock prevention, Avoidance and Detection, Recovery from deadlock, Combined approach to deadlock handling.

### Unit-IV

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, Thrashing, 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 scheduling methods, Disk management, Swap-Space management.

### Unit-V

Security & Case Study: Protection and Security-Goals of protection, Domain of protection, Access matrix, Implementation of access Matrix, Revocation of Access Rights, language based protection, The Security problem, Authentication, One Time passwords, Program threats, System threats, Threat Monitoring, Encryption. Windows NT-Design principles, System components, Environmental subsystems, File system, security

### References

1. Abraham Siberschatz and Peter Baer Galvin, "Operating System Concepts", Fifth Edition, Addison-Wesley
2. Milan Milankovic, "Operating Systems, Concepts and Design", McGraw-Hill.
3. Harvey M Deital, "Operating Systems", Addison Wesley
4. Richard Peterson, "Linux: The Complete Reference", Osborne McGraw-Hill



## KMCA-312: Design and Analysis of Algorithms

L	T	P
3	1	0

### Unit-I

**Introduction** : Algorithms, Analyzing algorithms, Complexity of algorithms, Growth of functions, Performance measurements, Recurrences: The substitution method, The iteration method, The master method. Sorting and order Statistics - Shell sort, Quick sort, Merge sort, Heap sort, Comparison of sorting algorithms, Sorting in linear time.

### Unit -II

**Advanced Data Structures:** Red-Black trees, B – trees, Binomial Heaps, Fibonacci Heaps.

### Unit - III

**Divide and Conquer Approach:** Matrix Multiplication, Longest Common Subsequence, Convex hull and Searching. Greedy methods: Optimal Reliability Allocation, Knapsack Minimum Spanning trees : Prim's and Kruskal's algorithms, Single source shortest paths - Dijkstra's and Bellman Ford algorithms.

### Unit - IV

**Dynamic programming:** Knapsack, All pair shortest paths – Warshal's and Floyd's algorithms, Resource allocation problem. Backtracking, Branch and Bound with examples such as Travelling Salesman Problem, Graph Coloring, n-Queen Problem, Hamiltonian Cycles and Sum of subsets.

### Unit -V

#### **String matching:**

The naïve String Matching algorithm, The Rabin-Karp Algorithm, String Matching with finite automata, The Knuth-Morris Pratt algorithm.

#### **NP-Complete Problem:**

Polynomial-time verification, NP-Completeness and Reducibility, NP-Completeness Proof, NP-Complete problems.

### **References:**

1. Thomas H. Cormen, Charles E. Leiserson and Ronald L. Rivest, "Introduction to Algorithms", Prentice Hall of India.
2. RCT Lee, SS Tseng, RC Chang and YT Tsai, "Introduction to the Design and Analysis of Algorithms", Mc Graw Hill, 2005.
3. E. Horowitz & S Sahni, "Fundamentals of Computer Algorithms",
4. Berman, Paul, "Algorithms", Cengage Learning.
5. Aho, Hopcraft, Ullman, "The Design and Analysis of Computer Algorithms" Pearson Education, 2008.

## KMCA-313 Database Management System

L	T	P
3	1	0

### Unit- I

**Introduction:** An overview of database management system, database system Vs file system, Database system concepts and architecture, data models, schema and instances, data independence, data base language and interfaces, Data definitions language, DML, Overall Database Structure.

#### **Data Modelling using the Entity Relationship Model:**

ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationships of higher degree, overview of XML.

### Unit- II

**Relational data Model and Language:** Relational data model concepts, integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus

**Introduction to SQL:** Characteristics of SQL. Advantage of SQL. SQL data types and literals. Types of SQL commands. SQL operators and their procedure. Tables, views and indexes. Queries and sub queries. Aggregate functions. Insert, update and delete operations. Joins, Unions, Intersection, Minus, Cursors in SQL.

### Unit- III

#### **Data Base Design & Normalization:**

Functional dependencies, Non redundant and Canonical cover, normal forms, first, second, third normal forms, BCNF, inclusion dependences, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design.

### Unit- IV

**Transaction Processing Concepts:** Transaction system, Testing of serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures, log based recovery, checkpoints, deadlock handling.

### Unit- V

**Concurrency Control Techniques:** Concurrency control, locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity, Multi version schemes, Recovery with concurrent transaction.

#### **Text Books**

- 1 Date C J, "An Introduction To Database System", Addison Wesley
- 2 Korth, Silbertz, Sudarshan, "Database Concepts", McGraw Hill
- 3 Elmasri, Navathe, "Fundamentals Of Database Systems", Addison Wesley
- 4 Leon & Leon, "Database Management System", Vikas Publishing House.

#### **References**

- 1 Bipin C. Desai, "An introduction to Database Systems", Galgotia Publication
- 2 Majumdar & Bhattacharya, "Database Management System", TMH
- 3 Ramakrishnan, Gehrke, "Database Management System", McGraw Hill
4. Kroenke, "Database Processing: Fundamentals, Design and Implementation", Pearson Education.
5. Maheshwari Jain, "DBMS: Complete Practical Approach", Firewall Media, New Delhi.

## KMCA-314 Internet & Java Programming

L	T	P
3	1	0

### Unit-1

**Internet:** Internet, Connecting to Internet: Telephone, Cable, Satellite connection, Choosing an ISP, Introduction to Internet services, E-Mail concepts, Sending and Receiving secure E-Mail, Voice and Video Conferencing.

### Unit- II

**Core Java:** Introduction, Operator, Data type, Variable, Arrays, Methods & Classes, Inheritance, Package and Interface, Exception Handling, Multithread programming, I/O, Java Applet, String handling, Networking, Event handling, Introduction to AWT, AWT controls, Layout managers.

### Unit-III

**Java Swing:** Creating a Swing Applet and Application, Programming using Panes, Labels, Text fields, Buttons, Toggle buttons, Checkboxes, Radio Buttons, Scroll Panes, Scroll Bars, Lists, Combo box, Progress Bar, Menus and Toolbars, Layered Panes, Tabbed Panes, Split Panes, Windows, Dialog Boxes, Inner frame.

**JDBC:** The connectivity Model, JDBC/ODBC Bridge, java.sql package, connectivity to remote database, navigating through multiple rows retrieved from a database.

### Unit-IV

**Java Beans:** Application Builder tools, The bean developer kit(BDK), JAR files, Introspection, Developing a simple bean using Bound properties, The Java Beans API, Session Beans, Entity Beans.

Introduction to Enterprise Java beans (EJB), Introduction to RMI (Remote Method Invocation): A simple client-server application using RMI.

### Unit-V

**Java Servlets:** Servlet basics, Servlet API basic, Life cycle of a Servlet, Running Servlet, Debugging Servlets, Thread-safe Servlets, HTTP Redirects, Cookies.

Introduction to Java Server pages (JSP).

### References: -

1. Margaret Levine Young, "The Complete Reference Internet", TMH
2. Naughton, Schildt, "The Complete Reference JAVA2", TMH
3. Balagurusamy E, "Programming in JAVA", TMH
4. Dustin R. Callway, "Inside Servlets", Addison Wesley
5. Mark Wutica, "Java Enterprise Edition", QUE
6. Steven Holzner, "Java2 Black book", dreamtech

## KMCA- 315 Management Information Systems

L	T	P
3	1	0

**Unit 1: Foundation of Information Systems:** Introduction to information system in business, fundamentals of information systems, Solving business problems with information systems, Types of information systems, Effectiveness and efficiency criteria in information system.

**Unit 2: An overview of Management Information Systems:** Definition of a management information system, MIS versus Data processing, MIS & Decision Support Systems, MIS & Information Resources Management, End user computing, Concept of an MIS, Structure of a Management information system.

**Unit 3: Concepts of planning & control:** Concept of organizational planning, The Planning Process, Computational support for planning, Characteristics of control process, The nature of control in an organization.

**Unit 4: Business applications of information technology:** Internet & electronic commerce, Intranet, Extranet & Enterprise Solutions, Information System for Business Operations, Information System for Managerial Decision Support, Information System for Strategic Advantage.

**Unit 5: Managing Information Technology:** Enterprise & global management, Security & Ethical challenges, Planning & Implementing changes.

**Advanced Concepts in Information Systems:** Enterprise Resource Planning, Supply Chain Management, Customer Relationship Management, and Procurement Management.

### Text Books

1. O Brian, "Management Information System", TMH
2. Gordon B. Davis & Margrethe H. Olson, "Management Information System", TMH.

### References

1. O Brian, "Introduction to Information System", MCGRAW HILL.
2. Murdick, "Information System for Modern Management", PHI.
3. Jawadekar, " Management Information System", TMH.
4. Jain Sarika, "Information System", PPM
5. Davis, "Information System", Palgrave Macmillan

## KMCA 411 Software Engineering

L	T	P
3	1	0

### **Unit-I: Introduction**

Introduction to Software Engineering, Software Components, Software Characteristics, Software Crisis, Software Engineering Processes, Similarity and Differences from Conventional Engineering Processes, Software Quality Attributes. Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models.

### **Unit-II: Software Requirement Specifications**

Requirement Engineering Process: Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modeling, Data Flow Diagrams, Entity Relationship Diagrams, Decision Tables, SRS Document, IEEE Standards for SRS. **Software Quality Assurance (SQA):** Verification and Validation, SQA Plans, Software Quality Frameworks, ISO 9000 Models, SEI-CMM Model.

### **Unit-III: Software Design**

Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design. Software Measurement and Metrics: Various Size Oriented Measures: Halstead's Software Science, Function Point (FP) Based Measures, Cyclomatic Complexity Measures: Control Flow Graphs.

### **Unit-IV: Software Testing**

Testing Objectives, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing, Testing for Functionality and Testing for Performance, Top-Down and Bottom-Up Testing Strategies: Test Drivers and Test Stubs, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Test Data Suit Preparation, Alpha and Beta Testing of Products. Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through, Code Inspection, Compliance with Design and Coding Standards.

### **Unit-V: Software Maintenance and Software Project Management**

Software as an Evolutionary Entity, Need for Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, Software Re-Engineering, Reverse Engineering. Software Configuration Management Activities, Change Control Process, Software Version Control, An Overview of CASE Tools. Estimation of Various Parameters such as Cost, Efforts, Schedule/Duration, Constructive Cost Models (COCOMO), Resource Allocation Models, Software Risk Analysis and Management..

### **References:**

1. R. S. Pressman, Software Engineering: A Practitioners Approach, McGraw Hill.
2. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.
3. K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers.
4. Pankaj Jalote, Software Engineering, Wiley
5. Carlo Ghezzi, M. Jarayeri, D. Manodrioli, Fundamentals of Software

Engineering, PHI Publication.

6. Ian Sommerville, Software Engineering, Addison Wesley.
7. Kassem Saleh, "Software Engineering", Cengage Learning.
8. Pfleeger, Software Engineering, Macmillan Publication.

## KMCA-412 Object Oriented Systems

L	T	P
3	1	0

### UNIT I

**Object Modeling:** Objects and classes, links and association, generalization and inheritance, aggregation, abstract class, multiple inheritance, meta data, candidate keys, constraints. Introduction to UML, conceptual model of the UML, Architecture.

### UNIT II

**Dynamic Modeling:** Events and states, operations, nested state diagrams and concurrency, advanced dynamic modeling concepts, a sample dynamic model. Basic Behavioural Modelling: Use cases, Use case Diagrams, Activity Diagrams.

### UNIT III

**Functional Modeling:** Data flow diagram, specifying operations, constraints, a sample functional model. OMT (object modeling techniques) methodologies, examples and case studies to demonstrate methodologies, comparisons of methodologies. Structured analysis and structured design (SA/SD), Jackson Structured Development (JSD).

### Unit – IV

**Java Programming:** Introduction, Operator, Data types, Variables, Methods & Classes, Multithread Programming, I/O, Java Applet.

**Java Library:** String Handling, Input/Output exploring Java.io, Networking, Applets classes, Event Handling, Introduction to AWT, Working with window, Graphics, AWT Controls, Layout Manager and Menus, Images, Additional packages.

### Unit – V

#### Software Development using Java:

Java Beans, Java Swing, Java Servlets, Migrating from C++ to java, Application of java, Dynamic Billboard Applet, Image Menu: An image based menu, Lavatron Applets, Scrabblets, JDBC, Brief functioning of upper layer E-mail and their applications.

#### Text Books:

1. James Rumbaugh et al, “Object Oriented Modeling and Design”, PHI
2. Herbert Schildt, “The Complete Reference: Java”, TMH.
3. E. Balagurusamy, “Programming in JAVA”, TMH.

#### References:

1. Booch Grady, “Object Oriented Analysis & Design with application 3/e”, Pearson Education, New Delhi.
2. Bjarne Stroustrup, “C++ Programming Language”, Addison Wesley

## KMCA- 413 Web Technology

<b>L</b>	<b>T</b>	<b>P</b>
<b>3</b>	<b>1</b>	<b>0</b>

**Unit I: Introduction:** Introduction to web, protocols governing the web, web development strategies, Web applications, web project, web team.

**Unit II: Web Page Designing:** HTML: list, table, images, frames, forms, CSS, introduction to HTML5  
XML: DTD, XML schema, XML DOM, presenting and using XML

**Unit III: Scripting:** Java script: Introduction, documents, forms, statements, functions, objects; event and event handling; introduction to AJAX, VB Script

**Unit IV: Server Site Programming:** Introduction to active server pages (ASP), ASP.NET, java server pages (JSP), JSP application design, tomcat server, JSP objects, declaring variables, and methods, debugging, sharing data between JSP pages, Session, Application: data base action development of java beans in JSP.

**Unit V: PHP (Hypertext Pre-processor):** Introduction, syntax, variables, strings, operators, if-else, loop, switch, array, function, form handling, validation, file upload, cookies, session, E-mail, error, exception, filter, PHP-ODBC.

### References

1. Xavier, C, “ Web Technology and Design” , New Age International
2. Ivan Bayross,” HTML, DHTML, Java Script, Perl & CGI” , BPB Publication.
3. Ramesh Bangia, “Internet and Web Design” , New Age International
4. Bhave, “Programming with Java” , Pearson Education
5. Ullman, “PHP for the Web: Visual QuickStart Guide” , Pearson Education



## KMCA-414 Computer Networks

L	T	P
3	1	0

### Unit-I

Introductory Concepts: Goals and Applications of Networks, Network structure and architecture, the OSI reference model, services, networks topology, Physical Layer- transmission, switching methods, Integrated services digital networks.

### Unit-II

Medium access sub layer: Channel allocations, LAN protocols, ALOHA Protocols- Pure ALOHA, slotted ALOHA, Carrier Sense Multiple Access Protocols, CSMA with Collision Detection, Collision free Protocols, IEEE standards, Ethernet, FDDI, Data Link Layer- basic design issues, error correction & detection algorithms, elementary data link layer protocols, sliding window protocols, error handling, High Level Data Link Control

### Unit-III

Network Layer:Point-to Point networks, concept of virtual circuit and LAN, routing algorithms, congestion control algorithms, internetworking, TCP/IP protocol, IP addresses, IPv6.

### Unit-IV

Transport Layer:

Design issues, connection management, Internet Transport Protocol (UDP), Ethernet transport Protocol, Transmission Control Protocol. (TCP)

### Unit-V

Application Layer:Domain Name System, Simple Network Management Protocol, Electronic mail, File Transfer Protocol, Hyper Text Transfer Protocol, Introduction to Cryptography and Network Security (DES, RSA algorithms), Communication Security (IPSec, Firewalls), Authentication protocols such as authentication based on shared key (Diffie Helleman Key exchanger).

### References

- 1.Computer Networks by A. S Tanenbaum, 4th, Edition", Pearson education
- 2.Data and Computer Communication by W. Stallings, Macmillan Press
- 3.Computer Networks & Internet with Internet Applications by Comer Pearson Education
- 4.Internetworking with TCP/IP by PHI
- 5.Data Communication and Networking by Forouzan TMH
- 6.Computer Networks with Internet Protocols by W Stallings, Pearson Education
- 7.Local and Metropolitan Area Networks by W Stallings, VIth edition, Pearson Education

**Elective Subject MCA 4<sup>th</sup> Semester**  
**KMCA-011 Compiler Design**

<b>L</b>	<b>T</b>	<b>P</b>
<b>3</b>	<b>1</b>	<b>0</b>

**Unit – I**

**Compiler Structure:** Introduction to Compiler, Phases and passes, cross compiler, Bootstrapping.

**Programming Languages:** High level languages, the lexical and syntactic structure of a language.

**Lexical Analysis:** The role of Lexical Analyzer, A simple approach to the design of Lexical Analyzer, Finite state machines, regular expressions and their applications to lexical analysis, Transition Diagrams, Implementation of Lexical Analyzer, Lexical Analyzer Generator: LEX, Capabilities of Lexical Analyzer

**Unit – II**

**The syntactic specification of programming languages:** Context free grammars, derivation and parse trees, ambiguity, capabilities of CFG. Syntax Analyzer Generator: YACC

**Basic Parsing Techniques:** Top-Down parsers with backtracking, Recursive Descent Parsers, Predictive Parsers, Bottom-up Parsers, Shift-Reduce Parsing, Operator Precedence Parsers.

**Unit – III**

**Automatic Construction of efficient Parsers:** LR parsers, the canonical Collection of LR(0) items, constructing SLR parsing tables, constructing Canonical LR parsing tables, Constructing LALR parsing tables.

**Intermediate Code Generation:** Different Intermediate forms: three address code, Quadruples & Triples. Syntax Directed translation mechanism and attributed definition. Translation of Declaration, Assignment, Control flow, Boolean expression, Array References in arithmetic expressions, procedure calls, case statements, postfix translation.

**Unit – IV**

**Symbol Tables:** Data structure for symbols tables, representing scope information. Run-Time Administration: Implementation of simple stack allocation scheme, storage allocation in block structured language.

**Error Detection & Recovery:** Lexical Phase errors, syntactic phase errors, semantic errors.

**Unit – V**

**Code Generation:** Design Issues, the Target Language. Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, Code Generator.

**Code optimization:** Machine-Independent Optimizations, Loop optimization, DAG representation of basic blocks, value numbers and algebraic laws, Global Data-Flow analysis.

**References:**

1. Aho, Sethi & Ullman, "Compilers: Principles, Techniques and Tools", Pearson Education
2. V Raghvan, "Principles of Compiler Design", TMH
3. Kenneth Loudon, "Compiler Construction", Cengage Learning.
4. Charles Fischer and Ricard LeBlanc, "Crafting a Compiler with C", Pearson Education

## **KMCA-012 Client Server Computing**

<b>L</b>	<b>T</b>	<b>P</b>
<b>3</b>	<b>1</b>	<b>0</b>

### **Unit I**

Tools, advantages of client server computing.

### **Unit II**

Components of Client/Server application: The client: services, request for services  
Client/Server Computing: DBMS concept and architecture, Single system image, Client Server architecture, mainframe-centric client server computing, downsizing and client server computing, preserving mainframe applications investment through porting, client server development, RPC, windows services, print services, remote boot services, other remote services, Utility Services & Other Services, Dynamic Data Exchange (DDE), Object Linking and Embedding (OLE), Common Object Request Broker Architecture (CORBA).

The server: Detailed server functionality, the network operating system, available platforms, the server operating system.

### **Unit III**

Client/Server Network: connectivity, communication interface technology, Interposes communication, wide area network technologies, network topologies (Token Ring, Ethernet, FDDI, CDDI) network management, Client-server system development: Software, Client–Server System Hardware: Network Acquisition, PC-level processing unit, Macintosh, notebooks, pen, UNIX workstation, x-terminals, server hardware.

### **Unit IV**

Data Storage: magnetic disk, magnetic tape, CD-ROM, WORM, Optical disk, mirrored disk, fault tolerance, RAID, RAID-Disk network interface cards. Network protection devices, Power Protection Devices, UPS, Surge protectors.

Client Server Systems Development: Services and Support, system administration, Availability, Reliability, Serviceability, Software Distribution, Performance, Network management, Help Desk, Remote Systems Management Security, Network Management issues.

### **Unit V**

Client/Server System Development: Training, Training advantages of GUI Application, System Administrator training, Database Administrator training, End-user training. The future of client server Computing Enabling Technologies, The transformational system.

### **References: -**

1. Patrick Smith & Steave Guengerich, “Client / Server Computing”, PHI
2. Dawna Travis Dewire, “Client/Server Computing”, TMH
3. Majumdar & Bhattacharya, “Database management System”, TMH
4. Korth, Silberchatz, Sudarshan, “Database Concepts”, McGraw Hill
5. Elmasri, Navathe, S.B, “Fundamentals of Data Base System”, Addison Wesley

## KMCA-013 Data Mining And Data Warehousing

L	T	P
3	1	0

### Unit-I

**Data Warehousing:** Overview, Definition, Data Warehousing Components, Building a Data Warehouse, Warehouse Database, Mapping the Data Warehouse to a Multiprocessor Architecture, Difference between Database System and Data Warehouse, Multi Dimensional Data Model, Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture, Data Marting.

### Unit-II

**Data Warehouse Process and Technology:** Warehousing Strategy, Warehouse /management and Support Processes, Warehouse Planning and Implementation, Hardware and Operating Systems for Data Warehousing, Client/Server Computing Model & Data Warehousing. Parallel Processors & Cluster Systems, Distributed DBMS implementations, Warehousing Software, Warehouse Schema Design, Data Extraction, Cleanup & Transformation Tools, Warehouse Metadata

### Unit-II

**Data Mining:** Overview, Motivation, Definition & Functionalities, Data Processing, Form of Data Preprocessing, Data Cleaning: Missing Values, Noisy Data,(Binning, Clustering, Regression, Computer and Human inspection),Inconsistent Data, Data Integration and Transformation. Data Reduction:-Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity Reduction, Discretization and Concept hierarchy generation, Decision Tree.

### Unit-IV

**Classification:** Definition, Data Generalization, Analytical Characterization, Analysis of attribute relevance, Mining Class comparisons, Statistical measures in large Databases, Statistical-Based Algorithms, Distance-Based Algorithms, Decision Tree-Based Algorithms.

**Clustering:** Introduction, Similarity and Distance Measures, Hierarchical and Partitional Algorithms. Hierarchical Clustering- CURE and Chameleon. Density Based Methods- DBSCAN, OPTICS. Grid Based Methods- STING, CLIQUE. Model Based Method – Statistical Approach,

**Association rules:** Introduction, Large Itemsets, Basic Algorithms, Parallel and Distributed Algorithms, Neural Network approach.

### Unit-V

**Data Visualization and Overall Perspective:** Aggregation, Historical information, Query Facility, OLAP function and Tools. OLAP Servers, ROLAP, MOLAP, HOLAP, Data Mining interface, Security, Backup and Recovery, Tuning Data Warehouse, Testing Data Warehouse. Warehousing applications and Recent Trends: Types of Warehousing Applications, Web Mining, Spatial Mining and Temporal Mining.

### References:

1. Alex Berson, Stephen J. Smith “Data Warehousing, Data-Mining & OLAP”, TMH
2. Mark Humphries, Michael W. Hawkins, Michelle C. Dy, “ Data Warehousing: Architecture and Implementation”, Pearson
3. Margaret H. Dunham, S. Sridhar, ”Data Mining: Introductory and Advanced Topics”.
4. Arun K. Pujari, “Data Mining Techniques” Universities Press
5. Pieter Adriaans, Dolf Zantinge, “Data-Mining”, Pearson Education

## KMCA– 014 Cryptography and Network Security

L	T	P
3	1	0

### UNIT – I

**Introduction and Mathematical Foundations:** Introduction to group, field, finite field of the form  $GF(p)$ , modular arithmetic, prime and relative prime numbers, Extended Euclidean algorithm, Modular Arithmetic, Overview on Modern Cryptography, Number Theory, probability and Information Theory.

**Introduction To Security:** Attacks, Services & Mechanisms, Security, Attacks, Security Services.

**Classical Cryptosystems:** Classical Cryptosystems, Cryptanalysis of Classical Cryptosystems, Shannon's Theory: I, Shannon's Theory: II, Shannon's Theory: III.

### UNIT – II

**Symmetric Key Ciphers:** Symmetric Key Ciphers, Modern Block Ciphers (DES), Modern Block Cipher (AES), Block Cipher Design Principles, Block Cipher Modes of Operation.

**Cryptanalysis of Symmetric Key Ciphers:** Linear Cryptanalysis, Differential Cryptanalysis, Other Cryptanalytic Techniques, Overview on S-Box Design Principles, Modes of operation of Block Ciphers.

### UNIT - III

**Conventional Encryption Algorithms:** Triples DES, Blowfish, International Data encryption Algorithm, RC5, CAST-128, RC2 Placement & Encryption Function, Key Distribution, Random Number Generation, Placement Of Encryption Function, Fermat's & Euler's Theorem, The Chinese Remainder Theorem. Discrete Logarithmic Problem.

**Public Key Encryption:** Public-Key Cryptography: Principles Of Public-Key Cryptosystems, RSA Algorithm, Key Management, Diffie-Hellman Key Exchange.

**Modern Trends in Asymmetric Key Cryptography:** Elliptic curve based cryptography: I  
Elliptic curve based cryptography: II

### UNIT – IV

**Hash Functions:** Message Authentication & Hash Functions: Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions, Birthday Attacks, Security Of Hash Function & MACS, MD5 Message Digest Algorithm, Secure Hash Algorithm (SHA), Digital Signatures: Digital Signatures, Authentication Protocol, Digital Signature Standard (DSS), Proof Of Digital Signature Algorithm.

### UNIT-V

**Network & System Security:** Authentication Applications: Kerberos X.509, Directory Authentication Service, Electronic Mail Security, Pretty Good Privacy (PGP), S / Mime, Security: Architecture, Authentication Header, Encapsulating Security Payloads, Combining Security Associations, Key Management, Web Security: Secure Socket Layer & Transport Layer Security, Secure Electronic Transaction (Set), System Security: Intruders, Viruses, Firewall Design Principles, Trusted Systems.

### Reference Books:

1. Johannes A. Buchmann, "Introduction to cryptography", Springer- Verlag.
2. Atul Kahate, "Cryptography and Network Security", TMH
3. Douglas Stinson, "Cryptography Theory and Practice", 2nd Edition, Chapman & Hall/CRC.

4. William Stallings, "Cryptography and Network Security: Principles and Practice", Prentice Hall, New Jersey.
5. B. A. Forouzan, "Cryptography & Network Security", Tata Mc Graw Hill.

## KMCA-015 Theory Of Automata And Formal Languages

L	T	P
3	1	0

### Unit – I

Introduction; Alphabets, Strings and Languages; Automata and Grammars, Deterministic finite Automata (DFA)-Formal Definition, Simplified notation: State transition graph, Transition table, Language of DFA, Nondeterministic finite Automata (NFA), NFA with epsilon transition, Language of NFA, Equivalence of NFA and DFA, Minimization of Finite Automata, Myhill-Nerode Theorem

### Unit – II

Regular expression (RE) , Definition, Operators of regular expression and their precedence, Algebraic laws for Regular expressions, Kleen's Theorem, Regular expression to FA, DFA to Regular expression, Arden Theorem, Non Regular Languages, Pumping Lemma for regular Languages. Application of Pumping Lemma, Closure properties of Regular Languages, Decision properties of Regular Languages, FA with output: Moore and Mealy machine, Equivalence of Moore and Mealy Machine, Applications and Limitation of FA.

### Unit – III

Context free grammar (CFG) and Context Free Languages (CFL): Definition, Examples, Derivation , Derivation trees, Ambiguity in Grammar, Inherent ambiguity, Ambiguous to Unambiguous CFG, Useless symbols, Simplification of CFGs, Normal forms for CFGs: CNF and GNF, Closure properties of CFLs, Decision Properties of CFLs, Pumping lemma for CFLs,

### Unit – IV

Push Down Automata (PDA): Description and definition, Instantaneous Description, Language of PDA, Acceptance by Final state, Acceptance by empty stack, Deterministic PDA, Equivalence of PDA and CFG, CFG to PDA and PDA to CFG, Two stack PDA

### Unit – V

Turing machines (TM): Basic model, definition and representation, Language acceptance by TM, Variants of Turing Machine, Church's Thesis, Recursive and recursively enumerable languages, Halting problem, Undecidable problems about TMs. Post correspondence problem (PCP), Introduction to recursive function theory .

### Text Books and References:

1. Hopcroft, Ullman, "Introduction to Automata Theory, Languages and Computation", Pearson Education
2. K.L.P. Mishra and N.Chandrasekaran, "Theory of Computer Science : Automata, Languages and Computation", PHI
3. Martin J. C., "Introduction to Languages and Theory of Computations", TMH
4. Papadimitrou, C. and Lewis, C.L., "Elements of the Theory of Computation", PHI

## KMCA-016 Distributed Systems

L	T	P
3	1	0

### Unit-I

**Foundation and Characterization of Distributed Systems:** Introduction, Architecture of Distributed Systems, Distributed Operating System, Examples of distributed Systems, System Models: Architectural models and Fundamental Models, Limitation of Distributed system.

**Theoretical Foundation for Distributed System:**, Clock Synchronization, absence of global clock, shared memory, Logical clocks, Lamport's & vectors logical clocks. Causal Ordering of messages, termination detection.

**Distributed Mutual Exclusion:** Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non token based algorithms, performance metric for distributed mutual exclusion algorithms.

### Unit-II

**Distributed Deadlock Detection:** system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized deadlock detection, distributed deadlock detection, path pushing algorithms, edge chasing algorithms.

**Agreement Protocols:** Introduction, System models, classification of Agreement Problem, Byzantine agreement problem, Consensus problem, Interactive consistency Problem, Solution to Byzantine Agreement problem, Applications of Agreement problem.

### Unit-III

**Distributed Resource Management:** Issues in distributed File Systems, Mechanism for building distributed file systems, Design issues in Distributed Shared Memory, Algorithm for Implementation of Distributed Shared Memory.

**Distributed Scheduling:** Issues in Load Distribution, Requirements of Load Distributing Policies, Load Balancing versus Load Sharing, Components of a Load Distribution Algorithm.

### Unit-IV

**Failure Recovery in Distributed Systems:** Classification of Failure, Concepts in Backward and Forward recovery, Recovery in Concurrent systems, Checkpoints and Roll Back Recovery Algorithm.

**Fault Tolerance:** Issues in Fault Tolerance, Fault - Tolerant services, Commit Protocols, Voting protocols, Dynamic voting protocols. Role of Replica in Fault Tolerance.

### Unit -V

**Transactions and Concurrency Control:** Transactions, Nested transactions, Flat and nested distributed transactions, Concurrency control, Comparison of methods for concurrency control, Atomic Commit protocols, Concurrency control in distributed transactions.

**Distributed Objects and Remote Invocation:** Remote Procedure Call and RMI, Case Study: CORBA RMI.

### References:

1. Singhal & Shivaratri, "Advanced Concept in Operating Systems", McGraw Hill
2. Ramakrishna, Gehrke, "Database Management Systems", Mc Grawhill
3. Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design", Pearson Education
4. Tenanuanbaum, Steen, "Distributed Systems", PHI
6. Gerald Tel, "Distributed Algorithms", Cambridge University Press



## KMCA-414 Computer Networks

L	T	P
3	1	0

### Unit-I

**Introductory Concepts:** Goals and Applications of Networks, Network structure and architecture, the OSI reference model, services, networks topology, Physical Layer-transmission, switching methods, Integrated services digital networks.

### Unit-II

**Medium access sub layer:** Channel allocations, LAN protocols, ALOHA Protocols- Pure ALOHA, slotted ALOHA, Carrier Sense Multiple Access Protocols, CSMA with Collision Detection, Collision free Protocols, IEEE standards, Ethernet, FDDI, Data Link Layer- basic design issues, error correction & detection algorithms, elementary data link layer protocols, sliding window protocols, error handling, High Level Data Link Control

### Unit-III

**Network Layer:** Point-to Point networks, concept of virtual circuit and LAN, routing algorithms, congestion control algorithms, internetworking, TCP/IP protocol, IP addresses, IPv6.

### Unit-IV

**Transport Layer:** Design issues, connection management, Internet Transport Protocol (UDP), Ethernet transport Protocol, Transmission Control Protocol. (TCP)

### Unit-V

**Application Layer:** Domain Name System, Simple Network Management Protocol, Electronic mail, File Transfer Protocol, Hyper Text Transfer Protocol, Introduction to Cryptography and Network Security (DES, RSA algorithms), Communication Security (IPSec, Firewalls), Authentication protocols such as authentication based on shared key (Diffie Helleman Key exchanger).

### References

1. Computer Networks by A. S Tanenbaum, 4th, Edition", Pearson education
2. Data and Computer Communication by W. Stallings, Macmillan Press
3. Computer Networks & Internet with Internet Applications by Comer Pearson Education
4. Internetworking with TCP/IP by PHI
5. Data Communication and Networking by Forouzan TMH
6. Computer Networks with Internet Protocols by W Stallings, Pearson Education
7. Local and Metropolitan Area Networks by W Stallings, VIth edition, Pearson Education

## KMCA-511 Fundamental Of E-Commerce

<b>L</b>	<b>T</b>	<b>P</b>
<b>3</b>	<b>1</b>	<b>0</b>

### Unit I:-

**Introduction:** Electronic Commerce - Technology and Prospects, Definition of E-Commerce, Economic potential of electronic commerce, Incentives for engaging in electronic commerce, forces behind E-Commerce, Advantages and Disadvantages, Architectural framework, Impact of E-commerce on business.

**Network Infrastructure for E- Commerce:** Internet and Intranet based E-commerce-Issues, problems and prospects, Network Infrastructure, Broadband telecommunication (ATM, ISDN, and FRAME RELAY).

### Unit II:-

**Mobile Commerce:** Introduction, Wireless Application Protocol, WAP technology, Mobile Information device, Mobile Computing Applications.

### Unit III:-

**Web Security:** Security Issues on web, Importance of Firewall, components of Firewall, Transaction security, Emerging client server Security Threats, Network Security, Factors to consider in Firewall design, Limitation of Firewalls.

### Unit IV:-

**Encryption:** Encryption techniques, Symmetric Encryption- Keys and data encryption standard, Triple encryption, Asymmetric encryption- Secret key encryption, public and private pair key encryption, Digital Signatures, Virtual Private Network.

### Unit V:-

**Electronic Payments:** Overview, The SET protocol, Payment Gateway, certificate, digital Tokens, Smart card, credit card, magnetic strip card, E-Checks, Credit/Debit card based EPS, online Banking. EDI Application in business, E- Commerce Law, Forms of Agreement, Govt. policies and Agenda.

### References: -

1. Ravi Kalakota, Andrew Winston, "Frontiers of Electronic Commerce", Addison Wesley.
2. Bajaj and Nag, "E-Commerce the cutting edge of Business", TMH.
3. P. Loshin, John Vacca, "Electronic commerce", Firewall Media, New Delhi.

## KMCA- 512 Dot Net Framework & C#

L	T	P
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### Unit-1 :-

**The .Net framework:** Introduction, The Origin of .Net Technology, Common Language Runtime (CLR), Common Type System (CTS), Common Language Specification (CLS), Microsoft Intermediate Language (MSIL), Just-In –Time Compilation, Framework Base Classes.

### Unit-II

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

### Unit-III:-

**C# Using Libraries:** Namespace- System, Input-Output, Multi-Threading, Networking and sockets, Managing Console I/O Operations, Windows Forms, Error Handling.

### Unit-IV :-

**Advanced Features Using C#:** Web Services, Window Services, Asp.net Web Form Controls, ADO.Net. Distributed Application in C#, Unsafe Mode, Graphical Device interface with C#. **Unit-V:-**

**.Net Assemblies and Attribute:** .Net Assemblies features and structure, private and share assemblies, Built-In attribute and custom attribute. Introduction about generic.

### References:-

1. Wiley, "Beginning Visual C# 2008", Wrox
2. Fergal Grimes, "Microsoft .Net for Programmers". (SPI)
3. Balagurusamy, "Programming with C#", (TMH)
4. Mark Michaelis, "Essential C# 3.0: For .NET Framework 3.5, 2/e, Pearson Education
5. Shibi Parikkar, "C# with .Net Frame Work", Firewall Media. MCA 513: Software Engineering

## KMCA- 513 Mobile Computing

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### UNIT – I

**Introduction to Mobile Communications and Computing** - Mobile Computing (MC): Introduction to MC, applications, limitations, and architecture.

**Cellular Overview** - Cellular networks, Cellular concept, location management, Handoffs

**Wireless LANs and Application overview** - WLAN, Wireless applications, Mac issues (Hidden and exposed terminals, Near and far terminals), Mobile IP, Mobile ad-hoc networks (MANET), TCP Issues, Disconnected operations, Data broadcasting, Mobile agents.

**GSM** - Air-interface, channel structure, timing, Mobile Services (Bearer, Tele- and-supplementary services), System Architecture, Radio subsystem, Network and switching subsystem, Operation subsystem, Protocols, Localization and calling, Handover, Value Added Services, SMS, Cell Broadcast Service, MMS, Location Services

### UNIT –II

**WAP** – Architecture, Protocol stack, Application environment, Application.

**Access Technologies** - Blue Tooth, GPRS, 802.11, CDMA 3, Mobile Phone Technologies (1G, 2G, 2.5G, 3G).

**Database Issues** - Hoarding techniques, Caching invalidation mechanisms, Client server computing with adaptation, Power-aware and context-aware computing, Transactional models, query processing, recovery and quality of service issues.

**Platform/Operating Systems for application development** - Palm OS, Windows CE, Embedded Linux, J2ME (Introduction), Symbian (Introduction)

### UNIT – III

Adhoc networks, localization, MAC issues, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), QoS in Ad Hoc Networks, applications.

### UNIT – IV

**Android application development** - Overview of Android, Devices running android, Why Develop for Android, Features of android, Architecture of Android, Libraries, Software development kit.

**Designing the user interface** - Introducing views and view groups, Introducing layouts, Creating new views, Creating and using Menus.

### UNIT – V

**Peer to peer to communication** - Accessing Telephony Hardware, Introducing Android Instant Messaging, GTalk Service : Using, binding & Making connection, Managing chat Sessions, Sending and receiving Data messages, Introducing SMS, Using, sending & Listening SMS Messages.

**Accessing Android Hardware** - Audio, Video and Using the camera, Introducing Sensor Manager, Android Telephony, Using Bluetooth, Manage network and Wi-Fi connections.

### References:

1. Mobile Communications J. Schiller, Addison Wesley Publication

2. GSM System Engineering A.Mehrotra, Addison Wesley Publication
3. Understanding WAP M. Heijden, M. Taylor, Artech House Publication
4. Professional Android™ Application Development Wrox Publications, Reto Meier
5. Hello Android, Introducing Google's Mobile Development Platform, Ed-Burnette, Pragmatic Programmers, ISBN: 978-1-93435-61 7-3
6. Sams teach yourself Android application development, Lauren Dercy and Shande Conder, Sams publishing
7. Mobile Computing: Asoke K Talukdar, Roopa R. Yavagal, TataMcGrawHill
8. Hansmann, Merk, Nicklous, Stober, "Principles of Mobile Computing", Springer, second edition

## KMCA-021 Computer Graphics and Animation

L	T	P
3	1	0

### Unit – I

**Introduction and Line Generation:** Types of computer graphics, Graphic Displays-Random scan displays, Raster scan displays, Frame buffer and video controller, Points and lines, Line drawing algorithms, Circle generating algorithms, Mid point circle generating algorithm, and parallel version of these algorithms.

### Unit – II

**Transformations:** Basic transformation, Matrix representations and homogenous coordinates, Composite transformations, Reflections and shearing. **Windowing and Clipping:** Viewing pipeline, Viewing transformations, 2-D Clipping algorithms- Line clipping algorithms such as Cohen Sutherland line clipping algorithm, Liang Barsky algorithm, Line clipping against non rectangular clip windows; Polygon clipping – Sutherland Hodgeman polygon clipping, Weiler and Atherton polygon clipping, Curve clipping, Text clipping.

### Unit – III

**Three Dimensional:** 3-D geometric primitives, 3-D Object representation, 3-D Transformation, 3-D viewing, projections, 3-D Clipping.

### Unit – IV

**Curves and Surfaces:** Quadric surfaces, Spheres, Ellipsoid, Blobby objects, Introductory concepts of Spline, Bspline and Bezier curves and surfaces. **Hidden Lines and Surfaces:** Back Face Detection algorithm, Depth buffer method, A- buffer method, Scan line method, basic illumination models – Ambient light, Diffuse reflection, Specular reflection and Phong model, Warn model, Intensity Attenuation, Color consideration, Transparency and Shadows.

### Unit – V

**Computer Animations :** Conventional and computer assisted animation, design of animation sequences, interpolation, simple animation effects, animation languages ( Key Frame System, Parameterized systems), motion specifications, methods of controlling animation.

### References:

1. Donald Hearn and M Pauline Baker, “Computer Graphics C Version”, Pearson Education
2. Amrendra N Sinha and Arun D Udai,” Computer Graphics”, TMH
3. Donald Hearn and M Pauline Baker, “ Computer Graphics with OpenGL”, Pearson education
4. Steven Harrington, “Computer Graphics: A Programming Approach”, PHI or TMH
5. James D Foley, A V Dam, S K Feiner and John f Hughes, “Computer Graphics Principles and Practice” Second Edition in C.

## **KMCA-022 Simulation and Modeling**

<b>L</b>	<b>T</b>	<b>P</b>
<b>3</b>	<b>1</b>	<b>0</b>

### **Unit-1**

Introduction to Simulation and Modeling, Simulation – introduction, appropriate and not appropriate, advantages and disadvantage, application areas, history of simulation software, an evaluation and selection technique for simulation software, general – purpose simulation packages.

System definition and components, stochastic activities, continuous and discrete systems, system modeling, types of models, static and dynamic physical models, static and dynamic mathematical models, full corporate model, types of system study.

### **Unit-II**

System simulation, why & when to simulate, nature and techniques of simulation, comparison of simulation and analytical methods, types of system simulation, real time simulation, hybrid simulation, simulation of pure-pursuit problem, single-server queuing system and an inventory problem, Monte-Carlo simulation, Distributed Lag models, Cobweb model.

### **Unit-III**

Simulation of continuous systems, analog vs. digital Simulation, Simulation of water reservoir system, Simulation of a servo system, simulation of an autopilot, Discrete system simulation, fixed time-step vs. even to even model, generation of random numbers, test for randomness, Monte-Carlo computation vs. stochastic simulation.

### **Unit-IV**

System dynamics, exponential growth models, exponential decay models, modified exponential growth models, logistic curves, generalization of growth models, system dynamic diagrams. Introduction to SIMSCRIPT: Program, system concepts, origination, and statements, defining the telephone system model.

### **Unit-V**

Simulation of PERT Networks, critical path computation, uncertainties in activity duration ,resource allocation and consideration. Simulation languages and software, continuous and discrete simulation languages, expression based languages, object oriented simulation, general purpose vs. application - oriented simulation packages, CSMP-III, MODSIM-III.

### **References**

1. Geoffrey Gordon, “ System Simulation”, PHI
2. Jerry Banks, John S. C Barry L. Nelson David M. Nicol, “Discrete Event System Simulation”, Pearson Education
3. V P Singh, “System Modeling and simulation”, New Age International.
4. Averill M. Law, W. David Kelton, “System Modeling and simulation and Analysis”, TMH

## **KMCA-023 Advanced Database Management Systems**

<b>L</b>	<b>T</b>	<b>P</b>
<b>3</b>	<b>1</b>	<b>0</b>

### **UNIT-I**

Transaction and schedules, Concurrent Execution of transaction, Conflict and View Serializability, Testing for Serializability, Concepts in Recoverable and Cascadeless schedules.

### **UNIT –II**

Lock based protocols, time stamp based protocols, Multiple Granularity and Multiversion Techniques, Enforcing serializability by Locks, Locking system with multiple lock modes, architecture for Locking scheduler .

### **UNIT III**

Distributed Transactions Management, Data Distribution, Fragmentation and Replication Techniques, Distributed Commit, Distributed Locking schemes, Long duration transactions, Moss Concurrency protocol.

### **UNIT –IV**

Issues of Recovery and atomicity in Distributed Databases, Traditional recovery techniques, Log based recovery, Recovery with Concurrent Transactions, Recovery in Message passing systems, Checkpoints, Algorithms for recovery line, Concepts in Orphan and Inconsistent Messages.

### **UNIT V**

Distributed Query Processing, Multiway Joins, Semi joins, Cost based query optimization for distributed database, Updating replicated data, protocols for Distributed Deadlock Detection, Eager and Lazy Replication Techniques .

### **References**

1. Silberschatz, Korth and Sudershan, Database System Concept', Mc Graw Hill
2. Ramakrishna and Gehrke,' Database Management System, Mc Graw Hill
3. Garcia-Molina, Ullman,Widom,' Database System Implementation' Pearson Education
4. Ceei and Pelagatti,'Distributed Database', TMH 5. Singhal and Shivratri, 'Advance Concepts in Operating Systems' MC Graw Hill



## KMCA-024 Artificial Intelligence

<b>L</b>	<b>T</b>	<b>P</b>
<b>3</b>	<b>1</b>	<b>0</b>

### Unit-I

**Introduction :** Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence, Intelligent Agents

**Introduction to Search :** Searching for solutions, Uniformed search strategies, Informed search strategies, Local search algorithms and optimistic problems, Adversarial Search, Search for games.

### Unit-II

**Knowledge Representation & Reasoning:** Propositional logic, Theory of first order logic, Inference in First order logic, Forward & Backward chaining, Resolution, Probabilistic reasoning, Utility theory, Hidden Markov Models (HMM), Bayesian Theory .

### Unit-III

**Machine Learning :** Supervised and unsupervised learning, Decision trees, Statistical learning models, Learning with complete data - Naive Bayes models, Learning with hidden data – EM algorithm, Reinforcement learning.

**Natural Language Possessing:** Introduction , Applications of NLP Parsing Techniques, context free transformational grammars,,Natural Language processing and understanding, Organization of Natural language Understanding Systems.

### Unit-IV

**Pattern Recognition :** Introduction, Design principles of pattern recognition system, Statistical Pattern recognition, Parameter estimation methods - Principle Component Analysis (PCA) and Linear Discriminant Analysis (LDA), Clustering and Classification Techniques,

**Expert system:** Introduction, functionality, advantage ,disadvantages, Architecture of Expert system. Development of small DSS, expert system, intelligent systems and their tools like LISP, PROLOG , JESS.

### Unit-V

**Perception:** Introduction to perception, Introduction to Robotics, Robot Architecture,

**Computer vision:** Introduction ,applications, biometrics based applications.

**Prolog:** Introduction to prolog, Structure of prolog, backtracking in prolog, Applications of prolog.

### References:

1. Stuart Russell, Peter Norvig, “Artificial Intelligence – A Modern Approach”, Pearson Education
2. Elaine Rich and Kevin Knight, “Artificial Intelligence”, McGraw-Hill
3. E Charniak and D McDermott, “Introduction to Artificial Intelligence”, Pearson Education
4. Dan W. Patterson, “Artificial Intelligence and Expert Systems”, Prentice Hall of India,

## **KMCA-025 Information Security and Cyber Law**

<b>L</b>	<b>T</b>	<b>P</b>
<b>3</b>	<b>1</b>	<b>0</b>

### **UNIT-I:-**

History of Information Systems and its Importance, basics, Changing Nature of Information Systems, Need of Distributed Information Systems, Information System Threats and attacks, Classification of Threats and Assessing Damages

Security in Mobile and Wireless Computing- Security Challenges in Mobile Devices, Authentication Service Security, Security Implication for organizations, Laptops Security Concepts in Internet and World Wide Web: Brief review of Internet Protocols-TCP/IP, IPV4, IPV6. Functions of various networking components-routers, bridges, switches, hub, gateway and Modulation Techniques

### **UNIT-II:-**

Basic Principles of Information Security, Confidentiality, Integrity, Availability and other terms in Information Security, Information Classification and their Roles.

Security Threats to E Commerce, Virtual Organization, E-Governance and EDI, Concepts in Electronics payment systems, E Cash, Credit/Debit Cards.

### **UNIT-III:-**

Physical Security- Needs, Disaster and Controls, Basic Tenets of Physical Security and Physical ,Entry Controls, Access Control- Biometrics, Factors in Biometrics Systems, Benefits, Criteria for selection of biometrics, Interoperability Issues, Economic and Social Aspects, Framework for Information Security, ISO 27001, SEI-CMM, Security Metrics, Information Security V/s Privacy.

### **UNIT-IV:-**

Model of Cryptographic Systems, System of Keys, Public Key Cryptography, Digital Signature, Requirement of Digital Signature System, Finger Prints, Firewalls.

Network Security- Basic Concepts, Dimensions, Perimeter for Network Protection, Network Attacks, Need of Intrusion Monitoring and Detection, Intrusion Detection.

Virtual Private Networks- Need, Use of Tunneling with VPN, Authentication Mechanisms, Types of VPNs and their Usage, Security Concerns in VPN

### **UNIT-V:-**

Laws, Investigation and Ethics: Cyber Crime, Information Security and Law, Types & overview of Cyber Crimes, Cyber Law Issues in E-Business Management. Overview of Indian IT Act, Ethical Issues in Intellectual property rights (IPR), Copy Right, Patents, Data privacy and protection, Domain Name, Software piracy, Plagiarism, Issues in ethical hacking.

### **References: -**

1. Godbole, "Information Systems Security", Willey
2. Merkov, Breithaupt, "Information Security", Pearson Education
3. Yadav, "Foundations of Information Technology", New Age, Delhi
4. Schou, Shoemaker, "Information Assurance for the Enterprise", Tata McGraw Hill
5. Sood, "Cyber Laws Simplified", Mc Graw Hill
6. Furnell, "Computer Insecurity", Springer

## KMCA- 026 Information Storage & Management

L	T	P
3	1	0

### Unit-I:

**Introduction to Storage Technology :** Data proliferation and the varying value of data with time & usage, Sources of data and states of data creation, Data center requirements and evolution to accommodate storage needs, Overview of basic storage management skills and activities, The five pillars of technology, storage infrastructure components, Evolution of storage, Information Lifecycle Management concept, Data categorization within an enterprise, Storage and Regulations.

### Unit-II:

**Storage Systems Architecture :** Intelligent disk subsystems overview, Contrast of integrated vs. modular arrays, Component architecture of intelligent disk subsystems, Disk physical structure components, properties, performance, and specifications, Logical partitioning of disks, RAID & parity algorithms, hot sparing, Physical vs. logical disk organization, protection, and back end management, Array caching properties and algorithms, Front end connectivity and queuing properties, Front end to host storage provisioning, mapping, and operation, Interaction of file systems with storage, Storage system connectivity protocols.

### Unit-III:

**Introduction to Networked Storage :** JBOD, DAS, SAN, NAS, & CAS evolution, Direct Attached Storage (DAS) environments: elements, connectivity, & management, Storage Area Networks (SAN): elements & connectivity, Fibre Channel principles, standards, & network management principles, SAN management principles, Network Attached Storage (NAS): elements, connectivity options, connectivity protocols (NFS, CIFS, ftp), & management principles, IP SAN elements, standards (SCSI, FCIP, FCP), connectivity principles, security, and management principles, Content Addressable Storage (CAS): elements, connectivity options, standards, and management principles, Hybrid Storage solutions overview including technologies like virtualization & appliances.

### Unit-IV:

**Introduction to Information Availability:** Business Continuity and Disaster Recovery Basics, Local business continuity techniques, Remote business continuity techniques, Disaster Recovery principles & techniques.

**Unit-V: Managing & Monitoring :** Management philosophies (holistic vs. system & component), Industry management standards(SNMP, SMI-S, CIM), Standard framework applications, Key management metrics (thresholds, availability, capacity, security, performance), Metric analysis methodologies & trend analysis, Reactive and pro-active management best practices, Provisioning & configuration change planning, Problem reporting, prioritization, and handling techniques, Management tools overview.

### References

1. Information Storage and Management Storing, Managing, and Protecting Digital Information , by EMC, Hopkinton and Massachusetts, Wiley, ISBN: 9788126521470

## **KMCA-031 ERP Systems**

<b>L</b>	<b>T</b>	<b>P</b>
<b>3</b>	<b>1</b>	<b>0</b>

### **UNIT – I:**

ERP Introduction, Benefits, Origin, Evolution and Structure: Conceptual Model of ERP, The Evolution of ERP, The Structure of ERP.

### **UNIT – II:**

Business Process Reengineering, Data ware Housing, Data Mining, Online Analytic Processing(OLAP), Product Life Cycle Management(PLM),LAP, Supply chain Management.

### **UNIT – III:**

ERP Marketplace and Marketplace Dynamics: Market Overview, Marketplace Dynamics, The Changing ERP Market. ERP- Functional Modules: Introduction, Functional Modules of ERP Software, Integration of ERP, Supply chain and Customer Relationship Applications.

### **UNIT – IV**

ERP Implementation Basics, ERP Implementation Life Cycle, Role of SDLC/SSAD, Object Oriented Architecture, Consultants, Vendors and Employees.

### **UNIT - V**

ERP & E-Commerce, Future Directives- in ERP, ERP and Internet, Critical success and failure factors, Integrating ERP into organizational culture. Using ERP tool: either SAP or ORACLE format to case study.

### **References:**

1. Alexis Leon, “ERP Demystified”, Tata McGraw Hill
2. Rahul V. Altekar “Enterprise Resource Planning”, Tata McGraw Hill,
3. Vinod Kumar Garg and Venkitakrishnan N K, “Enterprise Resource Planning – Concepts and Practice”, PHI
4. Joseph A Brady, Ellen F Monk, Bret Wagner, “Concepts in Enterprise Resource Planning”, Thompson Course Technology
5. Mary Summer, “Enterprise Resource Planning” - Pearson Education

## KMCA-032 Software Project Management

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### **UNIT-I: Introduction and Software Project Planning**

Fundamentals of Software Project Management (SPM), Need Identification, Vision and Scope document, Project Management Cycle, SPM Objectives, Management Spectrum, SPM Framework, Software Project Planning, Planning Objectives, Project Plan, Types of project plan, Structure of a Software Project Management Plan, Software project estimation, Estimation methods, Estimation models, Decision process.

### **UNIT-II: Project Organization and Scheduling**

Project Elements, Work Breakdown Structure (WBS), Types of WBS, Functions, Activities and Tasks, Project Life Cycle and Product Life Cycle, Ways to Organize Personnel, Project schedule, Scheduling Objectives, Building the project schedule, Scheduling terminology and techniques, Network Diagrams: PERT, CPM, Bar Charts: Milestone Charts, Gantt Charts.

### **UNIT-III: Project Monitoring and Control**

Dimensions of Project Monitoring & Control, Earned Value Analysis, Earned Value Indicators: Budgeted Cost for Work Scheduled (BCWS), Cost Variance (CV), Schedule Variance (SV), Cost Performance Index (CPI), Schedule Performance Index (SPI), Interpretation of Earned Value Indicators, Error Tracking, Software Reviews, Types of Review: Inspections, Deskchecks, Walkthroughs, Code Reviews.

### **UNIT-IV: Software Quality Assurance and Testing**

Testing Objectives, Testing Principles, Test Plans, Test Cases, Types of Testing, Levels of Testing, Test Strategies, Program Correctness, Program Verification & validation, Testing Automation & Testing Tools, Concept of Software Quality, Software Quality Attributes, Software Quality Metrics and Indicators, The SEI Capability Maturity Model (CMM), SQA Activities, Formal SQA Approaches: Proof of correctness, Statistical quality assurance, Cleanroom process.

### **UNIT-V: Project Management and Project Management Tools**

Software Configuration Management: Software Configuration Items and tasks, Baselines, Plan for Change, Change Control, Change Requests Management, Version Control, Risk Management: Risks and risk types, Risk Breakdown Structure (RBS), Risk Management Process: Risk identification, Risk analysis, Risk planning, Risk monitoring, Cost Benefit Analysis, Software Project Management Tools: CASE Tools, Planning and Scheduling Tools.

### **References:**

1. M. Cotterell, Software Project Management, Tata McGraw-Hill Publication.
2. Royce, Software Project Management, Pearson Education
3. Kieron Conway, Software Project Management, Dreamtech Press
4. S. A. Kelkar, Software Project Management, PHI Publica

## KMCA-033 Real Time System

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### UNIT-I:

#### Introduction

Definition, Typical Real Time Applications: Digital Control, High Level Controls, Signal Processing etc., Release Times, Deadlines, and Timing Constraints, Hard Real Time Systems and Soft Real Time Systems, Reference Models for Real Time Systems: Processors and Resources, Temporal Parameters of Real Time Workload, Periodic Task Model, Precedence Constraints and Data Dependency.

### UNIT-II:

#### Real Time Scheduling

Common Approaches to Real Time Scheduling: Clock Driven Approach, Weighted Round Robin Approach, Priority Driven Approach, Dynamic Versus Static Systems, Optimality of Effective-Deadline-First (EDF) and Least-Slack-Time-First (LST) Algorithms, Rate Monotonic Algorithm, Offline Versus Online Scheduling, Scheduling Aperiodic and Sporadic jobs in Priority Driven and Clock Driven Systems.

### UNIT-III:

#### Resources Sharing

Effect of Resource Contention and Resource Access Control (RAC), Non-preemptive Critical Sections, Basic Priority-Inheritance and Priority-Ceiling Protocols, Stack Based Priority- Ceiling Protocol, Use of Priority-Ceiling Protocol in Dynamic Priority Systems, Preemption Ceiling Protocol, Access Control in Multiple-Unit Resources, Controlling Concurrent Accesses to Data Objects.

### UNIT-IV:

#### Real Time Communication

Basic Concepts in Real time Communication, Soft and Hard RT Communication systems, Model of Real Time Communication, Priority-Based Service and Weighted Round-Robin Service Disciplines for Switched Networks, Medium Access Control Protocols for Broadcast Networks, Internet and Resource Reservation Protocols

### UNIT-V:Real Time Operating Systems and Databases

Features of RTOS, Time Services, UNIX as RTOS, POSIX Issues, Characteristics of Temporal data, Temporal Consistency, Concurrency Control, Overview of Commercial Real Time databases.

#### References:

1. Real Time Systems by Jane W. S. Liu, Pearson Education Publication.
2. Mall Rajib, "Real Time Systems", Pearson Education
3. Albert M. K. Cheng , "Real-Time Systems: Scheduling, Analysis, and

Verification”, Wiley.

## **KMCA-034 Parallel Algorithms**

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### **UNIT-I:**

Sequential model, need of alternative model, parallel computational models such as PRAM, LMCC, Hypercube, Cube Connected Cycle, Butterfly, Perfect Shuffle Computers, Tree model, Pyramid model, Fully Connected model, PRAM-CREW, EREW models, simulation of one model from another one.

### **UNIT-II:**

Performance Measures of Parallel Algorithms, speed-up and efficiency of PA, Cost-optimality, An example of illustrate Cost- optimal algorithms- such as summation, Min/Max on various models.

### **UNIT-III:**

Parallel Sorting Networks, Parallel Merging Algorithms on CREW/EREW/MCC, Parallel. Sorting Networks on CREW/EREW/MCC/, linear array

### **UNIT-IV:**

Parallel Searching Algorithm, Kth element, Kth element in X+Y on PRAM, Parallel Matrix Transportation and Multiplication Algorithm on PRAM, MCC, Vector-Matrix Multiplication, Solution of Linear Equation, Root finding.

### **UNIT-V:**

Graph Algorithms - Connected Graphs, search and traversal, Combinatorial Algorithms- Permutation, Combinations, Derrangements.

### **References:**

1. M.J. Quinn, “Designing Efficient Algorithms for Parallel Computer”, McGrawHill.
2. S.G. Akl, “Design and Analysis of Parallel Algorithms”
3. S.G. Akl, ”Parallel Sorting Algorithm” by Academic Press

## KMCA-035 :Neural Networks

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### UNIT-I:

Neurocomputing and Neuroscience ,human Brain, neuron Mode l, Knowledge representation, AI and NN. Learning process: Supervised and unsupervised learning, Error correction learning,competitive learning, adaptation, statistical nature of the learning process.

### UNIT-II:

Data processing Scaling, normalization, Transformation (FT/FFT), principal component analysis, regression, covariance matrix, eigen values & eigen vectors. Basic Models of Artificial neurons, activation Functions, aggregation function, single neuron computation, least mean square algorithm, gradient descent rule, nonlinearly separable problems and bench mark problems in NN.

### UNIT-III

Multilayered network architecture, back propagation algorithm, heuristics for making BPalgorithm performs better. Accelerated learning BP (like recursive least square, quick prop, RPROP algorithm), approximation properties of RBF networks and comparison with multilayer perceptron.

### UNIT-IV

Recurrent network and temporal feed-forward network, implementation with BP, self organizing map and SOM algorithm, properties of feature map and computer simulation. Principal component and Independent component analysis, application to image and signal processing.

### UNIT-V

Complex valued NN and complex valued BP, analyticity of activation function, application in 2D information processing. Complexity analysis of network models. Soft computing. Neuro-Fuzzy-genetic algorithm Integration.

### References:

1. J.A. Anderson, An Intoduction to Neural Networks, MIT
2. Hagen Demuth Beale, Neural Network Design, Cengage Learning
3. R.L. Harvey, Neural Network Principles, PHI
4. Kosko, Neural Network and Fuzzy Sets, PHI



## KMCA-036 Pattern Recognition

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### UNIT-I

**Introduction:** Basics of pattern recognition, Design principles of pattern recognition system, Learning and adaptation, Pattern recognition approaches, Mathematical foundations – Linear algebra, Probability Theory, Expectation, mean and covariance, Normal distribution, multivariate normal densities, Chi squared test.

### UNIT-II

**Statistical Patten Recognition:** Bayesian Decision Theory, Classifiers, Normal density and discriminant functions,

### UNIT – III

**Parameter estimation methods:** Maximum-Likelihood estimation, Bayesian Parameter estimation, Dimension reduction methods - Principal Component Analysis (PCA), Fisher Linear discriminant analysis, Expectation-maximization (EM), Hidden Markov Models (HMM), Gaussian mixture models.

### UNIT - IV

**Nonparametric Techniques:** Density Estimation, Parzen Windows, K-Nearest Neighbor Estimation, Nearest Neighbor Rule, Fuzzy classification.

### UNIT - V

**Unsupervised Learning & Clustering:** Criterion functions for clustering, Clustering Techniques: Iterative square - error partitional clustering – K means, agglomerative hierarchical clustering, Cluster validation.

### References:

1. Richard O. Duda, Peter E. Hart and David G. Stork, "Pattern Classification", 2<sup>nd</sup> Edition, John Wiley, 2006.
2. C. M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2009.
3. S. Theodoridis and K. Koutroumbas, "Pattern Recognition", 4<sup>th</sup> Edition, Academic Press, 2009.