Kamla Nehru Institute of Technology Sultanpur

STUDY & EVALUATION SCHEME

B. Tech .Information Technology

(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		
THEORY										
1.	KIT301	Data Base Management System	3	1	0	30	20	50	100	150
2.	KIT302	Discrete Mathematics	3	1	0	30	20	50	100	150
3.	KIT303	Digital Logic Design	3	1	0	30	20	50	100	150
4.	KIT304	Data Structures	3	1	0	30	20	50	100	150
5.	KIT305	Object Oriented System	3	1	0	30	20	50	100	150
PRACTICAL/TRAINING/PROJECT										
6.	KIT 351	DBMS Lab	0	0	2	10	10	20	30	50
7.	KIT 352	Java Lab	0	1	2	10	10	20	30	50
8.	KIT 353	Object Oriented Lab	0	0	2	10	10	20	30	50
9	KIT 354	Data Structure Lab	0	0	2	10	10	20	30	50
10	GP-301	General Proficiency	-	-	-	-	-	50	-	50
Total										**1000**

Kamla Nehru Institute of Technology Sultanpur

STUDY & EVALUATION SCHEME

B. Tech. Information Technology

(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		
THEORY										
1.	KAS401	Mathematics-3	3	1	0	30	20	50	100	150
2.	KIT401	Communication System	3	1	0	30	20	50	100	150
3.	KIT402	Computer Organization	3	1	0	30	20	50	100	150
4.	KIT403	Introduction to Microprocessor	3	1	0	30	20	50	100	150
5.	KIT404	Theory of Automata and Formal Language	3	1	0	30	20	50	100	150
6.	KAS402	*Human Values and Professional Ethics	2	0	0	-	-	25	50	75
PRACTICAL/TRAINING/PROJECT										
7.	KIT 451	Communication Lab	0	0	2	10	10	20	30	50
8.	KIT 452	Computer Organization Lab	0	0	2	10	10	20	30	50
9.	KIT 453	Microprocessor Lab	0	0	2	10	10	20	30	50
10	KIT 454	Dot Net Lab	0	1	2	10	10	20	30	50
11	GP-401	General Proficiency	-	-	-	-	-	50	-	50
Total										**1000**

*Compulsory Audit-course. Candidate has to secure minimum 40% pass marks

Kamla Nehru Institute of Technology Sultanpur

STUDY & EVALUATION SCHEME

B. Tech Information Technology

(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		
THEORY										
1.	KAS501	Engineering & Managerial Economics	3	1	0	30	20	50	100	150
2.	KIT501	E- commerce	3	1	0	30	20	50	100	150
3.	KIT502	Operating system	3	1	0	30	20	50	100	150
4.	KIT503	Design and Analysis of Algorithm	3	1	0	30	20	50	100	150
5.	KIT504	Software Engineering	3	1	0	30	20	50	100	150
PRACTICAL/TRAINING/PROJECT										
6.	KIT551	Prog Lab	0	1	2	10	10	20	30	50
7.	KIT552	Operating System Lab	0	0	2	10	10	20	30	50
8.	KIT553	Algorithm Lab	0	0	2	10	10	20	30	50
9	KIT554	Software Engg Lab	0	0	2	10	10	20	30	50
10	GP-501	General Proficiency	-	-	-	-	-	50	-	50
Total										**1000**

Kamla Nehru Institute of Technology Sultanpur

STUDY & EVALUATION SCHEME

B. Tech Information Technology

(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		
THEORY										
1.	KAS601	Industrial Management	3	1	0	30	20	50	100	150
2.	KIT601	Information security & Cyber law	3	1	0	30	20	50	100	150
3.	KIT602	Computer Network	3	1	0	30	20	50	100	150
4.	KIT603	Web Technology	3	1	0	30	20	50	100	150
5.	KIT604	Computer graphics & multimedia	3	1	0	30	20	50	100	150
PRACTICAL/TRAINING/PROJECT										
6.	KIT651	Info security Lab	0	0	2	10	10	20	30	50
7.	KIT652	Computer Network Lab	0	0	2	10	10	20	30	50
8.	KIT653	Mini Project Lab	0	0	2	10	10	20	30	50
9	KIT654	Computer Graphics Lab	0	0	2	10	10	20	30	50
10	GP-601	General Proficiency	-	-	-	-	-	50	-	50
Total										**1000**

Kamla Nehru Institute of Technology Sultanpur

STUDY & EVALUATION SCHEME

B. Tech Information Technology

(Effective from the session 2016-17)

SEMESTER – VII

S.N.	Course Code	SUBJECT	PERIODS			Evaluation Scheme				Subject Total
						SESSIONAL EXAM.			ESE	
			L	T	P	CT	TA	Total		
THEORY										
1.	KIT701	Data Mining & Data Warehousing	3	1	0	30	20	50	100	150
2	KIT702	Digital Image Processing	3	1	0	30	20	50	100	150
3.	KIT703	Cryptography & Network security	3	1	0	30	20	50	100	150
4.		Department Elective -1	3	1	0	30	20	50	100	150
5.		Department Elective -2	3	1	0	30	20	50	100	150
PRACTICAL/TRAINING/PROJECT										
6.	KIT751	Seminar	0	0	4			50		50
7.	KIT752	Industrial Training**						50		50
8.	KIT753	Project#			4			100		100
9	GP-701	General Proficiency	-	-	-	-	-	50	-	50
Total										**1000**

** 4 weeks training after VI semester to be evaluated in VII semester

Project should be initiated in VII semester beginning and should be completed by the end of VIII semester

Kamla Nehru Institute of Technology Sultanpur

STUDY & EVALUATION SCHEME

B. Tech Information Technology

(Effective from the session 2016-17)

SEMESTER – VIII

S.N.	Course Code	SUBJECT	PERIODS			Evaluation Scheme				Subject Total
						SESSIONAL EXAM.			ESE	
			L	T	P	CT	TA	Total		
THEORY										
1.	KIT801	Mobile computing	3	1	0	30	20	50	100	150
2	KIT802	Artificial Intelligence	3	1	0	30	20	50	100	150
3.		Department Elective-3	3	1	0	30	20	50	100	150
4.		Department Elective-4	3	1	0	30	20	50	100	150
PRACTICAL/TRAINING/PROJECT										
5.	KIT851	Project	0	0	12		100	100	250	350
6	GP-801	General Proficiency	-	-	-	-	-	50	-	50
Total										**1000**

INFORMATION TECHNOLOGY

DEPARTMENT ELECTIVE -1

1. KIT-011 Digital Image Processing
2. KIT-012 Data compression
3. KIT-013 Pattern recognition
4. KIT-014 Bio informatics

DEPARTMENT ELECTIVE -2

1. KIT-021 Soft computing
2. KIT-022 Software project management
3. KIT-023 Parallel algorithm
4. KIT-024 Distributed database

DEPARTMENT ELECTIVE -3

1. KIT-031 Real time system
2. KIT-032 Embedded system
3. KIT-033 Natural language processing
4. KIT-034 Computer vision

DEPARTMENT ELECTIVE -4

1. KIT-041 Operation research
2. KIT-042 Software Quality Engineering
3. KIT-043 Computational complexity
4. KIT-044 Simulation & modeling

SYLLABUS

(Information Technology)

KIT-301 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 and data base language and interfaces, Data definitions language, DML, Overall Database Structure.

Data Modeling 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.

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, tuple and domain 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, 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”, Addision Wesley
2 Korth, Silbertz, Sudarshan, “Database Concepts”, McGraw Hill
3 Elmasri, Navathe, “Fundamentals Of Database Systems”, Addision 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.

KIT-302 : DISCRETE MATHEMATICS

L	T	P
3	1	0

Unit-I

Set Theory: Introduction, Combination of sets, Multisets, Ordered pairs. Proofs of some general identities on sets.

Relations: Definition, Operations on relations, Properties of relations, Composite Relations, Equality of relations, Recursive definition of relation, Order of relations.

Functions: Definition, Classification of functions, Operations on functions, Recursively defined functions. Growth of Functions.

Natural Numbers: Introduction, Mathematical Induction, Variants of Induction, Induction with Nonzero Base cases. Proof Methods, Proof by counter – example, Proof by contradiction.

Unit-II

Algebraic Structures: Definition, Groups, Subgroups and order, Cyclic Groups, Cosets, Lagrange's theorem, Normal Subgroups, Permutation and Symmetric groups, Group Homomorphisms, Definition and elementary properties of Rings and Fields.

Unit-III

Partial order sets: Definition, Partial order sets, Combination of partial order sets, Hasse diagram.

Lattices: Definition, Properties of lattices – Bounded, Complemented, Modular and Complete lattice.

Boolean Algebra: Introduction, Axioms and Theorems of Boolean algebra, Algebraic manipulation of Boolean expressions. Simplification of Boolean Functions, Karnaugh maps, Logic gates, Digital circuits and Boolean algebra.

Unit-IV

Propositional Logic: Proposition, well formed formula, Truth tables, Tautology, Satisfiability, Contradiction, Algebra of proposition, Theory of Inference. (8)

Predicate Logic: First order predicate, well formed formula of predicate, quantifiers, Inference theory of predicate logic.

Unit-V

Trees : Definition, Binary tree, Binary tree traversal, Binary search tree.

Graphs: Definition and terminology, Representation of graphs, Multigraphs, Bipartite graphs, Planar graphs, Isomorphism and Homeomorphism of graphs, Euler and Hamiltonian paths, Graph coloring,

Recurrence Relation & Generating function: Recursive definition of functions, Recursive algorithms, Method of solving recurrences.

Combinatorics: Introduction, Counting Techniques, Pigeonhole Principle.

References:

1. Koshy, Discrete Structures, Elsevier Pub. 2008

2. Kenneth H. Rosen, Discrete Mathematics and Its Applications, 6/e, McGraw-Hill, 2006.

3. B. Kolman, R.C. Busby, and S.C. Ross, Discrete Mathematical Structures, 5/e, Prentice Hall, 2004.

4. E.R. Scheinerman, Mathematics: A Discrete Introduction, Brooks/Cole, 2000.

5. R.P. Grimaldi, Discrete and Combinatorial Mathematics, 5/e, Addison Wesley, 2004.

KIT-303: Digital Logic Design

L	T	P
3	1	0

Unit-I

Digital computer system & generations, digital system and binary numbers: Signed binary numbers, binary codes, cyclic codes, error detecting and correcting codes, hamming codes, Fix and floating point representation, IEE standard for floating point representation.

Gate-level minimization: K- map method up to five variable, don't care conditions, POS simplification, NAND and NOR implementation, Quine Mc-Clusky method (tabular method).

Unit-II

Combinational logic: Combinational circuits, analysis procedure, design procedure binary adder-subtractor, decimal adder, 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, Cache memory,PLA, PAL. Design at the register transfer level: ASMs, design example, design with multiplexers.

Unit-V

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

Reference Books:

M. Morris Mano and M. D. ciletti, "Digital Design", 4th Edition, Pearson Education

KIT-304 : Data Structures

L	T	P
3	1	2

Unit –I

Introduction: Basic Terminology, Elementary Data Organization, Built in Data Types in C .Algorithm, Efficiency of an Algorithm, Time and Space Complexity, Asymptotic notations: Big-Oh, Time-Space trade-off. Abstract Data Types (ADT)
Arrays: Definition, Single and Multidimensional Arrays, Representation of Arrays: Row Major Order, and Column Major Order, Derivation of Index Formulae for 1D,2D,3D & nD Array Application of arrays, Sparse Matrices and their representations.
Linked lists: Array Implementation and Pointer Implementation of Singly Linked Lists, Doubly Linked List, Circularly Linked List, Operations on a Linked List. Insertion, Deletion, Traversal, Polynomial Representation and Addition Subtraction & Multiplications of Single variable & Two variable Polynomial.

Unit – II

Stacks: Abstract Data Type, Primitive Stack operations: Push & Pop, Array and Linked Implementation of Stack in C, Application of stack: Prefix and Postfix Expressions, Evaluation of postfix expression, Iteration and Recursion- Principles of recursion, Tail recursion, Removal of recursion Problem solving using iteration and recursion with examples such as binary search, Fibonacci numbers, and Hanoi towers. Tradeoffs between iteration and recursion.

Queues : Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, Array and linked implementation of queues in C, Dequeue and Priority Queue.

Unit – III

Trees: Basic terminology used with Tree, Binary Trees, Binary Tree Representation: Array Representation and Pointer(Linked List) Representation, Binary Search Tree, Strictly Binary Tree ,Complete Binary Tree . A Extended Binary Trees, Tree Traversal algorithms: Inorder, Preorder and Postorder, Constructing Binary Tree from given Tree Traversal, Operation of Insertation , Deletion, Searching & Modification of data in Binary Search . Threaded Binary trees, Traversing Threaded Binary trees. Huffman coding using Binary Tree. Concept & Basic Operations for AVL Tree , B Tree & Binary Heaps

Unit – IV

Searching : Concept of Searching ,Sequential search ,Index Sequential Search, Binary Search. Concept of Hashing & Collision resolution Techniques used in Hashing.
Sorting: Insertion Sort, Selection, Bubble Sort, Quick Sort, Merge Sort, Heap Sort, Radix Sort.

Unit – V

Graphs: Terminology used with Graph, Data Structure for Graph Representations: Adjacency Matrices, Adjacency List, Adjacency . Graph Traversal : Depth First Search and Breadth First

Search, Connected Component, Spanning Trees, Minimum Cost Spanning Trees: Prims and Kruskal algorithm. Transistive Closure and Shortest Path algorithm: Warshal Algorithm and Dijikstra Algorithm.

Reference Books:

- Aaron M. Tenenbaum, Yedidyah Langsam and Moshe J. Augenstein "Data Structures Using C and C++" , PHI
- 2. Horowitz and Sahani, "Fundamentals of Data Structures", Galgotia Publication
- 3. R. Kruse etal, "Data Structures and Program Design in C", Pearson Education
- Lipschutz, "Data Structures" Schaum's Outline Series, TMH
- Jean Paul Trembley and Paul G. Sorenson, "An Introduction to Data Structures with applications", McGraw Hill

KIT-305 : Object Oriented Systems

L	T	P
3	1	0

Unit – I

Object Modeling: Objects and classes, identifying object relationships, attributes and methods, links and association, generalization and inheritance, aggregation, abstract class, multiple inheritance, meta data, candidate keys, constraints.

Unit – II

Dynamic Modeling: Events and states, operations, Uses case Diagrams, Activity Diagrams, State Machine, Process and thread, Event and signals, Time diagram, interaction diagram, Package diagram, nested state diagrams and concurrency, advanced dynamic modeling concepts, a sample dynamic model**.**

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

Object-Oriented Programming Languages, Dominant features of Java Programming Language: Introduction, Inheritance, Packages, Interface, abstract method and classes, Polymorphism, Inner classes, String Handling, Networking, Event Handling. Multi threading collection, Java Library: String Handling, Input/Output exploring Java.io, Networking, Applets classes, Event Handling, Introduction to AWT, Working with windows, 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, The Database Connectivity Model, JDBC/ODBC.

Text Books:

1. James Rumbaugh etal, "Object Oriented Modeling and Design", PHI
2. Herbert Schieldt, "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
3. E. Balagurusamy, "Object Oriented Programming with C++", TMH

KIT-401: Communication System

L	T	P
3	1	0

UNIT-I: Basic Communication Concept

Introduction to Communication: Communication and Communication System; Communication Channel; Primary Communication resources; Analog versus Digital Communication.

Data Communication: Introduction; Data Communication Network Architecture; Protocol & Standards, OSI model; Data Communication Circuits.

UNIT-II: Signals, Noise, Modulation & Demodulation

Signals: Introduction; Representation & Properties of signals (amplitude, frequency, phase etc.); Analysis of Signals; Sampling; Nyquist Criteria.

Noise: Definition; Overview of type of Noises; SNR.

Modulation/Demodulation: Introduction; Concept and types of modulation; need of modulation; analog modulation and its type; digital modulation and its type.

UNIT-III: Data Transmission System

Transmission Media: Optical Fiber; Twisted Pair; Co-axial; Wireless media;

Transmission Impairments: Attenuation; Limited BW of the Channel; Delay; Distortion; Noise; Data rate of Channels; effect of limited bandwidth on digital signal.

Physical Layer Interfaces: RS 232; X.21.

UNIT-IV: Standards in Data Communications

Communication modes: simplex; half duplex; full duplex.

Transmission modes: serial-; parallel-transmission.

Synchronizations: Asynchronous-; synchronous-transmission.

Type of services: connection oriented-; connectionless-services.

Flow control: unrestricted simplex protocol; simplex stop- and -wait protocol; sliding window protocol. **Switching systems:** circuit switching; Picketing switching: data gram; virtual circuits; permanent virtual circuits.

Telephone Systems: PSTN; ISDN.

Multiplexing: frequency division-; time-; wave- division multiplexing, CDM.

UNIT-V: Security in data communications

Transmission errors: feedback-; forward-error control approaches.

Error detection: Parity check; block sum check; frame check sequences.

Error correction: Hamming codes; cyclic redundancy check.

Data encryption: secret key cryptography; public key cryptography.

Data compression: Run length encoding; Huffman encoding, Shannon Fano.

Reference Books:

• Data Communication and Networking, Wayne Tomasi, Pearson

• Modern Digital & Analog Communications Systems, 3rd Edition, B. P. Lathi, Oxford University Press.

• Data & Computer Communications, W.Stallings PHI

• Communication Systems, 4th Edition, by Simon Haykin, Wiley India.

• Data Communications and Networking, Behrouz A. Forouzan, 2003, 2nd Edition, T.M.H

KIT-402 : COMPUTER ORGANIZATION

L	T	P
3	1	0

Unit-I Introduction:

Functional units of digital system and their interconnections, buses, bus architecture, types of buses and bus arbitration. Register, bus and memory transfer.

Processor organization, general register organization, stack organization and addressing modes.

Unit-II Arithmetic and logic unit:

Look ahead carry adders. Multiplication: Signed operand multiplication, Booths algorithm and array multiplier. Division and logic operations. Floating point arithmetic operation,Arithmetic & logic unit design.

Unit-III Control Unit:

Instruction types, formats, instruction cycles and subcycles (fetch and execute etc) , micro-operations, execution of a complete instruction.

Hardwire and microprogrammed control: microprogramme sequencing, concept of horizontal and vertical microprogramming.

Unit-IV Memory:

Basic concept and hierarchy, semiconductor RAM memories, 2D & 2 1/2D memory organization. ROM memories.

Cache memories: concept and design issues & performance, address mapping and replacement

Auxiliary memories: magnetic disk, magnetic tape and optical disks

Virtual memory: concept implementation.

Unit-V Input / Output:

Peripheral devices, I/O interface, I/O ports, Interrupts: interrupt hardware, types of interrupts and exceptions.

Modes of Data Transfer: Programmed I/O, interrupt initiated I/O and Direct Memory Access., I/O channels and processors.

Serial Communication: Synchronous & asynchronous communication, standard communication interfaces.

Books

1. Patterson, Computer Organisation and Design, Elsevier Pub. 2009
2. William Stalling, " Computer Organization", PHI
3. Vravice,Hamacher & Zaky, "Computer Organization", TMH
4. Mano," Computer System Architecture", PHI
5. John P Hays, " Computer Organization", McGraw Hill
6. Tannenbaum," Structured Computer Organization', PHI
7. P Pal chaudhry, ' Computer Organization & Design', PHI

KIT-403: INTRODUCTION TO MICROPROCESSOR

L	T	P
3	1	0

Unit-I

Microprocessor evolution and types, microprocessor architecture and operation of its components, addressing modes, interrupts, data transfer schemes, instruction and data flow, timer and timing diagram, Interfacing devices.

Unit-II

Pin diagram and internal architecture of 8085 microprocessor, registers, ALU, Control & status, interrupt and machine cycle. Instruction sets. Addressing modes. Instruction formats Instruction Classification: data transfer, arithmetic operations, logical operations, branching operations, machine control and assembler directives.

Unit-III

Architecture of 8086 microprocessor: register organization, bus interface unit, execution unit, memory addressing, and memory segmentation. Operating modes. Instruction sets, instruction format, Types of instructions. Interrupts: hardware and software interrupts.

Unit-IV

Assembly language programming based on intel 8085/8086. Instructions, data transfer, arithmetic, logic, branch operations, looping, counting, indexing, programming techniques, counters and time delays, stacks and subroutines, conditional call and return instructions

Unit-V

Peripheral Devices: 8237 DMA Controller, 8255 programmable peripheral interface, 8253/8254programmable timer/counter, 8259 programmable interrupt controller, 8251 USART and RS232C.

Books

1. Gaonkar, Ramesh S , "Microprocessor Architecture, Programming and Applications with 8085", Penram International Publishing.
2. Ray A K , Bhurchandi K M , "Advanced Microprocessors and Peripherals", TMH
3. Hall D V ,"Microprocessor Interfacing', TMH
4. Liu and, " Introduction to Microprocessor", TMH
6. Brey, Barry B, "INTEL Microprocessors", PHI
7. Renu Sigh & B.P. Gibson G A , " Microcomputer System: The 8086/8088 family'' ,PHI
5. Aditya P Mathur Sigh, "Microprocessor, Interfacing and Applications
8. M Rafiqzzaman, "Microprocessors, Theory and Applications

KIT-404: Theory of Automata and Formal Languages

L	T	P
3	1	0

UNIT-1

Basic Concepts and Automata Theory: Introduction to Theory of Computation- Automata, Computability and Complexity, Alphabet, Symbol, String, Formal Languages, Deterministic Finite Automaton (DFA)- Definition, Representation, Acceptability of a String and Language, Non-Deterministic Finite Automaton (NFA), Equivalence of DFA and NFA, NFA with ε-Transition, Equivalence of NFA's with and without ε-Transition, Finite Automata with output- Moore Machine, Mealy Machine, Equivalence of Moore and Mealy Machine, Minimization of Finite Automata, Myhill-Nerode Theorem, Simulation of DFA and NFA.

UNIT-2

Regular Expressions and Languages: Regular Expressions, Transition Graph, Kleen's Theorem, Finite Automata and Regular Expression- Arden's theorem, Algebraic Method Using Arden's Theorem, Regular and Non-Regular Languages- Closure properties of Regular Languages, Pigeonhole Principle, Pumping Lemma, Application of Pumping Lemma, Decidability- Decision properties, Finite Automata and Regular Languages, Regular Languages and Computers, Simulation of Transition Graph and Regular language.

UNIT-3

Regular and Non-Regular Grammars: Context Free Grammar(CFG)-Definition, Derivations, Languages, Derivation Trees and Ambiguity, Regular Grammars-Right Linear and Left Linear grammars, Conversion of FA into CFG and Regular grammar into FA, Simplification of CFG, Normal Forms- Chomsky Normal Form(CNF), Greibach Normal Form (GNF), Chomsky Hierarchy, Programming problems based on the properties of CFGs.

UNIT-4

Push Down Automata and Properties of Context Free Languages: Nondeterministic Pushdown Automata(NPDA)- Definition, Moves, A Language Accepted by NPDA, Deterministic Pushdown Automata(DPDA) and Deterministic Context free Languages(DCFL), Pushdown Automata for Context Free Languages, Context Free grammars for Pushdown Automata, Two stack Pushdown Automata, Pumping Lemma for CFL, Closure properties of CFL, Decision Problems of CFL, Programming problems based on the properties of CFLs.

UNIT-5

Turing Machines and Recursive Function Theory : Basic Turing Machine Model, Representation of Turing Machines, Language Acceptability of Turing Machines, Techniques for Turing Machine Construction, Modifications of Turing Machine, Turing Machine as Computer of Integer Functions, Universal Turing machine, Linear Bounded Automata, Church's Thesis, Recursive and Recursively Enumerable language, Halting Problem, Post's Correspondance Problem, Introduction to Recursive Function Theory.

Text 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.

KIT-501 : Electronic-Commerce

L	T	P
3	1	0

Unit I:-
Introduction: Definition of Electronic Commerce, E-Commerce: technology and prospects, needs of E-Commerce, advantages and disadvantages, E-Commerce framework, Impact of E-commerce on business, E-Commerce Models.

Unit II:-
Network Infrastructure for E- Commerce: Internet and Intranet based E-commerce- Issues, problems and prospects, Network Infrastructure, Broadband telecommunication (ATM, ISDN, and FRAME RELAY).
Mobile Commerce: Introduction, Wireless Application Protocol, WAP technology.

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, Secret key encryption; Asymmetric encryption: public and private pair key encryption, Digital Signatures, Virtual Private Network.

Unit V:-
Electronic Payments: Overview, The SET protocol, Payment Gateway, 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. Pete Lohsin , John Vacca "Electronic Commerce", New Age International
3. Goel, Ritendra "E-commerce", New Age International
4. Laudon, "E-Commerce: Business, Technology, Society", Pearson Education
5. Bajaj and Nag, "E-Commerce the cutting edge of Business", TMH
6. Turban, "Electronic Commerce 2004: A Managerial Perspective", Pearson Education

KIT 502: Operating System

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Unit – I

Introduction : Operating system and functions, Classification of Operating systems- Batch, Interactive, Time sharing, Real Time System, Multiprocessor Systems, Multiuser Systems, Multiprocess Systems, Multithreaded Systems, Operating System Structure- Layered structure, System Components, Operating System services, Reentrant Kernels, Monolithic and Microkernel Systems.

Unit – II

Concurrent Processes: Process Concept, Principle of Concurrency, Producer / Consumer Problem, Mutual Exclusion, Critical Section Problem, Dekker's solution, Peterson's solution, Semaphores, Test and Set operation; Classical Problem in Concurrency- Dining Philosopher Problem, Sleeping Barber Problem; Inter Process Communication models and Schemes, Process generation.

Unit – III

CPU Scheduling: Scheduling Concepts, Performance Criteria, Process States, Process Transition Diagram, Schedulers, Process Control Block (PCB), Process address space, Process identification information, Threads and their management, Scheduling Algorithms, Multiprocessor Scheduling. Deadlock: System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from deadlock.

Unit – IV

Memory Management: Basic bare machine, Resident monitor, Multiprogramming with fixed partitions, Multiprogramming with variable partitions, Protection schemes, Paging, Segmentation, Paged segmentation, Virtual memory concepts, Demand paging, Performance of demand paging, Page replacement algorithms, Thrashing, Cache memory organization, Locality of reference.

Unit – V

I/O Management and Disk Scheduling: I/O devices, and I/O subsystems, I/O buffering, Disk storage and disk scheduling, RAID. File System: File concept, File organization and access mechanism, File directories, and File sharing, File system implementation issues, File system protection and security.

References:

1. Silberschatz, Galvin and Gagne, "Operating Systems Concepts", Wiley
2. Sibsankar Halder and Alex A Aravind, "Operating Systems", Pearson Education
3. Harvey M Dietel, " An Introduction to Operating System", Pearson Education
4. D M Dhamdhere, "Operating Systems : A Concept based Approach", 2nd Edition,TMH
5. William Stallings, "Operating Systems: Internals and Design Principles ", 6th Edition, Pearson Education

KIT-503: Design and Analysis of Algorithms

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Unit-I

Introduction : Algorithms, Analyzing algorithms, Complexity of algorithms, Growth of functions, Performance measurements, 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 with examples such as Sorting, Matrix Multiplication, Convex hull and Searching.Greedy methods with examples such as 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 with examples such as Kanpsack, 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

Selected Topics: String Matching, Theory of NP-completeness, Approximation algorithms and Randomized algorithms.

References:

1. Thomas H. Coreman, Charles E. Leiserson and Ronald L. Rivest, "Introduction to Algorithms", Printice 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.

KIT-504: Software Engineering

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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 (SRS)

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: Halestead'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.

KIT-601 Information Security and Cyber Law

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UNIT-I:-

History of Information Systems and its Importance, basics, Changing Nature of Information Systems, Need of Distributed Information Systems, Role of Internet and Web Services, 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

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

UNIT-II:-

Security Threats to E Commerce, Virtual Organization, Business Transactions on Web, E-Governance and EDI, Concepts in Electronics payment systems, E Cash, Credit/Debit Cards. Physical Security- Needs, Disaster and Controls.

Access Control- Biometrics, Factors in Biometrics Systems, Benefits, Criteria for selection of Biometrics, Design Issues in Biometric Systems, Economic and Social Aspects, Legal challenges.

UNIT-III:-

Model of Cryptographic Systems, Issues in Documents Security, System of Keys, Public Key Cryptography, Digital Signature, Requirement of Digital Signature System, Finger Prints, Firewalls, Design and Implementation Issues, Policies.

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

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

UNIT-IV:-

Security metrics- Classification and their benefits, Information Security & Law, IPR, Patent law, copyright Law, Legal Issues in Data mining Security, Building Security into Software Life Cycle

Ethics- Ethical Issues, Issues in Data and Software Privacy, Cyber Crime Types & overview of cyber Crimes

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
7. IT Act 2000

KIT-602: Computer Network

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UNIT-I

Introduction Concepts: Goals and Applications of Networks, Network structure and architecture,The OSI reference model, services, Network Topology Design - Delay Analysis, Back Bone Design, Local Access Network Design, Physical Layer Transmission Media, Switching methods, ISDN, Terminal Handling.

Unit-II

Medium Access sub layer: Medium Access sub layer - Channel Allocations, LAN protocols ALOHA protocols - Overview of IEEE standards - FDDI. Data Link Layer - Elementary DataLink Protocols, Sliding Window protocols, Error Handling.

Unit - III

Network Layer: Network Layer Point - to Pont Networks, routing, Congestion control Internetworking -TCP / IP, IP packet, IP address, IPv6.

Unit - IV

Transport Layer: Transport Layer - Design issues, connection management, session Layer-Design issues, remote procedure call. Presentation Layer-Design issues, Data compression techniques, cryptography - TCP - Window Management.

Unit-V

Application Layer: Application Layer: File Transfer, Access and Management, Electronic mail, Virtual Terminals, Other application. Example Networks-Internet and Public Networks.

References :

1. Forouzen, "Data Communication and Networking", TMH
2. A.S. Tanenbaum, Computer Networks, Pearson Education
3. W. Stallings, Data and Computer Communication, Macmillan Press
4. Anuranjan Misra, “Computer Networks”, Acme Learning
5. G. Shanmugarathinam, ”Essential of TCP/ IP”, Firewall Media

KIT-603 : Web Technology

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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

KIT 604: Computer Graphics & Multimedia

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Unit – I

Computer Graphics Application : Introduction to Computer Graphics, Application of Computer Graphics. Different type of output devices.
Computer Display: Flat-Panel Displays, Raster Scan Systems, Random Scan Systems, Hard Copy Output Devices

Unit – II
Different type of Graphics Input Devices: Keyboards, Mouse, Trackball and Spaceball, Joysticks, Data Glove, Digitizers, Image Scanners, Touch Panels, Light Pens, Voice Systems, Input of Graphical Data, Logical Classification of Input Devices, Input Functions, Initial Values for Input Device Parameters, Interactive Picture Construction Techniques
Determinants, Matrix (Definition), Type of operations of Matrices and their properties.
Vectors: Definition of a Vector, Vectors and Coordinate System, Algebra of Vectors Addition, Multiplication of a Vector by a Scalar, Components of a Vector, Direction and Magnitude of a Vector in Terms of its Components, Collinear and Coplanar Vectors, Some Applications to Geometry.

Unit – III
Raster Scan Graphics: Derivative of a Function, Digital Differential Analyzer, Bresenham's Algorithm, Integer Bresenham's Algorithm, General Bresenham's Algorithm, Circle Generation algo, Scan Conversion-Generation of the Display, Real-Time Scan Conversion, Run-Length Encoding, Cell Encoding, Frame Buffers, Addressing the Raster, Line Display, Character Display, Solid Area Scan Conversion, Polygon Filling, Scan-Converting Polygons, A Simple Ordered Edge List Algorithm, More Efficient Ordered Edge List Algorithms, The Edge Fill Algorithm, The Edge Flag Algorithm, Seed Fill Algorithms, A Simple Seed Fill Algorithm, A Scan Line Seed Fill Algorithm.
Introduction to aliasing & antialiasing.Windowing & clipping with their algorithms.

Unit – IV
2D- Transformation: Representation of Points, Transformations and Matrix, Transformation of Straight Line, 2-D - Rotation, Reflection, Scaling, Combined Transformations, Translation and Homogeneous Coordinates, Translation, Rotation about an Arbitrary Point, Reflection through an Arbitrary Line
3-D-Transformation: Representation of Points, 3D- Scaling, 3D- Shearing, 3D- Rotation, Three Dimensional Translation, 3D- Reflection, Multiple Transformations, Rotation about an Axis Parallel to a Coordinate Axis, Rotation about an Arbitrary Axis in Space, Three.

Unit – V
The Dimensional Perspective Geometry: Geometric Projection, Orthographic Projections, Oblique Projections, Perspective Transformations, Single-Point Perspective Transformation, Two-Point Perspective Transformation, Three-Point Perspective Transformation.

Hidden-Surface, Lines and Bezier Curve: Hidden Surfaces and Lines, Back-Face Detection, Back-Face Removal, Z-Buffers Algorithm, The Painter's Algorithm, Binary Space Partition, Franklin Algorithm, Properties of Bezier Curve.
Multimedia and Animation: Multimedia, Multimedia Terms, Multimedia Hardware, Hardware Peripherals, Basic tools in Multimedia, Multimedia Building Blocks (Media Forms/Elements), Sound, Image, Animation, Video, JPEG, MPEG, DVI Indeo, P*64, Graphic File Formats, Multimedia Applications

Reference Books:

1. Donald Hearn and M. Pauline Baker, "Computer Graphics in C Version", Second Edition, Pearson Education
2. Tom McReynolds – David Blythe " Advanced Graphics Programming Using OpenGL" , Elsevier, 2010
3. Parag Havaldar and Gerard Medioni, "Multimedia Systems-Algorithms, Standards and Industry Practices", Course Technology, Cengage Learning, 2010.
4. John F. Koegel Bufend , "Multimedia systems", Pearson Education, Delhi, 2002
5. Ralf Steinmetz and Klara "Multimedia Computing, Communications and Applications", Pearson Education,2004.
6. Kurose and Ross, 'Computer Networks : A top down Approach', Pearson Education, 2002
7. Mohammad Dastbaz, Desgning Interactive Multimedia Systems
8. Multimedia – Technology and applications David Hillman Galgotia Publications, Delhi
9. Ralf Steinmetz and Klara Nahrstedt "Multimedia Applications", Springer, 2007.

KIT 701 : DATA MINING AND DATA WAREHOUSING

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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 Maining.

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, Wherehouse 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 comparisions, Statistical measures in large Databases, Statistical-Based Algorithms, Distance-Based Algorithms, Decision Tree-Based Algorithms.

Clustering: Introdiction, 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” Pearson Education
4. Arun K. Pujari, “Data Mining Techniques” Universities Press
5. Pieter Adriaans, Dolf Zantinge, “Data-Mining”, Pearson Education
6. Bhavani Thura-is-ingham, “Data-Mining Technologies, Techniques Tools & Trends”, CRC Press

7. Navathe, “Fundamental of Database System”, Pearson Education
8. Jiawei Han, Micheline Kamber, ”Data Mining Concepts & Techniques” Elsevier
9. Sam Anahory, Dennis Murray, “Data Warehousing in the Real World : A Practical Guide for Building Decision Support Systems, 1/e “ Pearson Education
   Mallach,”Data Warehousing System”,McGraw –Hill

KIT 702 : Digital Image Processing

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UNIT-I

Introduction and Fundamentals

Motivation and Perspective, Applications, Components of Image Processing System, Element of Visual Perception, A Simple Image Model, Sampling and Quantization.

Image Enhancement in Frequency Domain

Fourier Transform and the Frequency Domain, Basis of Filtering in Frequency Domain, Filters – Low-pass, High-pass; Correspondence Between Filtering in Spatial and Frequency Domain; Smoothing Frequency Domain Filters – Gaussian Lowpass Filters; Sharpening Frequency Domain Filters – Gaussian Highpass Filters; Homomorphic Filtering.

UNIT-II

Image Enhancement in Spatial Domain

Introduction; Basic Gray Level Functions – Piecewise-Linear Transformation Functions: Contrast Stretching; Histogram Specification; Histogram Equalization; Local Enhancement; Enhancement using Arithmetic/Logic Operations – Image Subtraction, Image Averaging; Basics of Spatial Filtering; Smoothing - Mean filter, Ordered Statistic Filter; Sharpening – The Laplacian.

UNIT-III

Image Restoration

A Model of Restoration Process, Noise Models, Restoration in the presence of Noise only-Spatial Filtering – Mean Filters: Arithmetic Mean filter, Geometric Mean Filter, Order Statistic Filters – Median Filter, Max and Min filters; Periodic Noise Reduction by Frequency Domain Filtering – Bandpass Filters; Minimum Mean-square Error Restoration.

UNIT-IV

Morphological Image Processing

Introduction, Logic Operations involving Binary Images, Dilation and Erosion, Opening and Closing, Morphological Algorithms – Boundary Extraction, Region Filling, Extraction of Connected Components, Convex Hull, Thinning, Thickening

UNIT-V Registration

Introduction, Geometric Transformation – Plane to Plane transformation, Mapping, Stereo Imaging – Algorithms to Establish Correspondence, Algorithms to Recover Depth

Segmentation

Introduction, Region Extraction, Pixel-Based Approach, Multi-level Thresholding, Local Thresholding, Region-based Approach, Edge and Line Detection: Edge Detection, Edge Operators, Pattern Fitting Approach, Edge Linking and Edge Following, Edge Elements Extraction by Thresholding, Edge Detector Performance, Line Detection, Corner Detection.

References:

1. Digital Image Processing 2nd Edition, Rafael C. Gonzalvez and Richard E. Woods. Pearson Education.
2. Digital Image Processing and Computer Vision, R.J. Schalkoff. Published by: John Wiley and Sons, NY.
3. Fundamentals of Digital Image Processing, A.K. Jain. Published by Prentice Hall, Upper Saddle River, NJ.

KIT 703 CRYPTOGRAPHY & NETWORK SECURITY

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Unit-I

Introduction to security attacks, services and mechanism, introduction to cryptography. Conventional Encryption: Conventional encryption model, classical encryption techniques- substitution ciphers and transposition ciphers, cryptanalysis, stereography, stream and block ciphers. Modern Block Ciphers: Block ciphers principals, Fiestal structure, data encryption standard (DES), strength of DES, differential and linear crypt analysis of DES, block cipher modes of operations, triple DES, confidentiality using conventional encryption, traffic confidentiality, key distribution, random number generation.

Unit-II

Introduction to group, ring and field, prime and relative prime numbers, modular arithmetic, Fermat's and Euler's theorem, primality testing, Euclid's Algorithm, Chinese Remainder theorem, discrete logarithms. Principals of public key crypto systems, RSA algorithm, security of RSA, Key Management, Diffle-Hellman key exchange algorithm, introductory idea of Elliptic curve cryptography.

Unit-III

Message Authentication and Hash Function: Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions and MACS, MD5 message digest algorithm, Secure hash algorithm(SHA). Digital Signatures: Digital Signatures, authentication protocols, digital signature standards (DSS), proof of digital signature algorithm.

Unit-IV

Authentication Applications: Kerberos and X.509, directory authentication service, electronic mail security-pretty good privacy (PGP), S/MIME.

Unit-V

IP Security: Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management.
Web Security: Secure socket layer and transport layer security, secure electronic transaction (SET).
System Security: Intruders, Viruses and related threads, firewall design principals, trusted systems.

Books:

1. William Stallings, "Cryptography and Network Security: Principals and Practice", Prentice Hall.
2. Johannes A. Buchmann, "Introduction to Cryptography", Springer-Verlag.
3. Bruce Schiener, "Applied Cryptography". John Wiley & Sons.
4. Behrouz A. Frouzan: Cryptography and Network Security, TMH.

KIT 801 : Mobile Computing

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Unit – I

Introduction, issues in mobile computing, overview of wireless telephony: cellular concept, GSM: air-interface, channel structure, location management: HLR-VLR, hierarchical, handoffs, channel allocation in cellular systems, CDMA, GPRS.

Unit - II

Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP: Architecture, protocol stack, application environment, applications.

Unit – III

Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, File system, Disconnected operations.

Unit - IV

Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment.

Unit – V

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.

References:

1. J. Schiller, Mobile Communications, Addison Wesley.
2. Charles Perkins, Mobile IP, Addison Wesley.
3. Charles Perkins, Ad hoc Networks, Addison Wesley**.**
4. Upadhyaya, "Mobile Computing", Springer

KIT-802: Artificial Intelligence

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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 grammers,,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,

ELECTIVE-I
KIT-011 : DISTRIBUTED SYSTEMS

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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
5. Gerald Tel, "Distributed Algorithms", Cambridge University Press.

ELECTIVE -I
KIT-012 : DATA COMPRESSION

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Unit - I: Introduction
Compression Techniques: Loss less compression, Lossy Compression, Measures of performance, Modeling and coding, Mathematical *Preliminaries* for Lossless compression: A brief introduction to information theory, Models: Physical models, Probability models, Markov models, composite source model, Coding: uniquely decodable codes, Prefix codes.

Unit – II: Huffman coding
The Huffman coding algorithm: Minimum variance Huffman codes, Adaptive Huffman coding: Update procedure, Encoding procedure, Decoding procedure. Golomb codes, Rice codes, Tunstall codes, Applications of Hoffman coding: Lossless image compression, Text compression, Audio Compression.

Unit-III: Arithmetic Coding
Coding a sequence, Generating a binary code, Comparison of Binary and Huffman coding, Applications: Bi-level image compression-The JBIG standard, JBIG2, Image compression. Dictionary Techniques: Introduction, Static Dictionary: Diagram Coding, Adaptive Dictionary. The LZ77 Approach, The LZ78 Approach, Applications: File Compression-UNIX compress, Image Compression: The Graphics Interchange Format (GIF), Compression over Modems: V.42 bits, Predictive Coding: Prediction with Partial match (ppm): The basic algorithm, The ESCAPE SYMBOL, length of context, The Exclusion Principle, The Burrows-Wheeler Transform: Move-to-front coding, CALIC, JPEG-LS, Multi-resolution Approaches, Facsimile Encoding, Dynamic Markoy Compression.

Unit – IV: Mathematical Preliminaries for Lossy Coding
Distortion criteria, Models, Scalar Ouantization: The Quantization problem, Uniform Quantizer, Adaptive Quantization, Non uniform Quantization.

Unit-V: Vector Quantization
Advantages of Vector Quantization *over* Scalar Quantization, The Linde-Buzo- Gray Algorithm, Tree structured Vector Quantizers. Structured *Vector* Quantizers.

Books:
1. Khalid Sayood, Introduction to Data Compression, Morgan Kaufmann Publishers

ELECTIVE –I

KIT-013 : 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", 2nd Edition, John Wiley, 2006.
2. C. M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2009.
3. S. Theodoridis and K. Koutroumbas, "Pattern Recognition", 4th Edition, Academic Press, 2009.

ELECTIVE -I
KIT-014 : Bio Informatics

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Unit I:
Bioinformatics objectives and overviews, Interdisciplinary nature of Bioinformatics, Data integration, Data analysis, Major Bioinformatics databases and tools. Metadata: Summary & reference systems, finding new type of data online.

Molecular Biology and Bioinformatics: Systems approach in biology, Central dogma of molecular biology, problems in molecular approach and the bioinformatics approach, oerview of the bioinformatics applications.

Unit II:
Basic chemistry of nucleic acids, Structure of DNA, Structure of RNA, DNA Replication, -Transcription, -Translation, Genes- the functional elements in DNA, Analyzing DNA,DNA sequencing. Proteins: Amino acids, Protein structure, Secondary, Tertiary and Quaternary structure, Protein folding and function, Nucleic acid-Protein interaction.

Unit III:

Perl Basics, Perl applications for bioinformatics- Bioperl, Linux Operating System, mounting/unmounting files, tar, gzip / gunzip, telnet, ftp, developing applications on Linux OS, Understanding and Using Biological Databases, Overview of Java, CORBA, XML, Web deployment concepts.

Unit IV:
Genome, Genomic sequencing, expressed sequence tags, gene expression, transcription factor binding sites and single nucleotide polymorphism. Computational representations of molecular biological data storage techniques: databases (flat, relational and object oriented), and controlled vocabularies, general data retrieval techniques: indices, Boolean search, fuzzy search and neighboring, application to biological data warehouses.

Unit V:
Macromolecular structures, chemical compounds, generic variability and its connection to clinical data. Representation of patterns and relationships: sequence alignment algorithms, regular expressions, hierarchies and graphical models, Phylogenetics. BLAST.

References

1. D E Krane & M L Raymer, ” Fundamental concepts of Bioinformatics”, Perason Education.
2. Rastogi, Mendiratta, Rastogi, “Bioinformatics Methods & applications, Genomics, Proteomics & Drug Discovery” PHI, New Delhi
3. Shubha Gopal et.al. “ Bioinformatics: with fundamentals of genomics and proteomics”, Mc Graw Hill.
4. O’Reilly, “ Developing Bio informatics computer skills”, CBS
5. Forsdyke, “Evolutionary Bioinformatics”, Springer

ELECTIVE-II
KIT-021 : Soft Computing

L	T	P
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Unit-I:
ARTIFICIAL NEURAL NETWORKS
Basic concepts - Single layer perception - Multilayer Perception - Supervised and Unsupervised learning – Back propagation networks - Kohnen's self organizing networks - Hopfield network.

Unit-II:
FUZZY SYSTEMS
Fuzzy sets, Fuzzy Relations and Fuzzy reasoning, Fuzzy functions - Decomposition - Fuzzy automata and languages - Fuzzy control methods - Fuzzy decision making.

Unit-III:
NEURO - FUZZY MODELING
Adaptive networks based Fuzzy interface systems - Classification and Regression Trees - Data clustering algorithms - Rule based structure identification - Neuro-Fuzzy controls - Simulated annealing – Evolutionary computation.

Unit-IV:
GENETIC ALGORITHMS
Survival of the Fittest - Fitness Computations - Cross over - Mutation - Reproduction - Rank method - Rank space method.

Unit-V:
APPLICATION OF SOFT COMPUTING
Optimiation of traveling salesman problem using Genetic Algorithm, Genetic algorithm based Internet Search Techniques, Soft computing based hybrid fuzzy controller, Intoduction to MATLAB Environment for Soft computing Techniques.

References:

1. Sivanandam, Deepa, " Principles of Soft Computing", Wiley
2. Jang J.S.R, Sun C.T. and Mizutani E, "Neuro-Fuzzy and Soft computing", Prentice Hall
3. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", McGraw Hill
4. Laurene Fausett, "Fundamentals of Neural Networks", Prentice Hall
5. D.E. Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley
6. Wang, "Fuzzy Logic", Springer

ELECTIVE-II

KIT-022: Software Project Management

L	T	P
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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: Risk identification, Risk analysis, Risk planning, Risk monitoring, Cost Benefit Management: Risks and risk types, Risk Breakdown Structure (RBS), Risk Management Process 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 Publication.

ELECTIVE –II

KIT-023 : PARALLEL ALGORITHMS

L	T	P
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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

ELECTIVE –II
KIT-024 : Distributed Database

L	T	P
3	1	0

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 serializablity 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, orth 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

ELECTIVE-III

KIT-031 : Real Time System

L	T	P
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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 Consistencey, 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.

ELECTIVE III
KIT-032 : Embedded Systems

L	T	P
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Unit-I
Introduction to embedded systems: Classification, Characteristics and requirements, Applications

Unit-II
Timing and clocks in Embedded systems, Task Modeling and management, Real time operating system issues.

Unit-III
Signals, frequency spectrum and sampling, digitization (ADC, DAC), Signal Conditioning and Processing.Modeling and Characterization of Embedded Computation System.

Unit-IV
Embedded Control and Control Hierarchy, Communication strategies for embedded systems: Encoding and Flow control.

Unit-V
Fault-Tolerance, Formal Verification., Trends in Embedded Processor, OS, Development Language

References:

1. H.Kopetz, "Real-Time Systems", Kluwer
2. R.Gupta, "Co-synthesis of Hardware and Software for Embedded Systems", Kluwer
3. Shibu K.V., "Introduction to Embedded Systems", TMH
4. Marwedel, "Embedded System Design", Springer

ELECTIVE III

KIT-033 : Natural Language Processing

L	T	P
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Unit-I

Introduction to Natural Language Understanding: The study of Language, Applications of NLP, Evaluating Language Understanding Systems, Different levels of Language Analysis, Representations and Understanding, Organization of Natural language Understanding Systems, Linguistic Background: An outline of English syntax.

Unit-II

Introduction to semantics and knowledge representation, Some applications like machine translation, database interface.

Unit-III

Grammars and Parsing: Grammars and sentence Structure, Top-Down and Bottom-Up Parsers, Transition Network Grammars, Top- Down Chart Parsing. Feature Systems and Augmented Grammars: Basic Feature system for English, Morphological Analysis and the Lexicon, Parsing with Features, Augmented Transition Networks.

Unit-IV

Grammars for Natural Language: Auxiliary Verbs and Verb Phrases, Movement Phenomenon in Language, Handling questions in Context-Free Grammars. Human preferences in Parsing, Encoding uncertainty, Deterministic Parser.

Unit-V

Ambiguity Resolution: Statistical Methods, Probabilistic Language Processing, Estimating Probabilities, Part-of-Speech tagging, Obtaining Lexical Probabilities, Probabilistic Context-Free Grammars, Best First Parsing. Semantics and Logical Form, Word senses and Ambiguity, Encoding Ambiguity in Logical Form.

References:

1. Akshar Bharti, Vineet Chaitanya and Rajeev Sangal, NLP: A Paninian Perspective, Prentice Hall, New Delhi
2. James Allen, Natural Language Understanding, Pearson Education
3. D. Jurafsky, J. H. Martin, Speech and Language Processing, Pearson Education
4. L.M. Ivansca, S. C. Shapiro, Natural Language Processing and Language Representation
5. T. Winograd, Language as a Cognitive Process, Addison-Wesley

KIT-034 : Computer Vision

L	T	P
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Unit-I

Introduction, purpose, state of the art, applications ,history , the Marr paradigm and scene reconstruction, other paradigm for image analysis

Unit-II

Image Formation: Image Geometry, Radiometry,Digitization

Image Formation Models: Monocular imaging system, Orthographic & Perspective Projection, Camera model and Camera calibration, Binocular imaging systems

Unit-III

Image Processing and Feature Extraction: Image representations (continuous and discrete), Edge detection, corner detection,line and curve detection,SIFT operator,image based modelling and rendering,Mosaics,snakes

Unit-IV

Motion Estimation: Regularization theory, Optical computation, Stereo Vision, Motion estimation, Structure from motion, Motion detection and optical flow

Unit-V

Shape Representation and Segmentation: Deformable curves and surfaces, Snakes and active contours, Level set representations, Fourier and wavelet descriptors, Medial representations, Multiresolution analysis

Object recognition: Hough transforms and other simple object recognition methods, Shape correspondence and shape matching, Principal component analysis, Shape priors for recognition

Refrences:

1.Computer Vision - A modern approach, by D. Forsyth and J. Ponce, Prentice Hall

2.Introductory Techniques for 3D Computer Vision, by E. Trucco and A. Verri, Publisher: Prentice Hall.

3. Robot Vision, by B. K. P. Horn, McGraw-Hill.

Elective IV

KIT-041 : Operations Research

L	T	P
3	1	0

UNIT – 1

Linear Programming

Various definitions, statements of basic theorems and properties, Advantages, Limitations and Application areas of Linear Programming , Linear Programming problem, The Graphical Solution methods of Linear Programming problem, Big –M method, Phase II of the Simplex method problems, Sensitivity Analysis, Revised Simplex Method, Primal and Dual Simplex Method,

UNIT – 2

Linear Programming Problems: Integer Linear Programming Problems, Mixed Integer Linear Programming Problems, Cutting Plane Method, Branch and Bound Method, 0-1 integer linear programming problem.

Transportation Problems: Introduction to Transportation Model, Matrix Form of TP, Applications of TP Models, Basic Feasible Solution of a TP, Degeneracy in TP, Formation of Loops in TP, Solution Techniques of TP, Different Methods for Obtaining Initial Basic Feasible Solutions viz. Matrix Minima Method, Row Minima Method, Column Minima Methods, Vogel's Approximation Method, Techniques for Obtaining Optimal Basic Feasible Solution.

Assignment Problems: Definition, Hungarian Method for AP.

UNIT – 3

Introduction to NLP: Definition of NLP, Convex Programming Problems, Quadratic Programming Problems, Wolfe's Method for Quadratic Programming, Kuhn-Tucker Conditions, Geometrical Interpretation of KT-Conditions, KT-Points etc.

Dynamic Programming: Bellman's Principle of optimality of Dynamic Programming, Multistage decision problem and its solution by Dynamic Programming with finite number of stages, Solution of linear programming problems as a Dynamic Programming problem

UNIT – 4

Game Theory and Sequencing : Two Person Zero Sum Game, Pure and Mixed Strategies, Algebraic Solution Procedure, Graphical Solution, Solving by Linear Programming; Sequencing Problem, Processing of n Jobs Through Two Machines and m Machines, Graphical Method of Two Jobs m Machines Problem.

UNIT – 5

Inventory and Queuing Models: Classical EOQ Models, EOQ Model with Price Breaks, EOQ with Shortage, Probabilistic EOQ Model, Newsboy Problem. Elements of Queuing Model, Pure Birth Death Model, Single Server and

Multi-server Markovian Models with Infinite and Finite Capacity, Machine Repair Model, Networks of Queues.

References:

1. Mohan, C. and Deep, Kusum: "Optimization Techniques", New Age, 2009.

2. Mittal, K. V. and Mohan, C. "Optimization Methods in Operations Research and Systems Analysis", New Age, 2003.
3. Taha, H.A. : "Operations Research - An Introduction", Prentice Hall, (7th Edition), 2002.
4. Ravindran, A. , Phillips, D. T and Solberg, J. J. "Operations Research: Principles and Practice", John Willey and Sons, 2nd Edition, 2009.
5. Hiller, F. S. and Liebermann, G. J. "Introduction to Operations Research", Tata McGraw Hill, 2002.
6. Chandra, Suresh, Jayadeva and Mehra, Aparna, "Numerical Optimization with Applications", Narosa, 2009.

Elective IV

KIT-042 : Software Quality Engineering

L	T	P
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UNIT-I: Introduction

Defining Software Quality, Software Quality Attributes and Specification, Cost of Quality, Defects, Faults, Failures, Defect Rate and Reliability, Defect Prevention, Reduction, and Containment, Overview of Different Types of Software Review, Introduction to measurement and Inspection Process, Documents and Metrics.

UNIT-II: Software Quality Metrics

Product Quality Metrics: Defect Density, Customer Problems Metric, Customer Satisfaction Metrics, Function Points, In-Process Quality Metrics: Defect Arrival Pattern, Phase-Based Defect Removal Pattern, Defect Removal Effectiveness, Metrics for Software Maintenance: Backlog Management Index, Fix Response Time, Fix Quality, Software Quality Indicators.

UNIT-III: Software Quality Management and Models

Modeling Process, Software Reliability Models: The Rayleigh Model, Exponential Distribution and Software Reliability Growth Models, Software Reliability Allocation Models, Criteria for Model Evaluation, Software Quality Assessment Models: hierarchical Model of Software Quality Assessment.

UNIT-IV: Software Quality Assurance

Quality Planning and Control, Quality Improvement Process, Evolution of Software Quality Assurance (SQA), Major SQA Activities, Major SQA Issues, Zero Defect Software, SQA Techniques, Statistical Quality Assurance, Total Quality Management, Quality Standards and Processes.

UNIT-V: Software Verification, Validation & Testing:

Verification and Validation, Evolutionary Nature of Verification and Validation, Impracticality of Testing all Data and Paths, Proof of Correctness, Software Testing, Functional, Structural and Error-Oriented Analysis & Testing, Static and Dynamic Testing Tools, Characteristics of Modern Testing Tools.

References: -

1. Jeff Tian, Software Quality Engineering (SQE), Wiley
2. Stephen H. Kan, Metrics and Models in Software Quality Engineering, Addison-Wesley

ELECTIVE -IV

KIT-043 : Computational Complexity

L	T	P
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UNIT-I

Models of Computation, resources (time and space), algorithms, computability, complexity.

UNIT-II

Complexity classes, P/NP/PSPACE, reductions, hardness, completeness, hierarchy, relationships between complexity classes.

UNIT-III

Randomized computation and complexity; Logical characterizations, incompleteness; Approximability.

UNIT-IV

Circuit complexity, lower bounds; Parallel computation, complexity in parallel computation; Counting problems; Interactive proofs.

UNIT-V

Probabilistically checkable proofs; Communication complexity; Quantum computation

Books:

1. Combinatorial Optimization: Algorithms and Complexity (Hardcover) by Christos H.

Papadimitriou.

2. Complexity Theory: A Modern Approach Sanjeev Arora and Boaz Barak

3. Computability and Complexity Theory (Texts in Computer Science) (Hardcover) by Steven Homer (Author), Alan L. Selman (Author) Publisher: Springer; 1 edition.

ELECTIVE -IV

KIT-044 : Simulation and Modeling

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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. Geoftrey 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.