SCHEME OF EXAMINATION

&

SYLLABI

for

B. TECH. COMPUTER SCIENCE & ENGINEERING

SECOND YEAR (III & IV Semester)

(Effective from the session: 2010-2011)

Uttrakhand Technical University,Dehradun

www.uktech.in

Semester-III

Subject Code	Subject	Contact Hrs.	Credit
TCS-301	Discrete Structures	3-1-0	4
TCS-302	Computer Based Numerical & Statistical Techniques	2-0-0	2
TCS-303	Data Structures	3-1-0	4
TEC-301	Digital Electronics & Design Aspect	3-1-0	4
TCS-304	Object Oriented Programming	3-1-0	4
THU-301	Engineering Economics & Costing	2-0-0	2
PRACTICAL:			
PCS-302	Computer Based Numerical & Statistical Techniques Lab	0 0 2	2
PCS-303	Data Structure Lab	0 0 2	2
PEC-350	Digital Electronics	0 0 2	2
PCS-304	Object oriented programming using Java/ C++	0 0 2	2
PD III /GP III	Personality Development/ General Proficiency	0 0 2	-
TOTAL			**28**

Semester-IV

Subject Code	Subject	Contact Hrs.	Credit
TCS-401	Computer Organization	3-1-0	4
TCS-402	Unix & Shell Programming	2-0-0	2
TCS-403	Theory Of Automata & Formal Language	3-1-0	4
TCS-404	Database Management System	3-1-0	4
TCS-405	Microprocessor	3-1-0	4
TCS-406	Software Engineering	2-0-0	2
Practical			
PCS-402	Unix & Shell Programming Lab	0-0-2	2
PCS-404	Database Management System Lab	0-0-2	2
PCS-405	Microprocessor Lab	0-0-2	2
PCS 407	Seminar	0-0-2	2
PD IV /GP IV	Personality Development/ General Proficiency	0 0 2	-
TOTAL			**28**

Semester-III

S. No.	SUBJECT CODE	SUBJECT	PERIODS			EVALUATION SCHEME				
						SESSIONAL EXAM			ESE	Subject Total
			L	T	P	CT	TA	Total		
1	TEC-301	Discrete Structures	3	1	0	30	20	50	100	150
2	TCS-302	Computer Based Numerical & Statistical Techniques	2	0	0	15	10	25	50	75
3	TCS-303	Data Structures	3	1	0	30	20	50	100	150
4	TEC-301	Digital Electronics & Design Aspect	3	1	0	30	20	50	100	150
5	TCS-304	Object Oriented Programming	3	1	0	30	20	50	100	150
6	THU-301	Engineering Economics & Costing	2	0	0	15	10	25	50	75
PRACTICALS										
7	PCS-350	Digital Electronics Lab	0	0	2		25	25	25	50
8	PCS-302	Computer Based Numerical & Statistical Techniques Lab	0	0	2		25	25	25	50
9	PCS-303	Data Structure Lab	0	0	2		25	25	25	50
10	PCS-304	Object Oriented programming Lab using Java/C++	0	0	2		25	25	25	50
11	PD III /GP III	Personality Development/ General Proficiency	0	0	2			50		50
		Total								**1000**

Semester-IV

S. No.	SUBJECT CODE	SUBJECT	PERIODS			EVALUATION SCHEME				
						SESSIONAL EXAM			ESE	Subject Total
			L	T	P	CT	TA	Total		
1	TCS-401	Computer Organization	3	1	0	30	20	50	100	150
2	TCS-402	UNIX & Shell Programming	2	0	0	15	10	25	50	75
3	TCS-403	Theory Of Automata & Formal Language	3	1	0	30	20	50	100	150
4	TCS-404	Database Management System	3	1	0	30	20	50	100	150
5	TCS-405	Microprocessor	3	1	0	30	20	50	100	150
6	TCS-406	Software Engineering	2	0	0	15	10	25	50	75
PRACTICALS										
7	PCS-402	UNIX & Shell Programming Lab	0	0	2		25	25	25	50
8	PCS-404	Database Management System Lab	0	0	2		25	25	25	50
9.	PCS-405	Microprocessor Lab	0	0	2		25	25	25	50
10	PCS-407	Seminar-I	0	0	2		50	50	-	50
11	PD IV /GP IV	Personality Development/ General Proficiency	0	0	2			50		50
		Total								**1000**

TCS-301

DISCRETE STRUCTURES

L	T	P
3	1	0

Unit-I **(10L)**

Set Theory: Definition of sets, countable and uncountable sets, Venn Diagrams, proofs of some general identities on sets

Relation: Definition, types of relation, composition of relations, Pictorial representation of relation, equivalence relation, partial ordering relation.

Function: Definition, type of functions, one to one, into and onto function, inverse function, composition of functions, recursively defined functions.

Theorem proving Techniques: mathematical induction (simple and strong), pigeonhole principle, prove by contradiction.

Unit-II **(8L)**

Algebraic Structures: Definition, Properties, types: Semi Groups, Monoid, Groups, Abelian group, properties of groups, Subgroup, cyclic groups, Cosets, factor group, Permutation groups, Normal subgroup, Homomorphism and isomorphism of Groups, example and standard results, Rings and Fields: definition and standard results.

Unit-III **(8L)**

Posets, Hasse Diagram and Lattices: Introduction, ordered set, Hasse diagram of partially, ordered set, isomorphic ordered set, well ordered set, properties of Lattices, bounded I and complemented lattices.

Unit-IV **(8L)**

Propositional Logic: Proposition, First order logic, Basic logical operation, truth tables, tautologies, Contradictions, Algebra of Proposition, logical implications, logical equivalence, predicates, Universal and existential quantifiers.

Unit-V **(6L)**

Combinatorics & Graphs: Recurrence Relation, Generating function., Permutation & Combination, Probabilistic Permutation & Combination

Reference Book:

1. Y N Singh, "Discrete Mathematical Structures", Wiley India
2. Liptschutz, Seymour, " Discrete Mathematics", McGraw Hill. 3rd edition
3. Trembley, J.P & R. Manohar, "Discrete Mathematical Structure with Application to Computer Science", McGraw Hill, Reprint 2010

TCS-302

COMPUTER BASED NUMERICAL AND STATISTICAL TECHNIQUES

L T P
2 0 0

Unit-I **(6L)**

Introduction: Numbers and their accuracy, Computer Arithmetic, Mathematical preliminaries, Errors and their Computation, General error formula, Error in a series approximation.

Solution of Algebraic and Transcendental Equation:
Bisection Method, Iteration method, Method of false position, Newton-Raphson method, Methods of finding complex roots, Muller"s method, Rate of convergence of Iterative methods, Polynomial Equations.

Unit-II **(6L)**

Interpolation: 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

Unit-III(**(6L)**

Numerical Integration and Differentiation: Introduction, Numerical differentiation Numerical Integration: Trapezoidal rule, Simpson"s 1/3 and 3/8 rule, Boole"s rule, Waddle"s rule.

Solution of differential Equations: Picard"s Method, Euler"s Method, Taylor"s Method, Runge-Kutta Methods, Predictor Corrector Methods, Automatic Error Monitoring and Stability of solution.

Unit-IV **(6L)**

Statistical Computation: Frequency chart, Curve fitting by method of least squares, fitting of straight lines, polynomials, exponential curves etc, Data fitting with Cubic splines, Regression Analysis, Linear and Non linear Regression, Multiple regression, Statistical Quality Control methods.

References:

1. Yang, "Applied Numerical Methods using MATLAB", Wiley India
2. Pradip Niyogi, "Numerical Analysis and Algorithms", TMH, 1st Edition.
3. Gerald & Whealey, "Applied Numerical Analyses", AW
4. Grewal B S, "Numerical methods in Engineering and Science", Khanna Publishers, Delhi.
5. Numerical Method Principles, analysis and algorithms ,Srimamta Pal (Oxford Higher ed)
6. Rajaraman V, "Computer Oriented Numerical Methods", PHI, 3rd edition.

TCS 303

DATA STRUCTURES

L T P
3 1 0

UNIT – I **(10L)**

Introduction: Basic Terminology, Elementary Data Organization, 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, example of recursion, Tower of Hanoi Problem, simulating recursion, Backtracking, recursive algorithms.

UNIT – II **(8L)**

Queues: Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, D-queues and Priority Queues**.**

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, Garbage Collection and Compaction.

UNIT –III **(8L)**

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, path length algorithm**.** Huffman Algorithm.
Binary Search Trees: Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of Search Algorithm.

UNIT –IV **(8L)**

Searching and Hashing: Sequential search, binary search, comparison and analysis, Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation.

Sorting: Insertion Sort, Bubble Sort, Quick Sort, Two Way Merge Sort, Heap Sort, Sorting on Different Keys.

UNIT – V **(6L)**

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.

Reference books:

1. Shukla, “Data Structures using C and C++”, Wiley India
2. A M. Tenenbaum, “Data Structures using C & C++”, Prentice-Hall of India Pvt. Ltd., New
3. Delhi.(2 nd ed).
4. R. Kruse etal, “Data Structures and Program Design in C”, Pearson Education Asia,
5. Delhi-2002. Reprint 2010.

TEC-301

DIGITAL ELECTRONICS & AND DESIGN ASPECT

L T P

3 1 0

Unit-I : Introduction (8L)

Characteristics of digital system, Types of Digital circuits, Number system: Direct conversion between bases Negative numbers & BCD and their arithmetic"s, Boolean algebra, Minimization of Boolean Functions: K Map upto 6 variable and multiple output circuits error detection & correcting codes, Hamming & cyclic codes quine mcclusky method

Unit-II : Combinational Logic Circuits (8L)

Design Procedure, adders, subtractiors & code conversion, Multiplexers/Demultiplexers, encoder/decoders, decimal adders & amplitude comparators, ROM as decoder, PLA & PAL. DRC, RDC.

Unit-III : Sequential Logic Circuits (8L)

Flip-Flops and their conversions, analysis and synthesis of synchronous sequential circuit, excitation table, state table & diagram. Design of synchronous counters, shift registers and theie applications.

Unit-IV : Logic Families (8L)

Diode, BJT & MOS as a switching element concept of transfer characteristics, Input characteristics and output characteristics of logic gates, TTL, IIL,ECL,NMOS,CMOS Tri-state logic, open collector output, Interfacing between logic families, packing density, power consumption & gate delay.

Unit-V : Hazard ,Fault Detection &Memories (8L)

Hazard and Fault Detection: Static and dynamic Hazard: Gate delay, Generation of spikes, Determination of hazard in combinational circuits, Fault detection methods: Fault Table & Path sensitizing methods.

Memories: Sequential, Random Access, NMOS & CMOS Static and Dynamic Memory elements, one and multi-dimensional selection arrangement, Read-only memories, Formation of memory banks, internal & External address decoding

Reference books:

1. Maini, "Digital Electronics: Principles and Integrated Circuits", Wiley India
2. Digital Systems: Principles and Design, Raj Kamal, Pearson
3. Balbanian, Digital logic design, Wiley India
4. M. Morris Mano and M. D. Ciletti, Digital Design, M. Morris Mano and M. D. Ciletti, 4th Edition, pearson
5. Switching Circuit & Logic Design, Hill & Peterson, Wiley

TCS -304

OBJECT ORIENTED PROGRAMMING

L T P
3 1 0

Unit I **(8L)**

Object Modeling: Objects and classes, links and association, generalization and inheritance, aggregation, abstract class, multiple inheritance, meta data, candidate keys, constraints.Dynamic Modeling: Events and states, operations, nested state diagrams and concurrency, advanced dynamic modeling concepts, a sample dynamic model.

Unit II **(8L)**

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, SA/SD, JSD.

Unit III **(8L)**

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

Unit IV **(8L)**

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

Unit V **(8L)**

Software Development using Java:

Java Swing, Migrating from C++ to java, Application of java, JDBC.

Reference books:

1. Horstmann, Big Java, Wiley India
2. Herbert Schieldt, "The Complete Reference: Java", TMH, 7th Edition.
3. Nino," An Introduction to Programming and Object Oriented Design using Java, w/CD", Wiley India
4. James Rumbaugh etal, "Object Oriented Modeling and Design", PHI
5. Bjarne Stroustrup, "C++ Programming Language", Addison Wesley, 3rd Edition.

THU-301

ENGINEERING ECONOMICS AND COSTING

L T P

2 0 0

Unit I **(6L)**

Time value of money : Simple and compound interest, Time value equivalence, Compound interest factors, Cash flow diagrams, Calculation, Calculation of time –value equivalences.
Present worth comparisons, Comparisons of assets with equal, unequal and infite lives, comparison of deferred investments, Future worth comparison, pay back period comparison.

Unit II **(6L)**

Use and situations for equivalent annual worth comparison, Comparison of assets of equal and unequal life. Rate of return, Internal rate of return, comparison of IIR with other methods, IRR misconceptions.

Unit III **(6L)**

Analysis of public Projects: Benefit/ Cost analysis, quantification of project, cost and benefits, benefit/ cost applications, Cost –effectiveness analysis.

Unit IV **(6L)**

Depreciation, computing depreciation charges, after tax economic comparison, Break-even analysis; linear and non-linear models.
Product and Process Costing, Standard Costing, cost estimation, Relevant Cost for decision making, Cost control and Cost reduction techniques.

Reference books:

1. White, Engineering Economics, Wiley India
2. Horn green, C.T., Cost Accounting, Prentice Hall of India
3. Riggs, J.L., Dedworth, Bedworth, D.B, Randhawa, S.U. Engineering Economics, McGrawHill International Edition, 1996

PCS- 302 : Computer Based Numerical Techniques Lab

L T P

0 0 2

Write Programs in 'C' Language:

1. To deduce error envolved in polynomial equation.
2. To Find out the root of the Algebraic and Transcendental equations using
3. To implement Newton"s Forward and Backward Interpolation formula.
4. To implement Gauss Forward and Backward, Bessel"s, Sterling"s and Evertt"s Interpolation formula.
5. To implement Newton"s Divided Difference and Langranges Interpolation formula.
6. To implement Numerical Differentiations.
7. To implement Numerical Integration using Trapezoidal, Simpson 1/3 and Simpson 3/8 rule.
8. To implement Least Square Method for curve fitting.
9. To draw frequency chart like histogram, frequency curve and pie-chart etc.
10. To estimate regression equation from sampled data and evaluate values of standard deviation, t-statistics, regression coefficient, value of R2 for atleast two independent variables.

PCS- 303 : Data Structure Lab

L T P

0 0 2

Write Program in C or C++ for following.

1. Program for Stack
2. Program Queue, Circular Queue
3. Program demonstrating Stack operation
4. Program for Stack Using Linked List
5. Program for Queue Using Linked List
6. Traversing of Tree Using Linked List
7. Queue Using Array
8. Program for Tree Structure, Binary Tree, Binary Search Tree
9. Program for Heap Sort
10. Program for Quick Sort
11. Graph Implementation BFS,DFS
12. Deletion in BST
13. Insertion in BST

PEC-350 DIGITAL ELECTRONICS LAB

L T P
0 0 2

1. Bread-board implementation of various flip-flops.
2. Bread-board implementation of counters & shift registers.
3. Determination of Delay time and NAND, NOR, Ex-OR, AND & OR Gates.
4. Bread Board Implementation of Flip-Flops.
5. Experiments with clocked Flip-Flop.
6. Design of Counters.
7. Bread Board implementation of counters & shift registers.
8. Implementation of Arithmetic algorithms.
9. Bread Board implementation of Adder/Subtractor (Half, Full)
10. Transfer characteristics of TTL inverters & TTL Schmitt Trigger inverter.
11. Transfer characteristics of CMOS inverters series and CD40 series and
12. estimation of Gate delay of CD40 series CMOS inverter.
13. Monoshot multivibrators using 74121 and 74123.
14. Clock circuit realization using 555 and CMOS inverter and quartz crystal.
15. Adder/ subtractor operation using IC7483 4 bit/ 8 bit.
16. Demultiplexer / Decoder operation using IC-74138.

PCS- 304 : Object Oriented Programming Using Java

L T P
0 0 2

1. To become familiar with classes that represent entities that can interact with the user.
2. To successfully write simple programs that involve if statements.
3. To gain practice in the use of Boolean operators like && and ||.
4. To construct a class that represents a simple ATM (automatic teller machine).
5. Write a new program called Options.java that will request that the user enter an integer and then will display the message .positive,. .negative,. or zero. if the value that was entered was greater than zero, less than zero, or equal to zero, respectively.
6. Write a simple program called RandomGeneration.java that will request N, the number of values desired, and then generate a list of N random double values. Use a ViewFrame for input and output.
7. Write program for Java Applets.
8. Use Java Servlets for proxy server.

TCS-401

COMPUTER ORGANIZATION

L T P
3 1 0

Unit-I **(8L)**

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 **(8L)**

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 Next-address field, Prefetching Microinstruction).

Unit-III **(8L)**

Processor Design:

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

Input-Output Organization:

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

Unit-IV **(8L)**

Memory Organization:

Memory Hierarchy, Main Memory (RAM and ROM Chips), organization of Cache Memory, Auxiliary memory, Cache memory, Virtual Memory, Memory management hardware.

Unit – V(8L)

Parallel Processing, Pipelining- Arithmetic Pipelining, Instruction Pipelining, RISC Pipelining, Vector Processing, Array Processor. Multiprocessor: Characteristic of Multiprocessor, Interconnection Structure, Interprocessor Arbitration, Cache Coherence

Reference books:

1. Computer Organization, John P.Hayes, McGraw Hill, 3rd Edition.
2. Fundamentals of Computer Organization and Design, Dadamundi, Wiley India
3. Computer System Architecture, M. Mano, Pearson
4. R.S.Gaonkar - Microprocessor architecture – Programming and Application with 8085/8080A - Wiley Eastern Limited.

TCS-402

UNIX AND SHELL PROGRAMMING

L T P
2 0 0

Unit-1 **(6L)**

Introduction

Introduction to UNIX, UNIX system organization (the kernel and the shell), Unix File System, Basic file attributes, Editors (vi and ed).

Unit-2 **(6L)**

General Purpose Utilities: cal, date, echo, script, mailx, passwd, who, uname, tty, sty, cat, cp,rm, mv, more, file, wc, od, cmp, comm, diff, lp, banner, dos2unix, and unix2dos, gzip and gunzip, zip and unzip.

Unit-3 **(6L)**

Unix Shell programming: Types of Shells, Shell Metacharacters, Shell variables, Shell scripts, Shell commands, the environment, Integer arithmetic and string Manipulation, Special command line characters, Decision making and Loop control, controlling terminal input, trapping signals, arrays.

Unit-4 **(6L)**

Unix System Administration: File System, mounting and unmounting file system, System booting, shutting down, handling user account, backup, recovery, security, creating files, storage of Files, Disk related commands, User quota and accounting.

Reference books:

1. Saurabh, "UNIX Programming: The First Drive", Wiley India
2. Sumitabh Das, "Unix Concepts and applications", TMH, 2003
3. Johnson , Shell scripting, Wiley
4. 4.Yashwant Kanitkar, "Unix Shell Programming", BPB, 2009
5. Mike Joy, Stephen Jarvis, Michael Luck, "Introducing Unix and Linux", Palgrave Macmillan.

TCS-403

THEORY OF AUTOMATA & FORMAL LANGUAGES

L T P
3 1 0

Unit I **(8L)**

Introduction to defining language, Kleene closures, Arithmetic expressions, defining grammar, Chomsky hierarchy, Finite Automata (FA), Transition graph, generalized transition graph.

Unit II **(8L)**

Nondeterministic finite Automata (NFA), Deterministic finite Automata (DFA), Construction of DFA from NFA and optimization, FA with output: Moore machine, Mealy machine and Equivalence, Applications and Limitation of FA.

Unit III **(8L)**

Arden Theorem, Pumping Lemma for regular expressions, Myhill-Nerode theorem, Context free grammar: Ambiguity, Simplification of CFGs, Normal forms for CFGs, Pumping lemma for CFLs, Decidability of CFGs, Ambiguous to Unambiguous CFG.

Unit IV **(8L)**

Push Down Automata (PDA): Description and definition, Working of PDA, Acceptance of a string by PDA, PDA and CFG, Introduction to auxiliary PDA and Two stack PDA.

Unit V **(8L)**

Turing machines (TM): Basic model, definition and representation, Language acceptance by TM, TM and Type – 0 grammar, Halting problem of TM, Modifications in TM, Universal TM, Properties of recursive and recursively enumerable languages, unsolvable decision problem, undecidability of Post correspondence problem, Church‟s Thesis, Recursive function theory.

Reference books:

1. Cohen, “Introduction to Computer theory”, Wiley India
2. Hopcroft, Ullman, “Introduction to Automata Theory, Language and Computation”, Nerosa Publishing House, 3rd Edition
3. K.L.P. Mishra and N.Chandrasekaran, “Theory of Computer Science(Automata, Languages and Computation)”, PHI, 3rd Edition
4. Martin J. C., “Introduction to Languages and Theory of Computations”, TMH

TCS 404

DATABASE MANAGEMENT SYSTEM

L T P
3 1 0

Unit- I **(8L)**

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 **(8L)**

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, Queries and sub queries. Aggregate functions. Insert, update and delete operations. Joins, Unions, Intersection, Minus, Cursors in SQL.

Unit- III **(8L)**

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 **(8L)**

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 **(8L)**

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.

Reference books:

1. Korth, Silbertz, Sudarshan, "Database Concepts", McGraw Hill, 5th Edition
2. Elmasri, Navathe, "Fundamentals Of Database Systems", Addision Wesley,5th edition
3. Gillenson, "Fundamentals of Database Management Systems", Wiley India
4. Date C J, "An Introduction To Database System", Pearson, 8th Edition.
5. Bipin C. Desai, "An introduction to Database Systems", Galgotia Publication

TCS-405 MICROPROCESSOR

L T P
3 1 0

Unit I **(8L)**

Introduction – Microprocessors Evolution and types (Intel 4004 – Pentium IV and road maps), Overview of 8085, 8086, 80286, 80386, 80486, Pentium processors and Micontrollers.

Unit II **(8L)**

Architecture of 8086 – Register Organization, Execution unit, Bus Interface Unit, Signal Description, Physical Memory Organization, General Bus Operation, I/O addressing capabilities, Minimum mode and maximum mode timing diagrams, Comparison with 8088

Unit III **(8L)**

8086 programming – Assembly language program development tools (editor, linker, loader, locator, Assembler, emulator and Debugger), Addressing modes, Instruction set descriptions,

Unit IV **(8L)**

Assembler directives and operators, Procedures and Macros. (Writing programs for use with an assembler MASM),8086 Interfacing – Interfacing 8086 with semiconductor memory, 8255, 8254/ 8243, 8251, 8279.

Unit V **(8L)**

A/D and D/A converters, Numeric processor 8087, I/O processor 8089, Bus Interface(USB, PCI).

Reference books:

1. D.V. Hall, "Microprocessors and Interfacing", TMH, 2 Ed. 1991.
2. Barry B Brey, "INTEL Microprocessors", Prentice-Hall.
3. Y.-C. Liu and G. A. Gibson, "Microprocessor Systems: The 8086/8088 family Architecture, Programming & Design", PHI, 2000.

TCS-406

SOFTWARE ENGINEERING

L T P
2 0 0

Unit-I: Introduction (5L)

Introduction to Software Engineering, Software Characteristics, Software Crisis, Software Engineering Processes, 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) (5L)

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),SEI-CMM Model.

Unit-III: Software Design (7L)

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: Coding, Testing & Software Maintenance (7L)

Top-Down and Bottom –Up programming, structured programming, Compliance with Design and Coding Standards.

Testing Objectives, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing, Top-Down and Bottom-Up Testing Strategies: Test Drivers and Test Stubs, Structural Testing (White Box Testing), Functional Testing (Black Box Testing),

Corrective and Perfective Maintenance, Cost of Maintenance, Software Re-Engineering, Reverse Engineering. Constructive Cost Models (COCOMO),

Reference Books:

1. Pankaj Jalote, Software Engineering , Wiley India
2. Rajib Mall, Fundamentals of Software Engineering, PHI Publication, 3rd Edition.
3. K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers,3rd Edition.
4. R. S. Pressman, Software Engineering: A Practitioners Approach, McGraw Hill, 6th Edition.
5. Ian Sommerville, Software Engineering, Addison Wesley, 8th Edition.

PCS- 402 : UNIX & Shell Programming Lab

L T P

0 0 2

1. Use Vi editor to create a file called myfile.txt which contain some text. Correct typing errors during creation, Save the file & Logout of the file
2.Open the file created in Exp 1, Add, Change, delete & Save the changes
3. Use the cat command to create a file containing the following data. Call it mutable use tabs to separate the fields 1425 ravi 15.65, 4320 ramu 26.27, 6830 sita 36.15, 1450 raju 21.86
4. Use the cat command to display the file, my table, use vi command to correct any errors in the file, my table, use the sort command to sort the file my table according to the first field. Call
the sorted file my table(same name) & print the file my table
5. Use the cut & paste commands to swap fields 2 and 3 my table. Call it mytable(same name) & print the new file, my table
6. Use the date and who commands in sequence ?(in one line) such that the output of date will display on the screen and the output of who will be redirected to a file called my file2.Use the more command to check the contents of myfile2.
7. Develop an interactive grep script that asks for a word and a file name and then tells how many lines contain that word
8. Write A shell script that takes a command –line argument and reports on whether it is directry ,a file,or something else
9. Write a shell script that accepts one or more file name as a arguments and converts all of them to uppercase,provided they exits in the current directory
10. Write a shell script that determines the period for which a specified user is working on the system

PCS- 404 : Database Management System Lab

L T P

0 0 2

1. Write the queries for Data Definition and Data Manipulation Language.
2. Write SQL queries using logical operations (=,<,>,etc)
3. Write SQL queries using SQL operators
4. Write SQL query using character, number, date and group functions
5. Write SQL queries for relational algebra
6. Write SQL queries for extracting data from more than one table
7. Write SQL queries for sub queries, nested queries
8. Write programme by the use of PL/SQL
9. Concepts for ROLL BACK, COMMIT & CHECK POINTS
10. Create VIEWS, CURSORS and TRGGERS & write ASSERTIONS.
11. Create FORMS and REPORTS

Note:
1. The queries to be implemented on DBMS using SQL
2. Students are advised to use Developer 2000/Oracle9i or other latest version for above experiments. However student may use Power Builder/SQL SERVER or DB2.

Mini Projects may also be planned & carried out through out the semester to understand important concepts of database.

PCS- 405 : Microprocessor Lab

L T P

0 0 2

1. To study 8085 microprocessor System
2. To study 8086 microprocessor System
3. To develop and run a programme to find out largest and smallest number
4. To develop and run a programme for converting temperature from F to C degree
5. To develop and run a programme to compute square root of a given number
6. To develop and run a programme for computing ascending/descending order of a number.
7. To perform interfacing of RAM chip to 8085/8086
8. To perform interfacing of keyboard controller
9. To perform interfacing of DMA controller
10. To perform interfacing of UART/USART

SCHEME OF EXAMINATION

& SYLLABI

for

B. TECH. COMPUTER SCIENCE & ENGINEERING

THIRD YEAR (V & VI Semester)

(Effective from the session: 2010-2011)

Uttrakhand Technical University,Dehradun

www.uktech.in

UTTRAKHAND TECHNICAL UNIVERSITY

STUDY AND EVALUATION SCHEME (B.TECH. III Year)- V Semester
B. Tech. Computer Science and Engineering

(Effective from the session : 2008-2009)

Year: III, Semester-V

S.No.	Course Code	Subject	PERIODS		EVALUATION SCHEME					Subject Total
					SESSIONAL EXAM				EXAM ESE	
			L	T	P	CT	TA	Total		
1	TCS-501	Computer Graphics	3	1	0	30	20	50	100	150
2	TCS-502	Compiler Design	3	1	0	30	20	50	100	150
3	TCS-503	Design & Analysis of Algorithms	3	1	0	30	20	50	100	150
4	TCS-504	Principle of Programming Languages	3	1	0	30	20	50	100	150
5	THU-501	Industrial Economics & Principles of Management	3	1	0	30	20	50	100	150
Practical/Training/Project										
1	PCS-551	Computer Graphics Lab	0	0	2		25	25	25	50
2	PCS-552	Compiler Design Lab	0	0	2		25	25	25	50
3	PCS-553	Design & Analysis of Algorithms Lab	0	0	2		25	25	25	50
	Total									**900**
	GP 651*	General Proficiency								100
	DIS652*	Discipline								100

*** (The marks will be awarded in VI Semester based on the performance of V & VI Semester)**

UTTRAKHAND TECHNICAL UNIVERSITY

STUDY AND EVALUATION SCHEME (B.TECH. III Year)- VI Semester
B. Tech. Computer Science and Engineering

(Effective from the session : 2008-2009)

Year: III, Se mester-VI

S.No.	Course Code	Subject	PERIODS			EVALUATION SCHEME				Subject Total
						SESSIONAL EXAM			EXAM ESE	
			L	T	P	CT	TA	Total		
1	TCS-601	Operating Systems	3	1	0	30	20	50	100	150
2	TCS-602	Computer Networks	3	1	0	30	20	50	100	150
3	TCS-603	Artificial Intelligence	3	1	0	30	20	50	100	150
4	TCS-604	Graph Theory	3	1	0	30	20	50	100	150
5	THU-602	Organizational Behavior	3	1	0	30	20	50	100	150
Practical/Training/Project										
1	PCS-651	Operating Systems Lab	0	0	2		25	25	25	50
2	PCS-652	Computer Networks Lab	0	0	2		25	25	25	50
3	PCS-653	Artificial Intelligence Lab	0	0	2		25	25	25	50
	Total									**900**
	GP 651*	General Proficiency								100
	DIS652*	Discipline								100
	Total									**1100**

*** (The marks will be awarded in VI Semester based on the performance of V & VI Semester)**

COMPUTER GRAPHICS (TCS-501)

Unit-I
Line generation: Points lines, Planes, Pixels and Frame buffers, vector and character generation. Graphics Primitives: Display devices, Primitive devices, Display File Structure, Display control text.

Unit-II
Polygon: Polygon Representation, Entering polygons, Filling polygons. Segments: Segments table, creating deleting and renaming segments, visibility, image transformations.

Unit-III
Transformations: Matrices transformation, transformation routines, displays procedure. Windowing and Clipping: Viewing transformation and clipping, generalize clipping, multiple windowing.

Unit-IV
Three Dimension: 3-D geometry primitives, transformations, projection clipping. Interaction: Hardware input devices handling algorithms, Event handling echoing, Interactive techniques.

Unit-V
Hidden Line and Surface: Back face removal algorithms, hidden line methods. Rendering and Illumination: Introduction to curve generation, Bezier, Hermite and B-spline algorithms and their comparisons.

References :

1. Rogers, "Procedural Elements of Computer Graphics", McGraw Hill
2. Asthana, Sinha, "Computer Graphics", Addison Wesley Newman and Sproul, "Principle of Interactive Computer Graphics", McGraw Hill
3. Steven Harrington, "Computer Graphics", A Programming Approach, 2nd Edition
4. Rogar and Adams, "Mathematical Elements of Computer Graphics", McGraw Hill.

COMPILER DESIGN (TCS-502)

Unit-I
Introduction to Compiler, Phases and passes, Bootstrapping, Finite state machines and regular expressions and their applications to lexical analysis, Implementation of lexical analyzers, lexical-analyzer generator, LEX-compiler, Formal grammars and their application to syntax analysis, BNF notation, ambiguity, YACC. The syntactic specification of programming languages: Context free grammars, derivation and parse trees, capabilities of CFG.

Unit-II
Basic Parsing Techniques: Parsers, Shift reduce parsing, operator precedence parsing, top down parsing, predictive parsers 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, using ambiguous grammars, an automatic

parser generator, implementation of LR parsing tables, constructing LALR sets of items.

Unit-III
Syntax-directed Translation: Syntax-directed Translation schemes, Implementation of Syntax- directed Translators, Intermediate code, postfix notation, Parse trees & syntax trees, three address code, quadruple & triples, translation of assignment statements, Boolean expressions, statements that alter the flow of control, postfix translation, translation with a top down parser. More about translation: Array references in arithmetic expressions, procedures call, declarations, case statements.

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
Introduction to code optimization: Loop optimization, the DAG representation of basic blocks, value numbers and algebraic laws, Global Data-Flow analysis.

References:

Aho, Sethi & Ullman, "Compiler Design", Addision Wesley.

DESIGN & ANALYSIS OF ALGORITHMS (TCS-503)

Unit -I
Introduction: Algorithms, analysis of algorithms, Growth of Functions, Master's Theorem, Designing of Algorithms. Sorting and order Statistics: Heap sort, Quick sort, Sorting in Linear time, Medians and Order Statistics.

Unit -II
Advanced Data Structure: Red-Black Trees, Augmenting Data Structure. B-Trees, Binomial Heaps, Fibonacci Heaps, Data Stricture for Disjoint Sets.

Unit -III
Advanced Design and Analysis Techniques: Dynamic Programming, Greedy Algorithms, Amortized Analysis, Back Tracking.

Unit -IV
Graph Algorithms: Elementary Graphs Algorithms, Minimum Spanning Trees, Single-source Shortest Paths, All-Pairs Shortest Paths, Maximum Flow, and Traveling Salesman Problem.

Unit -V
Selected Topics: Randomized Algorithms, String Matching, NP Completeness, Approximation Algorithms.

References:

1. Coreman, Rivest, Lisserson, : “Algorithm", PHI.

2. Basse, "Computer Algorithms: Introduction to Design & Analysis", Addision Wesley.
3. Horowitz & Sahani, "Fundamental of Computer Algorithm", Galgotia.

PRINCIPLES OF PROGRAMMING LANGUAGES (TCS-504)

Unit -I
Introduction: Characteristics of programming Languages, Factors influencing the evolution of programming language, developments in programming methodologies, desirable features and design issues. Programming language processors: Structure and operations of translators, software simulated computer, syntax, semantics, structure, virtual computers, binding and binding time.

Unit -II
Elementary and Structured Data Types: Data object variables, constants, data types, elementary data types, declaration, assignment and initialization, enumeration, characters, strings. Structured data type and objects: Specification of data structured types, vectors and arrays, records, variable size data structure, pointers and programmer constructed data structure, Sets files. Sub Program and programmer defined data types: Evolution of data types, abstractions, encapsulations, information hiding, sub programmes, abstract data types.

Unit -III
Sequence Control; Implicit and Explicit sequence control, sequence control with within expression and statements, recursive sub programmes, exception handling, co routines, Scheduled sub programmes, concurrent execution. Data control referencing environments, static and dynamic scope, local data local data referencing environment, shared data: Explicit common environment dynamic scope parameter passing mechanism.

Unit -IV
Storage Management: Major run time requirements, storage management phases, static storage management, stack based, heap based storage management. Syntax and translation: General syntactic criteria, syntactic element of a language, stages in translation, formal syntax and semantics.

Unit -V
Operating and Programming Environment: Batch Processing Environments, Embedded system requirements, Theoretical models, Introduction to Functional Programming, Lambda calculus, Data flow language and Object Oriented language, Comparison in various general and special purpose programming languages e.g. Fortran, C, Pascal, Lisp, etc.

References:

1. Terrance W Pratt, "Programming Languages: Design and Implementation" PHI
2. Sebesta, "Concept of Programming Language", Addison Wesley
3. E Horowitz , "Programming Languages", 2nd Edition, Addison Wesley
4. "Fundamentals of Programming Languages", Galgotia.

INDUSTRIAL ECONOMICS AND PRINCIPLES OF MANAGEMENT (THU 501)

Industrial Economics:

Unit –1.Introduction: Nature and significance of Economics. Meaning of Science, Engineering and Technology and their relationship with economic development.

Unit –2. Basic Concept: The concept of demand and supply. Elasticity of Demand and Supply. Indifference Curve Analysis, Price Effect, Income Effect and Substitution Effect.

Unit –3. Money and Banking: Functions of Money, Value of Money, Inflation and measures to control it. Brief idea of functions of banking system, viz., Commercial and central banking, Business fluctuations.

Management:

Unit –4. Introduction: Definition, Nature and Significance of Management,. Evaluation of Management thought, Contributions of Max Weber, Taylor and Fayol.

Unit –5. Human Behaviour: Factors of Individual Behaviour, Perception, Learning and Personality Development, Interpersonal Relationship and Group Behaviour.

References:

1. Dewett, K.K. / Modern Economic Theory/S.Chand & Co.
2. Luthers Fred/ Organizational Behaviour.
3. Prasad L.M./ Principles of Management.
4. A.W. Stonier & D.C. Horgne / A TextBook of Economic Theory/ Oxford Publishing House Pvt. Ltd.

COMPUTER GRAPHICS LAB (PCS-551)

1. Implementation of line generation using slope's method, DDA and Bresenham's algorithms.
2. Implementation of circle generation using Mid-point method and Bresenham's algorithm.
3. Implementation of ellipse generation using Mid-point method.
4. Implementation of polygon filling using Flood-fill, Boundary-fill and Scan-line algorithms.
5. Implementation of 2D transformation: Translation, Scaling, Rotation, Mirror Reflection and Shearing (write a menu driven program).
6. Implementation of Line Clipping using Cohen-Sutherland algorithm and Bisection Method.
7. Implementation of Polygon Clipping using Sutherland-Hodgman algorithm.
8. Implementation of 3D geometric transformations: Translation, Scalind and rotation.
9. Implementation of Curve generation using Interpolation methods.
10. Implementation of Curve generation using B-spline and Bezier curves.
11. Implementation of any one of Back face removal algorithms such as Depth-Buffer algorithm, Painter's algorithm, Warnock's algorithm, Scan-line algorithm).

COMPILER DESIGN LAB (PCS-552)

1. Simulation of a Finite state Automata to recognize the tokens of various control statements.
2. Simulation of a Finite state machine to distinguish among Integers, Real Numbers & Numbers with Exponents.
3. Program in LEX tool to recognize the tokens and to return the token found for a C like Language
4. Parsing of arithmetic and algebraic expressions and equations.
5. Use of YACC tool to parse the statements of C like Language.

DESIGN AND ANALYSIS OF ALGORITHMS LABORATORY (PCS-553)

Programming assignments on each algorithmic strategy:

1. Divide and conquer method (quick sort, merge sort, Strassen's matrix multiplication),
2. Greedy method (knapsack problem, job sequencing, optimal merge patterns, minimal spanning trees).
3. Dynamic programming (multistage graphs, OBST, 0/1 knapsack, traveling sales person problem).
4. Back tracking (n-queens problem, graph coloring problem, Hamiltonian cycles).
5. Sorting : Insertion sort, Heap sort, Bubble sort
6. Searching : Sequential and Binary Search
7. Selection : Minimum/ Maximum, Kth smallest element

OPERATING SYSTEMS (TCS-601)

Unit -I
Introduction: Operating System and Function, Evolution of Operating System, Batch, Interactive, Time Sharing and Real Time System, System Protection. Operating System Structure:
System Components, System Structure, Operating System Services.

Unit - II
Concurrent Processes: Process Concept, Principle of Concurrency, Producer / Consumer Problem, Critical Section, Problem, Semaphores, Classical Problems in Concurrency, Inter Processes Communication, Process Generation, Process Scheduling.

Unit - III
CPU Scheduling: Scheduling Concept, Performance Criteria Scheduling Algorithm, Evolution, Multiprocessor Scheduling. Deadlock: [05] System Model, Deadlock Characterization, Prevention, Avoidance and Detection, Recovery From Deadlock Combined Approach.

Unit - IV
Memory Management: Basic Machine, Resident Monitor, Multiprogramming with Fixed Partition, Multiprogramming With Variable Partition, Multiple Base Register, Paging, Segmentation, Paged Segmentation, Virtual' Memory Concept, Demand Paging, Performance, Paged Replaced Algorithm, Allocation of Frames, Thrashing, Cache Memory Organization, Impact on Performance.

Unit - V
I/O Management & Disk Scheduling: I/O Devices and The Organization of I/O Function, I/O Buffering, Disk I/O, Operating System Design Issues. File System: File Concept, File Organization and Access Mechanism, File Directories, File Sharing, Implementation Issues.

Suggested Books and References:
1. Milenekovie, "Operating System Concept", McGraw Hill.
2. Petersons, "Operating Systems", Addision Wesley.
3. Dietal, "An Introduction to Operating System", Addision Wesley.
4. Tannenbaum, "Operating System Design and Implementation", PHI.
5. Gary Nutt, "Operating System, A Modern Perspective", Addision Wesley.
6. Stalling, Willium, "Operating System", Maxwell Macmillan
7. Silveschatza, Peterson J, "Operating System Concepts", Willey.
8. Crowley, "Operating System", TMH.

COMPUTER NETWORKS (TCS-602)

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 Data Link 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”, 3rd Edition, Prentice Hall India, 1997.
3. S. Keshav, “An Engineering Approach on Computer Networking”, Addison Wesley, 1997
4. W. Stallings, “Data and Computer Communication”, Macmillan Press, 1989.

ARTIFICIAL INTELLIGENCE (TCS- 603)

UNIT -I

Introduction
Introduction to Artificial Intelligence, Simulation of sophisticated & Intelligent Behavior in different area problem 3OIving in games, natural language, automated reasoning, visual perception, heuristic algorithm versus solution guaranteed algorithms.

UNIT - II
Understanding Natural Languages.
Parsing techniques, context free and transformational grammars, transition nets, augmented transition nets, Fillmore's grammars, Shanks Conceptual Dependency, grammar free analyzers, sentence generation, and translation.

UNIT III
Knowledge Representation
First order predicate calculus, Horn Clauses, Introduction to PROLOG, Semantic Nets, Partitioned Nets, Minskey frames, Case Grammar Theory, Production Rules Knowledge Base, The Interface System, Forward & Backward Deduction.

UNIT - IV
Expert System
Existing Systems (DENDRAL, MYCIN) domain exploration Meta Knowledge, Expertise Transfer, Self Explaining System

UNIT - V
Pattern Recognition
Introduction to Pattern Recognition, Structured Description, Symbolic Description, Machine perception, Line Finding, Interception Semantic & Model, Object Identification, Speech Recognition. Programming Language ;Introduction to programming Language, LISP, PROLOG

References:

1. Charnick "Introduction to A.I.", Addision Wesley
2. Rich & Knight, "Artificial Intelligence"
3. Winston, "LISP", Addision Wesley
4. Marcellous, "Expert System Programming", PHI
5. Elamie, "Artificial Intelligence", Academic Press
6. Lioyed, "Foundation of Logic Processing", Springer Verlag

GRAPH THEORY (TCS604)

Unit- I

Graphs, Sub graphs, some basic properties, various example of graphs & their sub graphs, walks, path & circuits, connected graphs, disconnected graphs and component, euler graphs, various operation on graphs, Hamiltonian paths and circuits, the traveling sales man problem.

Unit- II
Trees and fundamental circuits, distance diameters, radius and pendent vertices, rooted and binary trees, on counting trees, spanning trees, fundamental circuits, finding all spanning trees of a graph and a weighted graph, algorithms of primes, Kruskal and dijkstra Algorithms.

Unit -III
Cuts sets and cut vertices, some properties, all cut sets in a graph, fundamental circuits and cut sets , connectivity and separability, network flows, planer graphs, combinatorial and geometric dual, Kuratowski to graphs detection of planarity, geometric dual , some more criterion of planarity, thickness and crossings.

Unit -IV
Vector space of a graph and vectors, basis vector, cut set vector, circuit vector, circuit and cut set verses subspaces, orthogonal vectors and subspaces, incidence matrix of graph, sub matrices of A(G), circuit matrix, cut set matrix, path matrix and relationships among Af, Bf, and Cf, fundamental circuit matrix and rank of B, adjacency matrices, rank- nullity theorem .

Unit -V
Coloring and covering and partitioning of a graph, chromatic number, chromatic partitioning, chromatic polynomials, matching, covering, four color problem, Directed graphs, some type of directed graphs, Directed paths, and connectedness, Euler digraphs, trees with directed edges, fundamental circuits in digraph, matrices A, B and C of digraphs adjacency matrix of a digraph,, enumeration, types of enumeration, counting of labeled and unlabeled trees, polya's theorem, graph enumeration with polya's theorem.
Graph theoretic algorithm must be provided wherever required to solve the problems .

References:-
1. Deo, N: Graph theory, PHI
2. Harary, F: Graph Theory, Narosa
3. Bondy and Murthy: Graph theory and application. Addison Wesley.

ORGANIZATIONAL BEHAVIOR (THU-602)

Introduction to organizations and individuals:
What is an organization, components of organization, nature and variety of organizations (in terms of objectives, structure etc.), models of analyzing organizational phenomena, organizational and business variables, organizations in the Indian context, institutions and structures, basic roles in an organization, etc. perceptions, attitudes, motives (achievement, power and affiliation), commitment, values, creativity, and other personality factors, profile of a manager and a entrepreneur.

Interpersonal and group processes:
Interpersonal trust, understanding the other person from his/her point of view, interpersonal communication, listening, feedback, counseling, transactional analysis, self-fulfilling prophecy, etc., leadership, motivating people, working as a member of a team, team functioning, team decision-making, team conflict resolution, team problem solving.

Organizational structure and integrating interpersonal and group dynamics elements of structure, functions of structures, determinants of structures, dysfunctionalities of structures, structure - technology?environment-people relationships, principles underlying design of organizations, organizational politics, issues of power and authority, organizational communications, organizational change, integrating cases (s). Case method and lectures should be supplemented with a variety of other methodologies such as feedback on questionnaires and tests, role plays, and behavior simulation exercise.

References :
1. Jit S Chandan "Organizational Behavior", Vikas
2. M.N. Mishra :Organization Behavior", Vikas
3. Arnold, John, Robertson, Ivan 1. and Cooper, Cary, I.," Work Psychology:understanding human behavior in the workplace", Macmillan India Ltd., Delhi. 1996.
4. Dwivedi, RS., Human relations and organizational behavior: a global perspective, Macmillan India Ltd., Delhi, .1995.
5. Hersey and Blanchard (6th ed.). "Management of organizational behavior L utilising human resources", Prentice Hall of India Pv1. Ltd., New Delhi, 1996.
6. Robbins (4th ed.), "Essentials of organizational behavior", Prentice Hall of India Pv1. L td., New Delhi, 1995.
7. Luthans F red., "Organizational Behavior", McGraw Hill, 1998.

OPERATING SYSTEMS LAB (PCS-651)

1. Simulation of the CPU scheduling algorithms a) Round Robin b) SJF c) FCFS d) Priority
2. Simulation of MUTEX and SEMAPHORES.
3. Simulation of Bankers Deadlock Avoidance and Prevention algorithms.
4. Implementation of Process Synchronization (Reader-Writer, Sleeping Barber and Dining Philosopher's Problem)
5. Simulation of page Replacement Algorithms a) FIFO b) LRU c) LFU
6. Simulation of paging techniques of memory management.
7. Simulation of file allocation Strategies a) Sequential b) Indexed c) Linked
8. Simulation of file organization techniques a) Single Level Directory b) Two Level c) Hierarchical d) DAG

COMPUTER NETWORKS LAB (PCS-652)

1. Implementation of the Data Link Layer framing method such as character stuffing and bit stuffing in C.
2. Implementation of CRC algorithm in C.
3. Implementation of a Hamming (7,4) code to limit the noise. We have to code the 4 bit data in to 7 bit data by adding 3 parity bits. Implementation will be in C.
4. Implementation of LZW compression algorithm in C.
5. Write a socket program in C to implement a listener and a talker.
6. Simulation of a network of 3 nodes and measure the performance on the same network.
7. Write a program in C to encrypt 64-bit text using DES algorithm.

ARTIFICIAL INTELLIGENCE LAB (PCS-653)

1. Write a LISP Program to solve the water-jug problem using heuristic function.
2. Create a compound object using Turbo Prolog.
3. Write a Prolog Program to show the advantage and disadvantage of green and red cuts.
4. Write a prolog program to use of BEST-FIRST SEARCH applied to the eight puzzle problem.
5. Implementation of the problem solving strategies: Forward Chaining, Backward Chaining, Problem Reduction.
6. Write a Lisp Program to implement the STEEPEST-ASCENT HILL CLIMB ING.
7. Write a Prolog Program to implement COUNTE PROPAGATION NETWORK.

SCHEME OF EXAMINATION

&

SYLLABI

for

B. TECH.COMPUTER SCIENCE & ENGINEERING
YEAR FOURTH
(Effective from the session: 2009-2010)

Uttrakhand Technical University,Dehradun

www.uktech.in

UTTRAKHAND TECHNICAL UNIVERSITY, DEHRADUN
STUDY AND EVALUATION SCHEME
B. TECH.COMPUTER SCIENCE & ENGINEERING
YEAR FOURTH, SEMESTER - VII
(Effective from the session: 2009-2010)

S.No	Course Code	Subject	PERIODS			EVALUATION SCHEME				Subject Total
						SESSIONAL EXAM			EXAM ESE	
			L	T	P	CT	TA	Total		
1	TCS-701	Introduction to Web Technology	3	1	0	30	20	50	100	150
2	TCS- 702	Advanced Computer Architecture	3	1	0	30	20	50	100	150
3		Elective I	3	1	0	30	20	50	100	150
4		Elective-II	3	1	0	30	20	50	100	150
5		Open Elective	3	1	0	30	20	50	100	150
Practical/Training/Project										
1	PIT-751	Web Technology Lab	0	0	2	-	25	25	25	50
2	PIT-752	Advanced Computer Architecture Lab	0	0	2	-	25	25	25	50
3	PIT-753	Colloquium & Industrial Report	0	0	2	-	50	50	-	50
4	PIT-754	Project	0	0	2	-	25	25	25	50
5	GP-701	General Proficiency	-	-	-	-	50	50	-	50
Total			**15**	**5**	**8**					**1000**

Choose one Subject from each Elective

Code	Elective I	Code	Elective II
CS – 011	Digital Image Processing	CS- 021	Cryptography & Network Security
CS – 012	Network Programming & Administration	CS 022	.Net Technologies & Visual Programming
CS – 013	Real Time System	CS 023	System Software and Administration
CS –014	Wireless Networks	CS 024	Soft Computing

UTTRAKHAND TECHNICAL UNIVERSITY, DEHRADUN
STUDY AND EVALUATION SCHEME
B. TECH.COMPUTER SCIENCE & ENGINEERING
YEAR FOURTH, SEMESTER - VIII
(Effective from the session : 2009-2010)

S.No	Course Code	Subject	PERIODS			EVALUATION SCHEME				Subject Total
						SESSIONAL EXAM			EXAM ESE	
			L	T	P	CT	TA	Total		
1	TCS-801	Distributed Systems	3	1	0	30	20	50	100	150
2	TCS 802	Mobile Computing	3	1	0	30	20	50	100	150
3		Elective-III	3	1	0	30	20	50	100	150
4		Elective-IV	3	1	0	30	20	50	100	150
Practical/Training/Project										
1	PCS-851	Distributed Systems Lab	0	0	2	-	25	25	25	50
2	PCS-852	Project	0	0	2	-	100	100	200	300
3	GP-801	General Proficiency	-	-	-	-	50	50	-	50
Total			**12**	**4**	**4**					**1000**

Choose one subject from each elective

Code	Elective II	Code	Elective III
CS – 031	Embedded Systems	CS – 041	Advanced DBMS
CS - 032	Parallel Computing	CS – 042	Data Mining & Date Warehousing
CS – 033	Multimedia Communication & System Design	CS – 043	Computational Geometry
CS – 034	Pattern Recognition	CS – 044	Granular Computing
CS-035	Natural Language Processing	CS-045	Storage Networks

(TCS-701) INTRODUCTION TO WEB TECHNOLOGY

UNIT I: Introduction and Web Development Strategies

History of Web, Protocols governing Web, Creating Websites for individual and Corporate World, Cyber Laws, Web Applications, Writing Web Projects, Identification of Objects, Target Users, Web Team, Planning and Process Development.

UNIT II: HTML, XML and Scripting

List, Tables, Images, Forms, Frames, CSS Document type definition, XML schemes, Object Models, Presenting XML, Using XML Processors: DOM and SAX, Introduction to Java Script, Object in Java Script, Dynamic HTML with Java Script.

UNIT III: Java Beans and Web Servers

Introduction to Java Beans, Advantage, Properties, BDK, Introduction to EJB, Java Beans API Introduction to Servelets, Lifecycle, JSDK, Servlet API, Servlet Packages: HTTP package, Working with Http request and response, Security Issues.

UNIT IV: JSP

Introduction to JSP, JSP processing, JSP Application Design, Tomcat Server, Implicit JSP objects, Conditional Processing, Declaring variables and methods, Error Handling and Debugging, Sharing data between JSP pages- Sharing Session and Application Data.

UNIT V: Database Connectivity

Database Programming using JDBC, Studying Javax.sql.*package, accessing a database from a JSP page, Application-specific Database Action, Developing Java Beans in a JSP page, introduction to Struts framework.

Books:

1. Burdman, “Collaborative Web Development” Addison Wesley.
2. Chris Bates, “Web Programing Building Internet Applications”, 2nd Edition, WILEY, Dreamtech
3. Joel Sklar , “Principal of web Design” Vikash and Thomas Learning
4. Horstmann, “CoreJava”, Addison Wesley.
5. Herbert Schieldt, “The Complete Reference:Java”, TMH.
6. Hans Bergsten, “Java Server Pages”, SPD O’Reilly

(TCS - 702) ADVANCE COMPUTER ARCHITECTURE

Unit-I: Introduction

Introduction to parallel computing, need for parallel computing, parallel architectural classification schemes, Flynn’s , Fengs classification, performance of parallel processors, distributed processing, processor and memory hierarchy, bus, cache & shared memory, introduction to super scalar architectures, quantitative evaluation of performance gain using memory, cache miss/hits.

Unit-II: Multi-core Architectures

Introduction to multi-core architectures, issues involved into writing code for multi-core architectures, development of programs for these architectures, program optimizations techniques, building of some of these techniques in compilers, OpenMP and other message passing libraries, threads, mutex etc.

Unit-III: Multi-threaded Architectures

Parallel computers, Instruction level parallelism (ILP) vs. thread level parallelism (TLP), Performance issues: Brief introduction to cache hierarchy and communication latency, Shared memory multiprocessors, General architectures and the problem of cache coherence, Synchronization primitives: Atomic primitives; locks: TTS, ticket, array;

Barriers: central and tree; performance implications in shared memory programs; Chip multiprocessors: Why CMP (Moore's law, wire delay); shared L2 vs. tiled CMP; core complexity; power/performance; Snoopy coherence: invalidate vs. update, MSI, MESI, MOESI, MOSI; performance trade-offs; pipelined snoopy bus design; Memory consistency models: SC, PC, TSO, PSO, WO/WC, RC; Chip multiprocessor case studies: Intel Montecito and dual-core, Pentium4, IBM Power4, Sun Niagara

Unit-IV: Compiler Optimization Issues

Introduction to optimization, overview of parallelization; Shared memory programming, introduction to OpenMP; Dataflow analysis, pointer analysis, alias analysis; Data dependence analysis, solving data dependence equations (integer linear programming problem); Loop optimizations; Memory hierarchy issues in code optimization.

Unit-V: Operating System Issues and Applications

Operating System issues for multiprocessing Need for pre-emptive OS; Scheduling Techniques, Usual OS scheduling techniques, Threads, Distributed scheduler, Multiprocessor scheduling, Gang scheduling; Communication between processes, Message boxes, Shared memory; Sharing issues and Synchronization, Sharing memory and other structures, Sharing I/O devices, Distributed Semaphores, monitors, spin-locks, Implementation techniques on multi-cores; OpenMP, MPI and case studies Case studies from Applications: Digital Signal Processing, Image processing, Speech processing.

Books:

1. Hwang, " Advanced Computer Architecture", New Age International
2. Quin, "Parallel Computing, Theory & Practices", McGraw Hill
3. M. Morris Mano, "Computer System Architecture", PHI
4. Richard Y. Kain, "Advanced Computer Architecture: A System Design Approach", PHI

(CS - 011) DIGITAL IMAGE PROCESSING

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 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-II

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.

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-III

Color Image Processing

Color Fundamentals, Color Models, Converting Colors to different models, Color Transformation, Smoothing and Sharpening, Color Segmentation.

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-IV

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.

UNIT-V

Feature Extraction

Representation, Topological Attributes, Geometric Attributes

Description

Boundary-based Description, Region-based Description, Relationship.

Object Recognition

Deterministic Methods, Clustering, Statistical Classification, Syntactic Recognition, Tree Search, Graph Matching

Books:

1. Digital Image Processing 2nd Edition, Rafael C. Gonzalvez and Richard E. Woods. Published by: PHI.
2. B. Chanda, D.D. Majumder, "Digital Image Processing & Analysis", PHI
3. Digital Image Processing and Computer Vision, R.J. Schalkoff. Published by: John Wiley and Sons, NY.
4. Fundamentals of Digital Image Processing, A.K. Jain. Published by Prentice Hall, Upper Saddle River, NJ.

(TCS – 012)Network Programming & Administration

Unit – I

Introduction to Systems Programming: Files, System Files, File Formats, Buffered I/O, Directories, File System, Inodes, links, fcntl, links, locks, Device I/O, Terminal I/O, ioctl(), Files and Devices ,Signals, video I/O ,Multi-Tasking

Unit - II

Processes and Inter-Process Communication: timers, polling vs interrupts, environment, fork, exec, wait, environment, exit and wait, pipe, fifos, message queues, semaphore

Unit - III

Network Programming: Sockets, Operation, Socket types, Domains Name Binding, Closing Sockets, I/O Multiplexing, Client/Server Models, Connection Based Services, Handling Out of Band Data, Connectionless Services, Design issues of Concurrent and iterative servers, Socket options

Unit - IV

XDR and Remote Procedure Calls, Network Programming at the level of Programming Language (can use Java or Python as case study)

Text Book:

1. Unix Network Programming, W. Richard Stevens, Prentice Hall, 1998

References:

1. Internetworking with TCP/IP, Volume3, Douglas Comer, Prentice Hall, 2000
2. Internetworking with TCP/IP, Volume1, Douglas Comer, Prentice Hall, 2000

(CS - 013) REAL TIME SYSTEMS

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, Offline Versus Online Scheduling, Scheduling Aperiodic and Sporadic jobs in Priority Driven and Clock Driven Systems.

UNIT-III: Resources Access Control

Effect of Resource Contention and Resource Access Control (RAC), Nonpreemptive 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: Multiprocessor System Environment

Multiprocessor and Distributed System Model, Multiprocessor Priority-Ceiling Protocol, Schedulability of Fixed-Priority End-to-End Periodic Tasks, Scheduling Algorithms for End-to-End Periodic Tasks, End-to-End Tasks in Heterogeneous Systems, Predictability and Validation of Dynamic Multiprocessor Systems, Scheduling of Tasks with Temporal Distance Constraints.

UNIT-V: Real Time Communication

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, Real Time Protocols, Communication in Multicomputer System, An Overview of Real Time Operating Systems.

Books:

1. Real Time Systems by Jane W. S. Liu, Pearson Education Publication.
2. Real-Time Systems: Scheduling, Analysis, and Verification by Prof. Albert M. K. Cheng, John Wiley and Sons Publications.

(CS – 014)WIRELESS NETWORKS

Unit – 1 Introduction

Liberalization of communications Industry, Digitalization of content, changes in spectrum management, cellular reuse, drive towards broadband, IEEE 802.11 networks

Unit – 2 Wireless Network Systems

Cellular networks

Tthe GSM circuit switched network, GSM channel structure, Authentication and location updating, physical channels, TMN

GPRS

Introduction to GPRS, contexts, PDP context, Mobility management context, MS-SGSN physical layer, MS-SGSN protocols, GPRS operations

Unit – 3 Principles of access network planning

Circuit voice networks

Introduction to CVN, coverage, capacity, planning for circuit multimedia services

Planning for packet multimedia services

Planning approaches, buffer-pipe model, characterization of applications, practical modeling methodologies, multiuser packet transport configurations

Unit – 4 Planning and design

RAN, GSM RAN, UMTS RAN, Cellular OFDM RAN, Mesh network

Unit – 5 Network operation and optimization

Enhanced telecom operations model (eTOM), wireless network life cycle – strategy, infrastructure and product, operations, enterprise management,

GSM network performance optimization – principles and key performance indicators, coverage optimization, GPRS RAN optimization, UMTS network performance optimization

Text Books:

1. Deploying Wireless networks, Andy wilton, Tim charity, Cambridge university press
2. Fundamental of Wireless Networking, Ron Price, TMH
3. 3G Wireless Networks, Clint Smity, TMH
4. Essentials of UMTS, Christopher Cox, Cambridge University Press

(CS 021/TIT 701) CRYPTOGRAPHY AND NETWORK SECURITY

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, Shannon's theory of confusion and diffusion, fiestal structure, data encryption standard(DES), strength of DES, differential and linear crypt analysis of DES, block cipher modes of operations, triple DES, IDEA encryption and decryption, strength of IDEA, confidentiality using conventional encryption, traffic confidentiality, key distribution, random number generation.

Unit-II

Introduction to graph, 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, Elganel encryption.

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, New Jersy.
2. Johannes A. Buchmann, "Introduction to Cryptography", Springer-Verlag.
3. B. Forouzan, "Cryptography and Network Security, TMH

(CS 022) .Net Technologies & Visual Programming

UNIT 1 The Philosophy of .NET

Understanding the previous states affair, The .NET Solution, The building Block of the .NET platform (CLR,CTS,CLS), the role of the .NET base class libraries, What C# brings to the table, additional .NET – Aware programming Languages, An overview of .NET binaries (aka assemblies), The role of the common intermediate language, The role of .NET type metadata, The role of the assembly manifest, Compiling CIL to platform specific instruction, Understanding the common type system, Intrinsic CTS data types, Understanding the common languages specification, Understanding the common languages runtime, A tour of the .NET namespace, increasing your namespace nomenclature, Deploying the .NET runtime.

UNIT 2 Building C# Applications

The role of the command line compiler (CSC.exe), Building C# application using csc.exe, Working with csc.exe response file, generating bug reports, Remaining C# compiler option, The command line debugger, using the visual studio. Net IDE, Other key aspects of the VS.Net IDE, Documenting your source code via XML, C# preprocessor directives, An interesting Aside: The System. Environment class, Building .Net application with other IDEs. C# Language Fundamentals : An Anatomy of a basic C# class, Creating objects: Constructor basic, the composition of a C# application, Default Assignment and variable scope, The C# member initialization syntax, Basic input and output with the console class, Understanding value types and reference types, The master node: System. Objects, The system Data type (And C# aliases), Converting between value type and reference type: Boxing and Unboxing, Defining program constraints, C# Iterations constructs, C# control flow constructs, The complete set C# operator, Defining Custom class methods, Understanding static methods, Method parameter modifiers, Array manipulation in C#, String manipulation in C#, C# Enumerations, Defining structures in C#, Defining custom namespaces.

UNIT 3 Object Oriented Programming with C#

Formal definition of the C# class, Definition the "Default public interface" of a type, Recapping the pillars of OOP, The first pillar: C# Encapsulation services, Pseudo Encapsulation: Creating read only field, The second pillar: C#'s Inheritance supports keeping family secrets: The "Protected" keyword, The Nested type definitions, The third pillar: C#'s Polymorphic support casting between types, Generating class definitions using Visual Studio. Net. Exceptions and Objects Life Time Ode to errors, Bugs and exceptions, The role of .NET exceptions handling, The system. Exception base class throwing a generic exception catching exception, CLR system level exception (System. system exception),Custom application level exception (System. application exception), Handling multiple exception, The finally block, The last chance exception, dynamically identify application and system level exception,

Debugging system exception using VS.Net, Understanding Object life time, The CIT of new, The basic of garbage collection, Finalizing a type, Finalization process, building and Ad hoc destruction method, garbage collection optimization, The system .GC type.

UNIT 4 Interfaces and Collections

Defining interfaces using C#, Invoking interface member at the object level, Exercising the shape hierarchy, Understanding explicit interface implementation, Interfaces as Polymorphic agents, Building interface hierarchies, Implementing interface using VS.Net, Understanding the Iconvertible interface, Building a custom enumerator (I Enumerable and Ienumerator), Building cloneable objects (Icloneable), Building comparable objects (I Comparable), Exploring the system the collection namespace, Building a custom container (Retrofitting the cars type).

UNIT 5

Understanding .Net Assembles Problems with classic COM Binaries, An overview of .Net assembly, Building a simple file test assembly, A C# Client Application, A Visual Basic .Net Client application, Cross Language Inheritance, Exploring the Carlibrary's manifest, Exploring the Carlibrary's Types, Building the multi file assembly, Using the multi file assembly, Understanding private assemblies, Probing for private assemblies (The Basics), Private assemblies and XML Configuration files, Probing for private assemblies (The Details),Understanding Shared assembly, Understanding Shared Names, Building a Shared assembly, Understanding delay Signing, Installing/Removing shared assemblies, Using a Shared assembly.

Text Book:

1. Andrew Troelsen C# and The .Net platform, , Second edition,2003, Dream TECH Press, India.
2. Tom Archer Inside C#, , 2001,WP Publishers.

(CS 023) System Software and Administration

Unit-I

Assemblers: General design procedures, Design of two pass assemblers, Cross Assemblers, Macro Processors – Features of a macro facility,(macro instruction arguments, conditional macro expansion, macro calls within macros), Implementation of a restricted facility : A two pass algorithm; Macro Assemblers.

Loader schemes: Compile and go loaders, absolute loaders, relocating loader, Linking, Reallocation- static & dynamic linking, Direct linking loaders, Binders, Overlays, dynamic binders; Working principle of Editors, Debuggers.

System Administration

Unit- II

Introduction: Duties of the Administrator, Administration tools, Overview of permissions.

Processes: Process status, Killing processes, process priority. Starting up and Shut down:

Peripherals, Kernel loading, Console, The scheduler, init and the inittab file, Run-levels, Run level scripts.

Managing User Accounts: Principles, password file, Password security, Shadow file, Groups and the group file, Shells, restricted shells, user management commands, homes and permissions, default files, profiles, locking accounts, setting passwords, Switching user, Switching group, Removing users.

Unit - III

Managing Unix File Systems: Partitions, Swap space, Device files, Raw and Block files, Formatting disks, Making filesystems, Superblock, I-nodes, Filesystem checker, Mounting filesystems, Logical Volumes, Network Filesystems, Boot disks

Configuring the TCP/IP Networking : Kernel Configuration; Mounting the /proc Filesystem, Installing the Binaries, Setting the Hostname, Assigning IP Addresses, Creating Subnets, Writing hosts and networks Files, Interface Configuration for IP, ifconfig, netstat command, Checking the ARP Tables; Name service and resolver configuration.

Unit- IV

TCP/IP Firewall : Methods of Attack, What Is a Firewall? What Is IP Filtering? Setting Up Linux for Firewalling Testing a Firewall Configuration; A Sample Firewall Configuration: IP Accounting, Configuring the Kernel for IP Accounting, Configuring IP Accounting, Using IP Accounting Results

IP Masquerade and Network Address Translation : Side Effects and Fringe Benefits, Configuring the Kernel for IP Masquerade, Configuring IP Masquerade.

Unit-V

The Network Information System : Getting Acquainted with NIS, NIS Versus NIS+ , The Client Side of NIS, Running an NIS Server, NIS Server Security.

Network file system: Preparing NFS, Mounting an NFS Volume, The NFS Daemons, The exports File.

System Backup & Recovery: Log files for system and applications; Backup schedules and methods (manual and automated).

Text Books:

1. L.L. Beck – "System Software " (3rd Ed.)- Pearson Education

2. Michel Ticher – "PC System Programming" , Abacus.

3. Kirch – " Linux network Administrator's guide (2nd Ed.)" – O'Rielly

4. Maxwell – "Unix system administration" - TMH

5. Limoncelli –"The Practice of System & Network Administration"-Pearson

6. Wells, LINUX Installation & Administration, Vikas

Reference Books:

1. W. R. Stevens – "Unix network programming, vol. 1(2nd Ed.)" – Pearson Education/PHI

2. W. R. Stevens – "TCP/IP illustrated, vol. 1" – PHI/Pearson Education

3. Comer – "Internetworking with TCP/IP, vol. 1(4th Ed.)" – Pearson Education/PHI

4. E. Nemeth, G. Snyder, S. Seebass, T. R. Hein – " Unix system administration handbook" – Pearson Education

(CS024) Soft Computing

Unit –I

Introduction to soft computing. Applications of Artificial Neural Networks, fuzzy logic, genetic algorithms and other soft-computing techniques. Their strengths and weaknesses. Synergy of soft computing techniques.

Artificial neural networks : over view of history, Mathematical Models of Neurons, ANN architecture.

Unit-II

Introduction to artificial neural network

Neural Networks: Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta, Back Propagation Algorithm, Multilayer Perceptron Model, Competitive learning networks, Kohonen self organizing networks, Hebbian learning; Hopfield Networks,

Unit-III

Fuzzy Logic: Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation.

Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations.

Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.

Unit - IV

Genetic algorithms(Gas),Evolution strategies(Ess),Evolutionary programming(EP),Genetic Programming(GP),Selecting, crossover, mutation, schema analysis, analysis of selection algorithms; convergence; Markov & other stochastic models.

Unit - V

Other Soft computing approaches Simulated Annealing, Tabu Search, Ant colony based optimisation, etc.

Text:

1. “Neuro-Fuzzy and Soft computing”, Jang, Sun, Mizutani, Pearson
2. “Neural networks: a comprehensive foundation”, Haykin, Pearson
3. “Genetic Algorithms”, Goldberg, Pearson
4. “Fuzzy Sets & Fuzzy Logic”, G.J. Klir & B. Yuan, PHI.

Reference:

1. “An Introduction to Neural Networks”, Anderson J.A., PHI, 1999.
2. “Introduction to the Theory of Neural Computation”, Hertz J. Krogh, R.G. Palmer, Addison- Wesley, California, 1991.
3. “An Introduction to Genetic Algorithm”, Melanie Mitchell, PHI, 1998.
4. “Neural Networks-A Comprehensive Foundations”, Prentice-Hall International, New Jersey, 1999.
5. “Neural Networks: Algorithms, Applications and Programming Techniques”, Freeman J.A. & D.M. Skapura, Addison Wesley, Reading, Mass, (1992).

(TCS-801) DISTRIBUTED SYSTEMS

Unit–I

Characterization of Distributed Systems: Introduction, Examples of distributed Systems, Resource sharing and the Web Challenges.

System Models: Architectural models, Fundamental Models

Theoretical Foundation for Distributed System: Limitation of Distributed system, absence of global clock, shared memory, Logical clocks, Lamport's & vectors logical clocks, Causal ordering of messages, global state, 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 dead lock detection, distributed dead lock 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, Application of Agreement problem, Atomic Commit in Distributed Database system.

Unit–III

Distributed Objects and Remote Invocation: Communication between distributed objects, Remote procedure call, Events and notifications, Java RMI case study.

Security: Overview of security techniques, Cryptographic algorithms, Digital signatures Cryptography pragmatics, Case studies: Needham Schroeder, Kerberos, SSL & Millicent.

Distributed File Systems: File service architecture, Sun Network File System, The Andrew File System, Recent advances.

Unit–IV

Transactions and Concurrency Control: Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency control.

Distributed Transactions: Flat and nested distributed transactions, Atomic Commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. Replication: System model and group communication, Fault - tolerant services, highly available services, Transactions with replicated data.

Unit –V

Distributed Algorithms: Introduction to communication protocols, Balanced sliding window protocol, Routing algorithms, Destination based routing, APP problem, Deadlock free Packet switching, Introduction to Wave & traversal algorithms, Election algorithm.

CORBA Case Study: CORBA RMI, CORBA services.

Books:

1. Singhal & Shivaratri, "Advanced Concept in Operating Systems", McGraw Hill
2. Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design", Pearson Ed.
3. Gerald Tel, "Distributed Algorithms", Cambridge University Press

(TCS-802) MOBILE COMPUTING

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

Ad Hoc 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.

Books:

1. J. Schiller, Mobile Communications, Addison Wesley.
2. A. Mehrotra , GSM System Engineering.
3. M. V. D. Heijden, M. Taylor, Understanding WAP, Artech House.
4. Charles Perkins, Mobile IP, Addison Wesley.
5. Charles Perkins, Ad hoc Networks, Addison Wesley**.**

(CS – 031) EMBEDDED SYSTEMS

Unit-I

Introduction to embedded systems: Classification, Characteristics and requirements

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.

Books:

1. H.Kopetz, "Real-Time Systems", Kluwer, 1997.
2. R.Gupta, "Co-synthesis of Hardware and Software for Embedded Systems", Kluwer 1995.
3. Rajkamal, "Embedded Systems", TMH, 2008

(CS - 032) PARALLEL COMPUTING

UNIT-1

Introduction: What is parallel and distributed computing, Scope of parallel and distributed computing, Scope of parallel computing. Parallel Programming Platforms: implicit parallelism, Dichotomy of parallel computing platforms, Physical organization for parallel platforms, communication cost in parallel machines, routing mechanism for interconnection networks.

UNIT-2

Basic Communication Operation: One-to-all broadcast; All-to-all broadcast; Reduction and prefix sums; One-to-all personalized communication; All-to-all personalized communication;

UNIT-3

Performance and Scalability of Parallel Systems: Performance matrices for Parallel systems ? Run time, Speed up, Efficiency and Cost; The effect of granularity on performance

UNIT-4

Sorting: Sorting networks; Bubble sort and its variants; Quick sort and other sorting algorithms

UNIT-5

Dynamic Programming: Overview of dynamic programming, Serial monadic DP Formulations: The shortest path Problem, the 0/1 Knapsack Problem, Serial Polyadic DP Formulation : all pair shortest paths algorithms.

References:

1. Vipin Kumar, Ananth Grama, Anshul Gupta and George Karypis; Introduction to Parallel Computing, The Benjamin/Cumming Publishing Company, Inc., Masschachusetts

2. George Coulouris, Jean Dollimore and Tim Kindberg; Distributed Systems Concepts and Design, Addison-Wesley, Masschachusetts

3. S G Akl; The Decision and analysis of parallel algorithms, PH Englewood Cliffs, New Jersey.

4. Advanced Computer Architecture: Parallelism, Scalability, Programmability, TMH.

5. J Jaja; An Introduction to Parallel Algorithms, Addison Wesley, Masschachusetts.

6. T G Lewis and H El ?Rewini; Introduction to Parallel Computing, Prentice-Hall, Englewood Cliffs, New Jersey.

7. M J Quinn; Parallel Computing: Theory and Practice, McGraw-Hill, New York.

(CS – 033) MULTIMEDIA COMMUNICATION & SYSTEM DESIGN

Unit-I: Introduction

Introduction to Multimedia, Multimedia Information, Multimedia Objects, Multimedia in business and work. Convergence of Computer, Communication and Entertainment products

Stages of Multimedia Projects

Multimedia hardware, Memory & storage devices, Communication devices, Multimedia software's, presentation tools, tools for object generations, video, sound, image capturing, authoring tools, card and page based authoring tools.

Unit-II: Multimedia Building Blocks

Text, Sound MIDI, Digital Audio, audio file formats, MIDI under windows environment Audio & Video Capture.

Unit-III: Data Compression

Huffman Coding, Shannon Fano Algorithm, Huffman Algorithms, Adaptive Coding, Arithmetic Coding Higher Order Modelling. Finite Context Modelling, Dictionary based Compression, Sliding Window Compression, LZ77, LZW compression, Compression, Compression ratio loss less & lossy compression.

Unit-IV: Speech Compression & Synthesis

Digital Audio concepts, Sampling Variables, Loss less compression of sound, loss compression & silence compression.

Unit-V: Images

Multiple monitors, bitmaps, Vector drawing, lossy graphic compression, image file formatic animations Images standards, JPEG Compression, Zig Zag Coding, Multimedia Database.Content based retrieval for text and images,**Video:**Video representation, Colors, Video Compression, MPEG standards, MHEG Standard Video Streaming on net, Video Conferencing, Multimedia Broadcast Services, Indexing and retrieval of Video Database, recent development in Multimedia.

Books:

1. Tay Vaughan "Multimedia, Making IT Work" Osborne McGraw Hill.
2. Buford "Multimedia Systems" Addison Wesley.
3. Agrawal & Tiwari "Multimedia Systems" Excel.
4. Mark Nelson "Data Compression Book" BPB.
5. David Hillman "Multimedia technology and Applications" Galgotia Publications.
6. Rosch "Multimedia Bible" Sams Publishing.
7. Sleinreitz "Multimedia System" Addison Wesley.
8. James E Skuman "Multimedia in Action" Vikas.

(CS – 034) PATTERN RECOGNITION

Unit – 1 Introduction

Pattern recognition, classification and description, patterns and features extraction, training and learning in PR systems, pattern recognition approaches

Unit – 2

Pattern Discrimination

Decision regions and functions, feature Space Metrics, The Covariance Matrix, Principal components, feature assessment, dimensionality ratio problem

Data Clustering

Unsupervised classification, Standardization issues, tree clustering, dimensional reduction, K-means clustering, cluster validation

Unit – 3 Statistical Classifications

Linear Discriminants, Bayesian classification, Model free techniques, feature selection, classifier evaluation, tree classifier

Unit – 4 Syntactic pattern recognition

Introduction, quantifying structure in pattern description, grammar based approach and applications, elements of formal grammars, recognition of syntactic descriptions, parsing, CYK parsing algorithm

Unit – 5 Structural pattern recognition

Primitives, structural representations, syntactic analysis, structural matching

Text Books:

1. Pattern Recognition: Statistical, structural and neural approaches, Robert J. Schalkoff, WILEY 1992
2. Pattern Recognition: Concepts, Methods and applications, J.P. Marques, Springer 2008
3. Pattern Recognition: Techniques and applications, rajjan Shinghal, Oxford University Press, 2006

(CS-035) NATURAL LANGUAGE PROCESSING

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.

Books:

1. Akshar Bharti, Vineet Chaitanya and Rajeev Sangal, *NLP: A Paninian Perspective*, Prentice Hall, New Delhi
2. James Allen, *Natural Language Understanding,* 2/e, Pearson Education, 2003
3. D. Jurafsky, J. H. Martin, *Speech and Language Processing*, Pearson Education, 2002
4. L.M. Ivansca, S. C. Shapiro, *Natural Language Processing and Language Representation*
5. T. Winograd, *Language as a Cognitive Process*, Addison-Wesley

(CS – 041) ADVANCED DATABASE SYSTEMS

UNIT-1

Distributed DBMS Concepts and design: Introduction, functions and architecture of a DDBMS, distributed relational database design, Transparencies in a DDBMS, Twelve rules for a DDBMS. Advanced concepts: Distributed transaction management, distributed concurrency control, distributed deadlock management, distributed database recovery, X/open distributed Transaction processing model, Replication servers, Distributed query optimization, Mobile databases.

UNIT-2

Object-Oriented DBMS Introduction, advanced database applications, weakness of RDBMS, storing objects in a relational database, next-generation database systems. Concepts and design: OODBMS perspectives, persistence, issues in OODBMS, advantages and disadvantages of OODBMS, Object-oriented database design.

UNIT-3

Standards and systems: object management group, object database standard ODMG 3.0 1999, Object store. Object relational DBMS: Introduction, third generation database manifestos, SQL8, Object oriented extensions in Oracle, Comparison of ORDBMS and OODBMS.

UNIT-4

Web technology and DBMS Web as a database Application Platform: Requirements for web-DBMS integration, web-DBMS architecture, advantages and disadvantages of web-DBMS approach, approaches to integrating the web and DBMS, Oracle Internet Application Server (IAS).

UNIT-5

Data Warehousing Concepts, OLAP and Data mining Evolution of data warehousing, data warehousing concepts, benefits and problems of data warehousing, comparison of OLTP systems and data warehousing, On-Line Processing, Introduction to data mining.

Books:

1. Adam, Nabil R., Bhargava, Bharat K., "Advanced Database Systems", Springer.
2. Carlo Zaniolo, Stefano Ceri, "Advanced Database Systems", Morgan Kaufmann, 1997

(CS – 042) DATA MINING AND WAREHOUSING

Unit-I

Overview, Motivation(for Data Mining),Data Mining-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, Clustering, Discretization and Concept hierarchy generation.

Unit-II

Concept Description:- Definition, Data Generalization, Analytical Characterization, Analysis of attribute relevance, Mining Class comparisions, Statistical measures in large Databases. Measuring Central Tendency, Measuring Dispersion of Data, Graph Displays of Basic Statistical class Description, Mining Association Rules in Large Databases, Association rule mining, mining Single-Dimensional Boolean Association rules from Transactional Databases– Apriori Algorithm, Mining Multilevel Association rules from Transaction Databases and Mining Multi-Dimensional Association rules from Relational Databases.

Unit-III

Classification and Predictions:

What is Classification & Prediction, Issues regarding Classification and prediction, Decision tree, Bayesian Classification, Classification by Back propagation, Multilayer feed-forward Neural Network, Back propagation Algorithm, Classification methods Knearest neighbor classifiers, Genetic Algorithm.

Cluster Analysis:

Data types in cluster analysis, Categories of clustering methods, Partitioning methods. Hierarchical Clustering- CURE and Chameleon, Density Based Methods-DBSCAN, OPTICS, Grid Based Methods- STING, CLIQUE, Model Based Method –Statistical Approach, Neural Network approach, Outlier Analysis

Unit-IV

Data Warehousing: Overview, Definition, Delivery Process, 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-V

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.

Books:

1. M.H.Dunham,"Data Mining:Introductory and Advanced Topics" Pearson Education
2. Jiawei Han, Micheline Kamber, "Data Mining Concepts & Techniques" Elsevier
3. Sam Anahory, Dennis Murray, "Data Warehousing in the Real World : A Practical Guide for Building Decision Support Systems, 1/e " Pearson Education
4. Mallach,"Data Warehousing System",McGraw –Hill

(CS – 043) COMPUTATIONAL GEOMETRY

UNIT-I

Convex hulls: construction in 2d and 3d, lower bounds; Triangulations: polygon triangulations, representations, point-set triangulations, planar graphs;

UNIT-II

Voronoi diagrams: construction and applications, variants; Delayney triangulations: divide-and-conquer, flip and incremental algorithms, duality of Voronoi diagrams, minmax angle properties;

UNIT-III

Geometric searching: point-location, fractional cascading, linear programming with prune and search, finger trees, concatenable queues, segment trees, interval trees; Visibility: algorithms for weak and strong visibility, visibility with reflections, art-gallery problems;

UNIT-IV

Arrangements of lines: arrangements of hyper planes, zone theorems, many-faces complexity and algorithms; Combinatorial geometry: Ham-sandwich cuts.

UNIT-V

Sweep techniques: plane sweep for segment intersections, Fortune's sweep for Voronoi diagrams, topological sweep for line arrangements; Randomization in computational geometry: algorithms, techniques for counting; Robust geometric computing; Applications of computational geometry;

Books:

1. *Computational Geometry: An Introduction* by Franco P. Preparata and Michael Ian Shamos; SpringerVerlag, 1985.
2. *Computational Geometry, Algorithms and Applications* by Mark de Berg, Marc van Kreveld, Mark Overmars, and Otfried Schwarzkopf; Springer-Verlag, 1997. from Springer.
3. *Algorithmische Geometrie* (auf deutsch)by Rolf Klein Addison-Wesley, 1996
4. *Computational Geometry and Computer Graphics in C++* by Michael J. Laszlo (Nova Southeastern University) Prentice-Hall, 1996.
5. *Computational Geometry: An Introduction Through Randomized Algorithms* by Ketan Mulmuley Prentice-Hall, 1994
6. *Computational Geometry in C* by Joseph O'Rourke Cambridge University Press, second edition, 1998.

(CS – 044) GRANULAR COMPUTING

Unit – 1 Methodology and mathematical framework

Information Granules, Formal models of information granules, conceptual aspects, granular world, granular computing: pyramid, communication between granular worls.

Unit – 2 Sets and Intervals

Formalism of sets, set enclosure, Interval analysis, Interval Vectors, Interval Matrices, enclosure of functions.

Fuzzy Sets

Concept and formalism, geometry of fuzzy sets, main classes, operations on fuzzy sets, relationships, transformation, fuzzy arithmetic

Rough sets

Concept, set approximation, characterization, rough functions.

Unit – 3

Algorithm of Information Granulation

Principle of granular clustering, computational aspects of granular computing, granular analysis

Recursive information granulation

Introduction, design and characterization of information granules, assessment and Interpretation, Granular time series.

Unit – 4 Granular Systems Application

Temporal granulation and signal analysis, Granulation of signals in spatial domain, Granular models of signals, rough sets in signal granulation.

Unit – 5 Granular Data Compression

Fuzzy relational equations, relational calculus in image compression, experiments.

Text Books:

1. Granular computing: An introduction Andrez bargiela, Witold Pedrycz, Kluwer Academic Publisher, 2003
2. Handbook Of Granular Computing, Witold Pedrycz, Andrzej Skowron, Vladik Kreinovich, by Wiley.
3. Rough Sets, Fuzzy Sets, Data Mining, and Granular Computing, Slezak, Wang, Szczuka, Springer, 2005.

(CS-045) STORAGE NETWORKS

Unit – 1 Introduction to Storage Technology

Introduction to storage network, Five pillars of IT, parameters related with storage, data proliferation, problem caused by data proliferation, Hierarchical storage management, Information life cycle management (ILM), Role of ILM, Information value vs. time mapping, Evolution of storage, Storage infrastructure component, basic storage management skills and activities, Introduction to Datacenters, Technical & Physical components for building datacenters

Unit – 2 Technologies for Storage network

Server centric IT architecture & its limitations, Storage centric IT architecture & advantages, replacing a server with storage networks, Disk subsystems, Architecture of disk subsystem, Hard disks and Internal I/O channel, JBOD, RAID& RAID levels, RAID parity, comparison of RAID levels, Hot sparing, Hot swapping, Caching : acceleration of hard disk access, Intelligent Disk subsystem architecture,

Tape drives

Introduction to tape drives, Tape media, caring for Tape& Tape heads, Tape drive performance, Linear tape technology, Helical scan tape technology

Unit- 3 I/O techniques

I/O path from CPU to storage systems, SCSI technology – basics & protocol, SCSI and storage networks, Limitations of SCSI,

Fibre channel

Fibre channel, characteristic of fibre channel, serial data transfer vs. parallel data transfer, Fibre channel protocol stack, Links, ports & topologies, Data transport in fibre channel, Addressing in fibre channel, Designing of FC-SAN, components, Interoperability of FC-SAN, FC products,

IP Storage

IP storage standards (iSCSI, iFCP, FCIP, iSNS), IPSAN products, Security in IP SAN, introduction to infiniband, Architecture of Infiniband

NAS – Evolution, elements & connectivity, NAS architecture,

Unit – 4 Storage Virtualization

Introduction to storage virtualization, products, definition, core concepts, virtualization on various levels of storage network, advantages and disadvantages, Symmetric and asymmetric virtualization, performance of San virtualization, Scaling storage with virtualization

Unit – 5 Management of storage Networks

Management of storage network, SNMP protocol, requirements of management systems, Management interfaces, Standardized and proprietary mechanism, In-band& Out-band management,

Text Book:

1. "Storage Networks: The Complete Reference", R. Spalding, McGraw-Hill
2. "Storage Networking Fundamentals: An Introduction to Storage Devices, Subsystems, Applications, Management, and Filing Systems", Marc Farley, Cisco Press.
3. "Designing Storage Area Networks: A Practical Reference for Implementing Fibre Channel and IP SANs, Second Edition", Tom Clark Addison Wesley