

CENTRAL INSTITUTE OF TECHNOLOGY
(Centrally Funded Institute Under the Ministry of HRD, Govt. of India)
Bodoland Territorial Council, Kokrajhar, Assam-783370
(B.Tech Syllabus in Computer Science and Engineering)

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STUDY PLAN

Total Credit Requirements : 219

Total Number of Semesters : 8

1st YEAR: 1st SEMESTER (JULY-DEC)

A. Theory							
	Code	Subjects	Contacts (periods per week)				Credit points
			L	T	P	Total	
1.	MA101	Engineering Mathematics -I	3	1	0	4	4
2.	PH101	Engineering Physics	3	1	0	4	4
3.	CS101	Introduction to Computer Programming	3	1	0	4	4
4.	HU101	Communication Skills	3	0	0	3	3
5.	ES101	Environmental Engineering	3	1	0	4	4
Total of theory							19

B. Practicals							
	Code	Subjects	Contacts (periods per week)				Credit points
			L	T	P	Total	
1.	PH171	Physics Lab	0	0	3	2	2
2.	CE101	Engineering Graphics	0	1	0	1	1
3.	CE171	Engineering Graphics Lab	0	0	3	2	2
4.	WS171	Workshop Practice -I	0	1	3	3	3
5.	CS171	Computing Lab	0	0	3	2	2
Total of practicals							10

Total of 1st Semester: 29

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1st YEAR: 2nd SEMESTER (JAN-JUNE)

A. Theory							
	Code	Subjects	Contacts (periods per week)				Credit points
			L	T	P	Total	
1.	MA201	Engineering Mathematics -II	3	1	0	4	4
2.	CY201	Engineering Chemistry	3	1	0	4	4
3.	ES201	Basic Electrical Engineering	3	1	0	4	4
4.	ME201	Engineering Mechanics	3	1	0	4	4
5.	EC201	Basic Electronics	3	1	0	4	4
6.	HU201	Professional Ethics and Human value	2	0	0	2	2
Total of Theory							22

B. Practicals							
	Code	Subjects	Contacts (periods per week)				Credit points
			L	T	P	Total	
1.	CY271	Engineering Chemistry Lab	0	0	3	2	2
2.	WS271	Workshop Practice -II	0	1	3	3	3
3.	EE271	Basic Electrical and Electronics Lab	0	0	3	2	2
Total of Practicals							7

Total of 2nd Semester: 29

*** Approved by GU

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2nd YEAR: 3rd SEMESTER (JULY-DEC)

A. Theory							
	Code	Subjects	Contacts (periods per week)				Credit points
			L	T	P	Total	
1.	CS301	Computer Organization and Architecture	3	0	0	3	3
2.	CS303	Operating System	3	0	0	3	3
3.	MA301	Mathematics-III	3	0	0	3	3
4.	MA302	Discrete Mathematics	3	1	0	4	4
5.	IE301	Network Theory	3	1	0	4	4
6.	CS304	Data structure	3	0	0	3	3
Total of Theory							20

B. Practicals							
	Code	Subjects	Contacts (periods per week)				Credit points
			L	T	P	Total	
1.	CS373	Operating System Lab	0	0	3	3	2
2.	CS374	Data structure Lab	0	0	3	3	2
3.	IE371	Circuit Simulation Lab	0	0	3	3	2
4.	HU371	Language Lab	0	0	3	3	2
Total of Practicals							8

Total of 3rd Semester: 27

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2nd YEAR: 4th SEMESTER (JAN-JUNE)

A. Theory							
	Code	Subjects	Contacts (periods per week)				Credit points
			L	T	P	Total	
1.	HU401	Engineering Economics	3	0	0	3	3
2.	EC401	Digital Electronics	3	1	0	4	4
3.	CS401	Database Management systems	3	1	0	4	4
4.	CS402	Computer networks	3	1	0	4	4
5.	MA401	Numerical Methods & Computer Programming	3	1	0	4	4
Total of Theory							19

B. Practicals							
	Code	Subjects	Contacts (periods per week)				Credit points
			L	T	P	Total	
1.	CS471	Database Management systems Lab	0	0	2	2	2
2.	CS472	Networks lab	0	0	2	2	2
3.	EC471	Digital Electronics Lab	0	0	2	2	2
4.	MA471	NMCP Lab	0	0	2	2	2
Total of Practicals							8

Total of 4th Semester: 27

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3rd YEAR: 5th SEMESTER (JULY-DEC)

A. Theory							
	Code	Subjects	Contacts (periods per week)				Credit points
			L	T	P	Total	
1.	HU501	Industrial Management and Entrepreneurship	3	0	0	3	3
2.	IE501	Microprocessor and Interfacing	3	1	0	4	4
3.	CS501	System programming	3	0	0	3	3
4	CS502	Theory of Computation	3	0	0	3	3
5.	CS503	Design and analysis of algorithm	3	0	0	3	3
6.	CS51*	Elective	3	0	0	3	3
Total of Theory							19

B. Practicals							
	Code	Subjects	Contacts (periods per week)				Credit points
			L	T	P	Total	
1.	IE571	Microprocessor Lab	0	0	2	2	2
3.	CS571	Unix programming lab	0	0	2	2	2
Total of Practicals							4

Total of 5th Semester: 25

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3rd YEAR: 6th SEMESTER (JAN-JUNE)

A. Theory							
	Code	Subjects	Contacts (periods per week)				Credit points
			L	T	P	Total	
1.	HU601	Professional Communication	2	0	0	2	2
2.	CS601	Compiler Design	3	0	0	3	3
3	CS602	Software Engineering	3	1	0	4	4
4.	CS603	Information Security	3	1	0	4	4
5.	CS604	Computer Graphics	3	0	0	3	3
Total of Theory							16

B. Practical							
	Code	Subjects	Contacts (periods per week)				Credit points
			L	T	P	Total	
1.	CS672	Compiler Design Lab	0	0	2	2	2
2.	CS674	Computer Graphics Lab	0	0	2	2	2
3.	CS673	Information Security Lab	0	0	2	2	2
Total of Practical							6

Total of 6th Semester: 21

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4th YEAR: 7th SEMESTER (JULY-DEC)

A. Theory							
	Code	Subjects	Contacts (periods per week)				Credit points
			L	T	P	Total	
1.	CS71*	Elective	3	1	0	4	4
2.	CS71*	Elective	3	1	0	4	4
3.	CS71*	Elective	3	1	0	4	4
4.	CS71*	Elective	3	0	0	3	3
Total of Theory							15

B. Sessionals							
	Code	Subjects	Contacts (periods per week)				Credit points
			L	T	P	Total	
1.	CS791	Major Project –I	0	0	12	12	8
2.	CS792	Report and Presentation on Practical Training – II	-	-	-	-	3
3.	CS770	Seminar	0	0	3	3	2
Total of Practicals							13

Total of 7th Semester: 28

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4th YEAR: 8th SEMESTER (JAN-JUNE)

A. Theory							
	Code	Subjects	Contacts (periods per week)				Credit points
			L	T	P	Total	
1.	CS81*	Elective	3	0	0	3	3
2.	CS81*	Elective	3	0	0	3	3
3.	CS81*	Elective	3	0	0	3	3
Total of Theory							9

B. Sessionals							
	Code	Subjects	Contacts (periods per week)				Credit points
			L	T	P	Total	
1.	CS891	Major project -II	0	0	18	18	12
2.	CS892	Project Defense	-	-	-	-	4
3.	CS893	Comprehensive Viva Voce	-	-	-	-	8
Total of Practicals							24

Total of 8th Semester: 33

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List of Elective Courses in Computer Science and Engineering

CS511: OBJECT ORIENTED ANALYSIS AND DESIGN
CS512: MULTIMEDIA
CS513: NEURAL COMPUTING
CS711: ARTIFICIAL INTELLIGENCE
CS712: MOBILE COMPUTING
CS713: ADVANCED DATABASES
CS714: PARALLEL COMPUTING
CS715: DIGITAL SPEECH & IMAGE PROCESSING
CS716: PATTERN RECOGNITION
CS717: CRYPTOGRAPHY AND NETWORK SECURITY
CS718: GRAPH THEORY
CS811: ATM NETWORKS
CS812: ROBOTICS
CS813: HIGH PERFORMANCE MICROPROCESSORS
CS814: C# AND .NET FRAME WORK
CS815: TCP / IP – DESIGN AND IMPLEMENTATION
CS816: SOFTWARE TESTING
CS817: EMBEDDED SYSTEMS

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Detail Syllabus
of
B.Tech Programme
in
CIT Kokrajhar

2nd Year Onwards

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BASIC SCIENCES COURSES

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MA301: ENGINEERING MATHEMATICS –III

Code: MA301

Credits: 04

L-T-P: 3-1-0

Partial Differential Equations

Basic concepts, formation of partial differential equations, equation solvable by direct integration, linear and non-linear equations of first order. Homogenous linear equations with constant coefficients, solutions of heat equations, wave equations, transmission line equations and Laplace equations.

Tensor Analysis

Curvilinear coordinates, unit vectors in curvilinear system, representation of a vector in terms of unit base vectors, contravariant and covariant components of F, arc length and volume element in orthogonal curvilinear coordinates. Transformations of coordinates. Definition of tensors, fundamental operations with tensors, Symmetric and skew-Symmetric tensors, Riemannian space and metric tensor, Conjugate tensor, Christoffel symbols.

Calculus of Complex Variables

Analytic functions, C-R equations, conjugate functions, Harmonic functions, orthogonal systems. Formation of analytic functions, conformal mapping, integration of a complex functions, Cauchy's Integral Theorem, power series representation of complex functions, Laurent's Series, singularities, Residue Theorem.

Transformations

Laplace transformation of elementary functions, inverse Laplace transform, Linearity, Laplace transform of derivatives and integrals, shifting Theorems, Laplace transform of unit step function, Dirac-delta function, Differentiation and integration of transforms, convolution, Application to differential equations.

Definition, properties, Z-transform of some basic sequences, Z-transforms of some basic discrete functions, Shifting theorems.

Texts / References:

1. *B.S. Grewal: Higher Engg. Mathematics, Khanna Publishers*
2. *Gilbert Strang: Linear Algebra and applications, Thomson Books*
3. *P.L. Meyer: Introduction to Probability & Statistics*
4. *Shanti Narayan: Functions of Complex Variables, S. Chand & Co.*
5. *Murray R. Spiegel: Laplace Transforms, Thomson Books*
6. *I.M. Snedon: Elements of Partial Differential Equations, S. Chand & Co.*

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MA-302: DISCRETE MATHEMATICS

L T P
3 1 0

Unit-I

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

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

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

Unit-II

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

Unit-III

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

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

Boolean Algebra: Introduction, Axioms and Theorems of Boolean algebra, Simplification of Boolean Functions, Karnaugh maps, Logic gates, and Boolean algebra.

Unit-IV

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

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

Unit-V

Trees and Tree's Properties

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

References:

1. Koshy, Discrete Structures, Elsevier Pub. 2008
2. Kenneth H. Rosen, Discrete Mathematics and Its Applications, 6/e, McGraw-Hill, 2006.
3. B. Kolman, R.C. Busby, and S.C. Ross, Discrete Mathematical Structures, 5/e, Prentice Hall, 2004.
4. E.R. Scheinerman, Mathematics: A Discrete Introduction, Brooks/Cole, 2000.
5. R.P. Grimaldi, Discrete and Combinatorial Mathematics, 5/e, Addison Wesley, 2004.
6. Jean Paul Trembley, R Manohar, Discrete Mathematical Structures with Application to Computer Science, McGraw-Hill, Inc. New York, NY, 1975.

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MA401: NUMERICAL METHODS & COMPUTER PROGRAMMING

Code: MA01; Credits: 04; L-T-P: 3-1-0

Computer Arithmetic

Floating point Arithmetic, Normalization, Approximations and errors, types of error in computations

Transcendental and Polynomial Equations

Methods of iteration for finding solution of transcendental and equations: Newton Raphson Method, Regula-Falsi Method, Bisection Method, Secant Method.

Solution of linear simultaneous equations by Gauss Elimination Method & Gauss Siedal Method.

Curve Fitting and Interpolation

Linear and non-linear Regression Analysis. Difference table, Newton's Forward and Backward interpolation formulae, Lagrange's Interpolation Formula, Divided differences and Newton's general formula.

Numerical Differentiation & Integration

Numerical differentiation, Numerical Integration: Trapezoidal and Simpson's Rules. Gaussian Quadrature Formula.

Numerical Solution of Ordinary Differential Equations

Euler method, Modified Euler Method, Taylor Series Method, Runge - Kutta Method and Predictor – Corrector Method.

Lab: Developing C programs for the following methods:

1. Numerical integration by Trapezoidal & Simpson's Rules
2. Various iteration methods for solving transcendental and algebraic equations: viz. Newton Raphson Method, Bisection Method, Regula – Falsi Method, Secant Method
3. Gauss – Siedal Iteration Method
4. Various matrix operations and their uses as sub – routines
5. Use of pointers, data structures, loops, arrays

Texts / References:

1. *E. Balaguruswamy: Numerical Methods, Tata McGraw Hill*
2. *Jain, Iyengar and Jain: Numerical Methods for Scientific and Engineering Computations, New Age International, New Delhi*
3. *Sastry, S.S.: Introductory Methods of Numerical Analysis, PHI*
4. *B.S. Grewal: Numerical Methods for Engineering and Science, Khanna Publishers*
5. *Schaum's Outlines: Numerical Analysis, Tata McGraw Hill*

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HUMANITIES & SOCIAL SCIENCES COURSES

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HU401: ENGINEERING ECONOMICS

Code: HU401

Credits: 03

L-T-P: 3-0-0

Definition of Economics, Consumer behaviour, Utility analysis and demand analysis, Kinds of Demand, Law of Demand and Law of Supply, Elasticity of Demand: Types and Measurement, Scope of Economics including economics of environment and e-commerce.

Market forms-Perfect and Imperfect markets, Features of Perfect competition, Monopoly and Monopolistic competition. Price and output determination under Perfect Competition, Monopoly, Monopolistic and Oligopoly etc., Concept of Production function, Cost Analysis, Estimation of cost function-Profit and Break Even Analysis.

National Income, GNP and NNP, Per-Capita Income, Source of Public Revenue-Tax Revenue and Non-Tax Revenue, Direct and Indirect Tax. Inflation and Deflation. Banking-Definition - Types of Banks. Concept of Investment Analysis

Features of Indian Economy, Planning in India, Objectives. Economic Reforms in India-Concept of Economic Liberalization, Privatization and Globalization. Unemployment Problem in India-Types, Causes and remedial measures.

International Trade, Gains from International Trade, The World Trading Environment and Multinational Corporations, BPO etc., Function and Role of IMF, World Bank and WTO. Concept of Stock Exchange Market and Market for Securities.

Reference Book:

1. *M.L. Jhingan—Micro Economic Theory*
2. *Sumitra Paul-Managerial Economics*
3. *Joel Dean—Managerial Economics*

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HU501: INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP

Code: HU501

Credits: 03

L-T-P: 3-0-0

Meaning and Concept of Management, Principles and function of Management, Concept of Organizational Behaviour, Function of a Manager—Planning, Organizing, Coordinating and Controlling. Motivation—implication of Managers and application.

Leadership and Decision Making : Qualities and Styles of Leadership, Decision making process.

Individual Process in Organizations-Perception, attitude and personality, Factors that affect them, How they influence people. Group Process in Organizations, Group formation, Group effectiveness, Group Conflict.

Evolution, Role and Status of Human Resource Management in India. Recruitment and Selection Process in Organization, Job Analysis, Job Specification, Selection Process-Test and Interview. Trade Union and Collective Bargaining

Entrepreneurship-Meaning, Types of entrepreneur, Qualities of an entrepreneur, Role of Entrepreneur, Factors affecting entrepreneurial growth. Entrepreneurship Development Programme-Concept, Objective and Importance, Engineer Entrepreneurship Training Programme Scheme

Small Scale Industry-Definition, Types of Small Scale Industry, How to Set up Small Scale Industry, Role and Problem of Small Scale Industry. Concept of Joint Stock Company, Private and Public Limited Company. Source of Finance for Entrepreneur-Bank, Government and Financial Institutions etc.

Reference Books:

1. *S.S. Khanka-Organisational Behaviour.*
2. *S.S. Sarkar, R.K.Sharma and S.K.Gupta – Business Organisation and Entrepreneurship Development.*
3. *Cynthia L. Greene – Entrepreneurship.*

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HU601: PROFESSIONAL COMMUNICATION

Code: HU601

Credits: 02

L-T-P: 2-0-0

Oral Communication: Aims at improving the oral communication skills. Public speaking skills, features of effective speech – verbal – non-verbal, Presentation skills, Group discussion. Mock Interviews.

Written Communication: Focuses on improving the writing skills. A review of grammar, transformation of sentences; reading comprehension; Precis-writing, skills to express ideas through various kinds of essays; business administrative and E-correspondence, business reports, technical documentation & project proposal writing and CVs/ resumes; Application letters, Notices, Agenda, Minutes & Memos. Case Analysis.

Organization Communication: Attempts to acquaint students with the process and requirements of communication in organizations. It includes the objectives of communication, Channels of communication, Barriers in Communication, Non-verbal & Cross-cultural communication, Meetings, Conferences, Press Conference and Press release. **Business Communication Technology:** Audio-Visual aids, Internet, e-mail. **Creative Communication:** Slogan-writing, Advertisement.

Texts / References:

1. *Wren & Martin., English Grammar*
2. *John Metchell., How to write Reports*
3. *Mark McCormack., Communication*
4. *Rajendra Pal & J.S. Korlahalli, Essentials of Business Communication*

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PROGRAMME CORE COURSES

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CS301: COMPUTER ORGANIZATION & ARCHITECTURE

Code: CS301

Credits: 03

L-T-P: 3-0-0

Basic Structure Of Computers : Computer Types, Functional unit, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers. Data Representation. Fixed Point Representation. Floating – Point Representation. Error Detection codes.

Register Transfer Language And Microoperations : Register Transfer language. Register Transfer Bus and memory transfers, Arithmetic Microoperations, logic micro operations, shift micro operations, Arithmetic logic shift unit. Instruction codes. Computer Registers Computer instructions
– Instruction cycle.

Memory – Reference Instructions. Input – Output and Interrupt. STACK organization. Instruction formats. Addressing modes. DATA Transfer and manipulation. Program control. Reduced Instruction set computer.

Micro Programmed Control : Control memory, Address sequencing, microprogram example, design of control unit Hard wired control. Microprogrammed control

Computer Arithmetic : Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations. Decimal Arithmetic unit Decimal Arithmetic operations.

The Memory System : Basic concepts semiconductor RAM memories. Read-only memories Cache memories performance considerations, Virtual memories secondary storage. Introduction to RAID.

Input-Output Organization : Peripheral Devices, Input-Output Interface, Asynchronous data transfer Modes of Transfer, Priority Interrupt Direct memory Access, Input –Output Processor (IOP) Serial communication; Introduction to peripheral component, Interconnect (PCI) bus. Introduction to standard serial communication protocols like RS232, USB, IEEE1394.

Pipeline And Vector Processing : Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Vector Processing, Array Processors.

Multi Processors : Characteristics or Multiprocessors, Interconnection Structures, Interprocessor Arbitration. InterProcessor Communication and Synchronization Cache Coherence. Shared Memory Multiprocessors.

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TEXT BOOKS :

1. *Computer Systems Architecture – M.Moris Mano, IIIrd Edition, Pearson/PHI*
2. *Computer Organization – Car Hamacher, Zvonks Vranesic, SafeaZaky, Vth Edition, McGraw Hill.*

REFERENCES :

1. *Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI*
2. *Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson*
3. *Fundamentals or Computer Organization and Design, - Sivaraama Dandamudi Springer Int. Edition.*
4. *Computer Organization, Anjaneyulu, Himalaya Pub house*

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CS303: OPERATING SYSTEM

Code: CS303

Credits: 03

L-T-P: 3-0-0

Introduction: Operating System objective and function. The Evaluation of Operating Systems. Batch, interactive, time-sharing and real time systems. Protection.

Operating System Structure: System components, operating system service, System structure.

Concurrent Processes: Process concept, Principles of concurrency. The Producer/consumer problem, the critical section problem, Semaphores, Classical problems in concurrency, Interprocesses Communication, Process generation, Process Scheduling.

CPU Scheduling: Scheduling concepts, Performance criteria, Scheduling algorithms. Algorithm evaluation, Multiprocessor scheduling.

Dead locks: System model. Dead lock characterization. Prevention, avoidance and detection. Recovery from dead lock Combined approach.

Memory Management: Base machine, Resident Monitor, Multiprogramming with fixed partitions. Multiprogramming with variable partitions. Multiple Base Registers. Paging, segmentation. Paged segmentation, Virtual Memory concept, Demand Paging, Performance, Page Replacement algorithms, Allocation of frames, Thrashing, cache memory organisation impact on performance.

I/O management & Disk Scheduling: I/O Devices and the organisation of the I/O function. I/O Buffering, Disk I/O, Operating System Design issues.

File System: File concept- File organisation and Access mechanism, File Directories, File sharing. Implementation issues.

Text Books & References

1. Milenkovic M., " Operating System: Concept & Design", McGraw Hill.
2. Tanenbaum, A.S., "Operating System Design & Implementation", Prentice Hall NJ.
3. Silberschatz A. and Peterson, J.L. "Operating System Concepts", Wiley.
4. Stalling, William "Operating Systems", Maxwell McMillan International Editions, 1992.

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CS304: DATA STRUCTURE

Code: CS304

Credits: 03

L-T-P: 3-0-0

Time and Space analysis of Algorithms- Order Notations.

Linear Data Structures : Sequential representations – Arrays and Lists, Stacks, Queues, Strings; Link Representations – Linear linked lists, Circular linked lists, Doubly linked lists; Applications.

Recursion- Design of Recursive Algorithms, Tail Recursion.

Nonlinear Data Structures: Trees – Binary Trees, Traversals and Threads, Binary Search Trees, Insertion and Deletion algorithms, Height balanced Trees and Weight Balanced Trees, B-trees, B+ trees, Application of trees; Graphs – Representations, Breadth – first and Depth-first Search.

Hashing – Hashing Functions, Collision Resolution Techniques.

Sorting and Searching Algorithms : Bubble sort, Selection sort, Insertion sort, Quick sort, Merge sort, Heap sort, Radix sort.

File Structures: Sequential and Direct Access, Relative files, Indexed files, B+ tree and index, Multi-index files, Hashed files.

Books:

1. Data Structures and Algorithms, A. V. Aho, J. E. Hopcroft, J. E. Ullman, Addison Wesley.
2. Fundamentals of Data Structures, E. Horowitz, S. Sahni, Galgotia Publ.
3. Data Structures using C, A.S. Tanenbaum
4. Algorithms, Data Structures, and Problem Solving, Addison Wesley.
5. Data Management and File Structures, Loomis, Marry, PHI
6. M. A. Weiss – Data Structures & Algorithm Analysis in C++, Addison Wesley.
7. Lipshutz – Theory and Problems of Data Structures, McGraw Hill.
8. Neil Graham _ Learning with C++, MacGraw Hill

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IE301: NETWORK THEORY

Code: IE301

Credits: 04

L-T-P: 3-1-0

Basic Circuit Concepts

Lumped circuits – circuit elements, ideal sources (independent and dependent), linear passive parameters R, L and C, V-I relationship of circuit elements – Sinusoidal voltage and current: RMS value, form factor – Kirchoff's Laws – analysis of series and parallel circuits – network reduction: voltage and current division, source transformation, star/delta transformation

Transient Analysis of First & Second Order Circuits

Source free response of RL and RC circuits – forced (step) response of RL and RC circuits – source free response of RLC series circuit – forced (step) response of RLC series circuit – forced response of RL, RC and RLC series circuit to sinusoidal excitation – Time constant and natural frequency of oscillation of circuits – Laplace Transform application to the solution of RL, RC & RLC circuits – Initial and final value theorems and applications – concept of complex frequency – driving point and transfer impedance – poles and zeros of network function.

Sinusoidal Steady State Analysis

Concept of phasor and complex Impedance / Admittance – Analysis of simple series and parallel circuits – active power, reactive power, apparent power (voltampere), power factor and energy associated with these circuits – concept of complex power – phasor diagram, impedance triangle and power triangle associated with these circuits – resonance in series and parallel circuits – Q factor, half-power frequencies and bandwidth of resonant circuits.

Multi Dimensional Circuit Analysis & Network Theorems

Node-voltage analysis of multi node circuit with current sources – rules for constructing nodal admittance matrix [Y] for solving matrix equation $[Y]V=I$ - Mesh-current analysis of multi node circuits with voltage sources – rules for constructing mesh impedance matrix[Z] for solving matrix equation $[Z]I=V$ – Super position theorem – Thevenin's theorem – Norton's theorem – Reciprocity theorem – Compensation theorem – Tellegen's theorem – Millman's theorem – maximum power transfer theorem for variable resistance load, variable impedance load and variable resistance and fixed reactance load.

Coupled Circuits and Three Phase Circuits

Coupled circuits: mutual inductance – coefficient of coupling – dot convention – analysis of simple coupled circuits – Three phase circuits: three phase balanced/ unbalanced voltage sources – analysis of three phase 3-wire and 4-wire circuits with star and delta connected loads, balanced & unbalanced – phasor diagram of voltages & currents – power and power factor measurements in three phase circuits.

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REFERENCES:

1. Joseph administer : *Electric circuits, Schaums Outline Series*
2. M.L.Soni and J.C Gupta : *Electrical Circuit Analysis, Dhanpat Rai and Sons, New Delhi*
3. W.H.hayt and J.E.Kemmerly , *Engineering Circuit analysis, McGraw-Hill, New york*
4. Theodre F.Bogart, Jr.*Electric circuits, Macmillan /McGraw-Hil*

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CS401: DATA BASE MANAGEMENT SYSTEM

Code: CS401

Credits: 04

L-T-P: 3-1-0

Introduction: Data Base System Concepts and architecture, Data models, scheme and instances, Data independence Data base language and Interface.

Data Modelling Using the Entity-Relationship Model

ER model concepts, Notations for ER diagram, Extended E.R. model, Relation-ships of higher degree.

Relational Data Model and Languages

Relational data Model concepts, constraints, relational algebra. Relational Calculus, Tuple and Domain calculus. SQL, data definitions queries and up-dates in SQL, QBE, Data definitions, queries and up-dates in QBE.

Example DBMS System (ORACLE/INGRESS/SYBASE)

Basic architecture. Data definitions Data Manipulation.

Database Design

Functional dependencies, Normal forms, First, second, and third functional normal forms. BCNF. Multivalued dependencies Fourth Normal form. Join Dependencies and fifth Normal form, Inclusion Dependencies.

Query Processing and Optimisation

Algorithms for executing query operations, Heuristics for query optimisations.

Transaction Processing Concepts

Transaction and system concepts, schedules and Recoverability serializability of schedules.

Concurrency Control Techniques

Locking Techniques for concurrency control Time stamping and concurrency control.

Suggested Text Books & References

1. Elmasri, Ramex Shamkant B. Navathe, "Fundamentals of Data base Systems".
2. Jeffry D. Ulman, "Principles of Data Base Systems", Second Edition Galgotia Pub.
3. Date, C.J. "An Introduction to Database System", Vol. I, II & IIIrd, Addison-Welsey.
4. Prakash, Naveen., "Introduction to Database Management", Tata McGraw Hill

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CS402: COMPUTER NETWORKS

Code: CS402

Credits: 04

L-T-P: 3-1-0

Introduction : OSI, TCP/IP and other networks models, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN.

Physical Layer : Transmission media copper, twisted pair wireless, switching and encoding asynchronous communications; Narrow band, broad band ISDN and ATM.

Data link layer : Design issues, framing, error detection and correction, CRC, Elementary Protocol-stop and wait, Sliding Window, Slip, Data link layer in HDLC, Internet, ATM.

Medium Access sub layer : ALOHA, MAC addresses, Carrier sense multiple access. IEEE 802.X Standard Ethernet, wireless LANS. Bridges,

Network Layer : Virtual circuit and Datagram subnets-Routing algorithm shortest path routing, Flooding, Hierarchical routing, Broad cast, Multi cast, distance vector routing.

Dynamic routing – Broadcast routing. Rotary for mobility. Congestion, Control Algorithms – General Principles – of Congestion prevention policies. Internet working: The Network layer in the internet and in the ATM Networks.

Transport Layer: Transport Services, Connection management, TCP and UDP protocols; ATM AAL Layer Protocol.

Application Layer – Network Security, Domain name system, SNMP, Electronic Mail; the World WEB, Multi Media.

TEXT BOOKS :

1. *Computer Networks* — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
2. *Data Communications and Networking* – Behrouz A. Forouzan. Third Edition TMH.

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REFERENCES :

1. *An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education*
2. *Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson*

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ECE401: DIGITAL ELECTRONICS

Code: EC401
Credits: 04
L-T-P: 3-1-0

Combinational Logic Design: Overview of codes and Boolean algebra, simplification of Boolean expressions, Logic gates – Implementation of combinational logic functions – Half adder, full adder – Half subtraction – full subtract or – parallel adder – binary adder – Magnitude comparator – encoder and decoders – multiplexers – code converters – parity generator/checker.

Sequential Circuits: Flip – flops (all types) – Truth table and excitation table, synchronous and Asynchronous Counter design – Up-down counter, BCD Counter – Modulus counters – shift registers – timing sequence – racing problems – Hazards – Hazard free Asynchronous circuits.

Semiconductor memories: Main memory operations, Instructions and instruction sequencing, addressing modes, registers and addressing, stacks and queues, ROM circuits, programmable ROM, static and dynamic RAM using BJT and MOS transceivers.

Digital Integrated Circuits: Performance parameters:- Rise time – fall time – switching speed – Noise margin – propagation delay – Fan in / Fan out. Study of TTL, ECL, I²L, MOS – CMOS families. Comparison of logic families.

System Design Using Digital Integrated Circuits: Designs of combinational and sequential circuits with standard IC's – Display drivers – Frequency counters with display unit - Programmable logic devices– PAL, PLA, FPGA.

TEXT/REFERENCES:

1. *Morris Mano, "Digital Design", Prentice Hall of India.*
2. *Floyd, "Digital Fundamentals", Universal Book Stall, New Delhi.*
3. *Albert Paul Malvino and Donald P Leach, "Digital principles and Applications", McGraw Hill.*
4. *Herbert Taub and Donald Schilling, "Digital Integrated Circuits", McGraw Hill.*

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CS501 SYSTEMS PROGRAMMING

Code: CS501

Credits: 03

L-T-P: 3-0-0

Evolution of Components Systems Programming, Assemblers, Loaders, Linkers, Macros, Compilers. Software tools, Text editors, Interpreters and program generators, Debug Monitors, Programming environment.

Compiler: Brief overview of compilation process, Incremental compiler, Assembler: Problem statement, single phase and two phase assembler, symbol table; Loader schemes, compile and go Loader, general loader schemes, absolute loader, Subroutine linkage, Reallocating loader, Direct linkage Loader, Binders, Linking loader, overlays.

Macro language and macro-processor, macro instructions, features of macro facility, macro instruction arguments, conditional macro expansion, macro calls with macro instruction defining macros.

Theoretical Concept of Unix Operating System: Basic features of operating system; File structure: CPU scheduling; Memory management: swapping, demand paging; file system: block and fragments, i-nodes, directory structure; User to user communication.

Getting Started with Unix: User names and groups, logging in; Format of Unix commands; Changing your password; Characters with special meaning; Unix documentation; Files and directories; Current directory, looking at the directory contents, absolute and relative pathnames, some Unix directories and files; Looking at the file contents; File permissions; basic operation on files; changing permission modes; Standard files, standard output; Standard input, standard error; filters and pipelines; Processes; finding out about processes; Stopping background process; Unix editor vi.

Text Manipulation: Inspecting files; File statistics; Searching for patterns; Comparing files; Operating on files; Printing files; Rearranging files; Sorting files; Splitting files; Translating characters; AWK utility.

Shell Programming: Programming in the Bourne and C-Shell; Wild cards; Simple shell programs; Shell variables; Shell programming constructs; interactive shell scripts; Advanced features.

System Administration: Definition of system administration; Booting the system; Maintaining user accounts; File systems and special files; Backups and restoration; Role and functions of a system manager.

Overview of the linux. operating system

Text Books:

- *Systems Programming by Donovan, TMH.*
- *The unix programming environment by Brian Kernighen & Rob Pike, 1984, PHI & Rob Pike.*
- *Design of the Unix operating system by Maurich Bach, 1986, PHI.*
- *Introduction to UNIX and LINUX by John Muster, 2003, TMH.*

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Reference Book:

- *Advanced Unix programmer's Guide by Stephen Prato, BPB*
- *Unix- Concept and applications by Sumitabha Das, 2002, T.M..H*

CS502: THEORY OF COMPUTATION

Code: CS601
Credits: 04
L-T-P: 3-1-0

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Fundamentals : Strings, Alphabet, Language, Operations, Finite state machine, definitions, finite automaton model, acceptance of strings, and languages, deterministic finite automaton and non deterministic finite automaton, transition diagrams and Language recognizers.

Finite Automata : NFA with $\hat{\Gamma}$ transitions - Significance, acceptance of languages. Conversions and Equivalence : Equivalence between NFA with and without $\hat{\Gamma}$ transitions, NFA to DFA conversion, minimisation of FSM, equivalence between two FSM's, Finite Automata with output- Moore and Melay machines.

Regular Languages : Regular sets, regular expressions, identity rules, Constructing finite Automata for a given regular expressions, Conversion of Finite Automata to Regular expressions. Pumping lemma of regular sets, closure properties of regular sets (proofs not required).

Grammar Formalism : Regular grammars-right linear and left linear grammars, equivalence between regular linear grammar and FA, inter conversion, Context free grammar, derivation trees, sentential forms. Right most and leftmost derivation of strings.

Context Free Grammars : Ambiguity in context free grammars. Minimisation of Context Free Grammars.

Chomsky normal form, Greiback normal form, Pumping Lemma for Context Free Languages. Enumeration of properties of CFL (proofs omitted).

Push Down Automata : Push down automata, definition, model, acceptance of CFL, Acceptance by final state and acceptance by empty state and its equivalence. Equivalence of CFL and PDA, interconversion.(Proofs not required). Introduction to DCFL and DPDA.

Turing Machine : Turing Machine, definition, model, design of TM, Computable functions, recursively enumerable languages. Church's hypothesis, counter machine, types of Turing machines (proofs not required).

Computability Theory : Chomsky hierarchy of languages, linear bounded automata and context sensitive language, LR(0) grammar, decidability of, problems, Universal Turing Machine, undecidability of posts. Correspondence problem, Turing reducibility, Definition of P and NP problems, NP complete and NP hard problems.

TEXT BOOKS :

1. "Introduction to Automata Theory Languages and Computation". Hopcroft H.E. and Ullman J. D. Pearson Education
2. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.

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REFERENCES :

1. *Introduction to languages and the Theory of Computation* ,John C Martin, TMH
2. “*Elements of Theory of Computation*”, Lewis H.P. & Papadimition C.H. Pearson /PHI.
3. *Theory of Computer Science – Automata languages and computation* -Mishra and Chandrashekar, 2nd edition, PHI
4. *Introduction to Theory of Computation –Sipser 2nd edition Thomson*

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CS503: DESIGN AND ANALYSIS OF ALGORITHMS

Code: CS503

Credits: 04

L-T-P: 3-1-0

Introduction: Algorithm, Psuedo code for expressing algorithms, Performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation, Probabilistic analysis, Amortized analysis.

Divide and conquer: General method , applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication.

Greedy method: General method, applications-Job sequencing with dead lines, 0/1 knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

Dynamic Programming: General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem, Reliability design.

Searching and Traversal Techniques: Efficient non recursive binary traversal algorithms, Graph traversal- Breadth first search and Depth first search, AND/OR graphs, game tree, Bi-connected components.

Backtracking: General method, applications-n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.

Branch and Bound: General method, applications - Travelling sales person problem, 0/1 knapsack problem-LC Branch and Bound solution, FIFO Branch and Bound solution.

NP-Hard and NP-Complete problems: Basic concepts, non deterministic algorithms, NP - Hard and NPComplete classes, Cook's theorem.

TEXT / REFERENCE BOOKS :

1. *Fundamentals of Computer Algorithms*, Ellis Horowitz, Satraj Sahni and S.Rajasekharam, Galgotia publications pvt. Ltd.
2. *Introduction to Algorithms, second edition*, T.H.Cormen, C.E.Leiserson, R.L.Rivest, and C.Stein, PHI Pvt. Ltd./ Pearson Education.
3. *Algorithm Design: Foundations, Analysis and Internet examples*, M.T.Goodrich and

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R.Tomassia, John wiley and sons.

4. Introduction to Design and Analysis of Algorithms A strategic approach, R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, Mc Graw Hill.

5. Data structures and Algorithm Analysis in C++, Allen Weiss, Second edition, Pearson education.

6. Design and Analysis of algorithms,Aho,Ullman and Hopcroft,Pearson education.

7. Algorithms – Richard Johnson baugh and Marcus Schaefer, Pearson Educatin

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IE501: MICROPROCESSORS AND MICROCONTROLLERS

Code: IE501

Credits: 04

L-T-P: 3-1-0

Architecture of Microprocessors: General definitions of mini computers, microprocessors, micro controllers and digital signal processors. Overview of 8085 microprocessor. Overview of 8086 microprocessor. Signals and pins of 8086 microprocessor

Assembly language of 8086: Description of Instructions. Assembly directives. Assembly software programs with algorithms

Interfacing with 8086: Interfacing with RAMs, ROMs along with the explanation of timing diagrams. Interfacing with peripheral ICs like 8255, 8254, 8279, 8259, 8259 etc. Interfacing with key boards, LEDs, LCDs, ADCs, and DACs etc.

Coprocessor 8087: Architecture of 8087, interfacing with 8086. Data types, instructions and programming

Architecture of Micro controllers: Overview of the architecture of 8051 microcontroller. Overview of the architecture of 8096 16 bit microcontroller.

Assembly language of 8051: Description of Instructions. Assembly directives. Assembly software programs with Algorithms.

Interfacing with 8051: Interfacing with keyboards, LEDs, 7 segment LEDs, LCDs, Interfacing with ADCs. Interfacing with DACs, etc.

High end processors: Introduction to 80386 and 80486

TEXT BOOKS

1. Ramesh S.Gaonkar, "Microprocessor - Architecture, Programming and Applications with the 8085", Penram International publishing private limited, fifth edition.
2. A.K. Ray & K.M.Bhurchandi, "Advanced Microprocessors and peripherals- Architectures, Programming and Interfacing", TMH, 2002 reprint.

REFERENCES

1. Douglas V.Hall, "*Microprocessors and Interfacing: Programming and Hardware*", TMH, Third edition.
2. Yu-cheng Liu, Glenn A.Gibson, "*Microcomputer systems: The 8086 / 8088 Family architecture, Programming and Design*", PHI 2003.
3. Mohamed Ali Mazidi, Janice Gillispie Mazidi, "*The 8051 microcontroller and embedded systems*", Pearson education, 2004.

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CS601: COMPILER DESIGN

Code: CS502

Credits: 04

L-T-P: 3-1-0

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

Top down Parsing: Context free grammars, Top down parsing – Backtracking, LL (1), recursive descent parsing, Predictive parsing, Preprocessing steps required for predictive parsing.

Bottom up parsing: Shift Reduce parsing, LR and LALR parsing, Error recovery in parsing, handling ambiguous grammar, YACC – automatic parser generator.

Semantic analysis: Intermediate forms of source Programs – abstract syntax tree, polish notation and three address codes. Attributed grammars, Syntax directed translation, Conversion of popular Programming languages language Constructs into Intermediate code forms, Type checker.

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

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

Data flow analysis: Flow graph, data flow equation, global optimization, redundant sub expression elimination, Induction variable elements, Live variable analysis, Copy propagation.

Object code generation: Object code forms, machine dependent code optimization, register allocation and assignment generic code generation algorithms, DAG for register allocation.

TEXT BOOKS :

1. *Principles of compiler design* -A.V. Aho . J.D.Ullman; Pearson Education.
2. *Modern Compiler Implementation in C*- Andrew N. Appel, Cambridge University Press.

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REFERENCES :

1. *lex & yacc – John R. Levine, Tony Mason, Doug Brown, O’reilly*
2. *Modern Compiler Design- Dick Grune, Henry E. Bal, Cariel T. H. Jacobs, Wiley dreamtech.*
3. *Engineering a Compiler-Cooper & Linda, Elsevier.*
4. *Compiler Construction, Loudon, Thomson.*

CS602: SOFTWARE ENGINEERING

Code: CS602

Credits: 04

L-T-P: 3-1-0

Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, Software myths.

A Generic view of process: Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models.

Process models: The waterfall model, Incremental process models, Evolutionary process models, The Unified process.

Software Requirements: Functional and non-functional requirements, User requirements, System requirements, Interface specification, the software requirements document.

Requirements engineering process: Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management.

System models: Context Models, Behavioral models, Data models, Object models, structured methods.

Design Engineering: Design process and Design quality, Design concepts, the design model.

Creating an architectural design: Software architecture, Data design, Architectural styles and patterns, Architectural Design.

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Object-Oriented Design: Objects and object classes, An Object-Oriented design process, Design evolution.

Performing User interface design: Golden rules, User interface analysis and design, interface analysis, interface design steps, Design evaluation.

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging.

Product metrics: Software Quality, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance.

Metrics for Process and Products: Software Measurement, Metrics for software quality.

Risk management: Reactive vs Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan.

Quality Management : Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards.

TEXT BOOKS :

1. *Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition. McGrawHill International Edition.*
2. *Software Engineering- Sommerville, 7th edition, Pearson education.*

REFERENCES :

1. *Software Engineering- K.K. Agarwal & Yogesh Singh, New Age International Publishers*
2. *Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiely.*
3. *Systems Analysis and Design- Shely Cashman Rosenblatt, Thomson Publications.*
4. *Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies.*

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CS603: INFORMATION SECURITY

Code: CS603

Credits: 04

L-T-P: 3-1-0

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC.

Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service.

Email privacy: Pretty Good Privacy (PGP) and S/MIME.

IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).

Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3. Intruders, Viruses and related threats.

Firewall Design principles, Trusted Systems. Intrusion Detection Systems.

TEXT BOOKS :

1. *Network Security Essentials (Applications and Standards)* by William Stallings Pearson Education.
2. *Hack Proofing your network* by Ryan Russell, Dan Kaminsky, Rain Forest Puppy, Joe Grand, David Ahmad, Hal Flynn Ido Dubrawsky, Steve W.Manzuik and Ryan Permech, wiley Dreamtech,

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REFERENCES :

1. *Fundamentals of Network Security* by Eric Maiwald (Dreamtech press)
2. *Network Security - Private Communication in a Public World* by Charlie Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.
3. *Cryptography and network Security, Third edition*, Stallings, PHI/Pearson
4. *Principles of Information Security*, Whitman, Thomson.
5. *Network Security: The complete reference*, Robert Bragg, Mark Rhodes, TMH
6. *Introduction to Cryptography*, Buchmann, Springer.

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CS604: COMPUTER GRAPHICS

Code: CS302

Credits: 03

L-T-P: 3-0-0

Introduction, Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices

Output primitives : Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms. Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms

2-D geometrical transforms : Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems.

2-D viewing : The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland–Hodgeman polygon clipping algorithm.

3-D object representation : Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces. Basic illumination models, polygon rendering methods.

3-D Geometric transformations : Translation, rotation, scaling, reflection and shear transformations, composite transformations.

3-D viewing : Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping .

Visible surface detection methods : Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods.

Computer animation : Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications.

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TEXT BOOKS :

1. *“Computer Graphics C version”*, Donald Hearn and M.Pauline Baker, Pearson Education.
2. *“Computer Graphics Principles & practice”*, second edition in C, Foley, VanDam, Feiner and Hughes, Pearson Education.

REFERENCES :

1. *“Computer Graphics”*, second Edition, Donald Hearn and M.Pauline Baker, PHI/Pearson Education.
2. *“Computer Graphics Second edition”*, Zhigand xiang, Roy Plastock, Schaum’s outlines, Tata Mc-Graw hill edition.
3. *Procedural elements for Computer Graphics*, David F Rogers, Tata Mc Graw hill, 2nd edition.
4. *“Principles of Interactive Computer Graphics”*, Neuman and Sproul, TMH.
5. *Principles of Computer Graphics*, Shalini Govil, Pai, 2005, Springer.
6. *Computer Graphics*, Steven Harrington, TMH

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ELECTIVE COURSES

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CS511: OBJECT ORIENTED ANALYSIS AND DESIGN

Code: CS511

Credits: 03

L-T-P: 3-0-0

Introduction to UML: Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture, Software Development Life Cycle.

Basic Structural Modeling: Classes, Relationships, common Mechanisms, and diagrams. Advanced Structural Modeling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages.

Class & Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams.

Basic Behavioral Modeling-I: Interactions, Interaction diagrams.

Basic Behavioral Modeling-II: Use cases, Use case Diagrams, Activity Diagrams.

Advanced Behavioral Modeling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams.

Case Study: The Unified Library application.

TEXT BOOKS :

1. Grady Booch, James Rumbaugh, Ivar Jacobson : *The Unified Modeling Language User Guide*, Pearson Education.
2. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: *UML 2 Toolkit*, WILEY-Dreamtech India Pvt. Ltd.

REFERENCE BOOKS:

1. Meilir Page-Jones: *Fundamentals of Object Oriented Design in UML*, Pearson Education.
2. Pascal Roques: *Modeling Software Systems Using UML2*, WILEY-Dreamtech India Pvt. Ltd.
3. Atul Kahate: *Object Oriented Analysis & Design*, The McGraw-Hill Companies.
4. Mark Priestley: *Practical Object-Oriented Design with UML*, TATA McGrawHill
5. *Applying UML and Patterns: An introduction to Object – Oriented Analysis and Design and Unified Process*, Craig Larman, Pearson Education.

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CS512: MULTIMEDIA

Code: CS512

Credits: 03

L-T-P: 3-0-0

Multimedia Applications – System Architecture- objects of multimedia systems – multimedia databases – types of compression – image compression.

CCITT – JPEG – Video Image Compression – MPEG – DVI Technology – Audio Compression – RTF format – TIFF file format – RIFF file format – MIDI – JPEG DIB – TWAIN.

Traditional devices – Pen Input – Video display systems – Scanners – Digital Audio- Video images and animation.

Magnetic media – RAID – Optical media – CD-ROM – WORM – Juke Box – Cache Management. Application classes – types of systems – virtual reality design – components – databases – authorizing systems – Hypermedia – User Interface design – Display / Play Back issues – Hypermedia Linking and Embedding.

TEXT BOOKS:

1. Koegel Buford JFK, “Multimedia Systems”, Addison Wesley Longman, 1999.

REFERENCES

1. Andleigh P K and Thakrar K, “Multimedia Systems Design”, Prentice Hall, 1999.

2. Vaughan T, “Multimedia”, Tata McGraw Hill, 1999.

3. Mark J.B, Sandra K.M, “Multimedia Applications Development using DVI technology”, McGraw Hill, 1992.

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CS513: NEURAL COMPUTING

Code: CS513

Credits: 03

L-T-P: 3-0-0

Black Propagation : Introduction Artificial neural systems – Principles and promises – Perception – Representation – Linear separability – Learning – Training algorithm – The back propagation network – The generalized delta rule – Practical considerations – BPN applications.

Statistical Methods : Hopfield nets – Cauchy training – Simulated annealing – The Boltzman machine – Associative memory – Bi-directional associative memory – Applications.

Counter Propagation Network and Self Organizing Maps : CPN building blocks – CPN data processing – An image classification example, SOM data processing – Applications of SOMs.

Adaptive Resonance Theory and Spatio Temporal Pattern Classification : ART network description – ART1 – ART2 – Applications. The formal avalanche – Architecture of Spatio temporal networks – The sequential competitive avalanche field – Applications of STNS.

Neo-Cognitron : Cognition – Structure & training – The neocognitron architecture – Neocognitron data processing – performance – Addition of lateral inhibition and feedback to the neocognitron. Optical neural networks – Holographic correlators.

TEXT BOOK

1. James Freeman A. and David Skapura M., “Neural Networks – Algorithms, Application and Programming techniques”, Addison Wesley Publishing Company, 1991.

REFERENCES

- 1. Yegnanarayana B., “Artificial Neural Networks”, Prentice Hall of India Private Ltd., New Delhi, 1999.*
- 2. Robert J. Schalkoff, “Artificial Neural Networks”, McGraw-Hill International Editions, 1997.*

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CS514: DISCRETE STRUCTURES

Code: CS514

Credits: 03

L-T-P: 3-0-0

Set Theory: Introduction to set theory, Set operations, Algebra of sets, Duality, Finite and Infinite sets, Classes of sets, Power Sets, Multi sets, Cartesian Product, Representation of relations, Types of relation, Equivalence relations and partitions, Partial ordering relations and lattices. Function and its types, Composition of function and relations, Cardinality and inverse relations.

Propositional Calculus: Basic operations: AND(\wedge), OR(\vee), NOT(\sim), Truth value of a compound statement, propositions, tautologies, contradictions.

Techniques Of Counting: Permutations with and without repetition, Combination.

Recursion And Recurrence Relation : Polynomials and their evaluation, Sequences, Introduction to AP, GP and AG series, partial fractions, linear recurrence relation with constant coefficients, Homogeneous solutions, Particular solutions, Total solution of a recurrence relation using generating functions.

Algebraic Structures Definition and examples of a monoid, Semigroup, Groups and rings, Homomorphism, Isomorphism and Automorphism, Subgroups and Normal subgroups, Cyclic groups, Integral domain and fields, Cosets, Lagrange's theorem

Graphs And Trees: Introduction to graphs, Directed and Undirected graphs, Homomorphic and Isomorphic graphs, Subgraphs, Cut points and Bridges, Multigraph and Weighted graph, Paths and circuits, Shortest path in weighted graphs, Eulerian path and circuits, Hamilton paths and circuits, Planar graphs, Euler's formula, Trees, Spanning trees, Binary trees and its traversals

Text Book:

- *Elements of Discrete Mathematics C.L Liu, 1985, McGraw Hill*

Reference Books:

- *Discrete Mathematics by Johnson Bough R., 5th Edition, PEA, 2001..*
- *Concrete Mathematics: A Foundation for Computer Science, Ronald Graham, Donald Knuth and Oren Patashik, 1989, Addison-Wesley.*
- *Mathematical Structures for Computer Science, Judith L. Gersting, 1993, Computer Science Press.*
- *Applied Discrete Structures for Computer Science, Doerr and Levasseur, (Chicago: 1985,SRA*
- *Discrete Mathematics by A. Chtewynd and P. Diggle (Modular Mathematics series), 1995, Edward Arnold, London*

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CS711: ARTIFICIAL INTELLIGENCE

Code: CS711

Credits: 04

L-T-P: 3-1-0

Introduction: AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.

Searching: Searching for solutions, uniformed search strategies – Breadth first search, depth first search, Depth limited search, Iterative deepening depth first search bi-direction search - comparison. Search with partial information (Heuristic search) Greedy best first search, A* search, Memory bounded heuristic search, Heuristic functions.

Local search Algorithms, Hill climbing, simulated, annealing search, local beam search, genetical algorithms.

Game Playing: Adversial search, Games, minimax, algorithm, optimal decisions in multiplayer games, Alpha-Beta pruning, Evaluation functions, cutting of search.

Knowledge Representation & Reasons logical Agents, Knowledge – Based Agents, the Wumpus world, logic, propositional logic, Resolution patterns in propos ional logic, Resolution, Forward & Backward Chaining.

First order logic. Inference in first order logic, propositional Vs. first order inference, unification & lifts forward chaining, Backward chaining, Resolution.

Planning – Classical planning problem, Language of planning problems, Expressiveness and extension, planning with state – space search, Forward states spare search, Backward states space search, Heuristics for stats space search. Planning search, planning with state space search, partial order planning Graphs.

Learning – Forms of learning, Induction learning, Learning Decision Tree, Statistical learning methods, learning with complex data, learning with Hidden variables – The EM Algorithm, Instance Based learning, Neural Networks.

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TEXT BOOKS :

1. *Artificial Intelligence – A Modern Approach. Second Edition, Stuart Russel, Peter Norvig, PHI/Pearson Education.*
2. *Artificial Intelligence, 3rd Edition, Patrick Henry Winston., Pearson Edition.*

REFERENCES :

1. *Artificial Intelligence , 2nd Edition, E.Rich and K.Knight (TMH).*
2. *Artificial Intelligence and Expert Systems – Patterson PHI.*
3. *Expert Systems: Principles and Programming- Fourth Edn, Giarrantana/ Riley, Thomson.*
4. *PROLOG Programming for Artificial Intelligence. Ivan Bratka- Third Edition – Pearson Education.*

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CS712: MOBILE COMPUTING

Code: CS712

Credits: 04

L-T-P: 3-1-0

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

GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services.

(Wireless) Medium Access Control: Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA.

Mobile Network Layer: Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).

Mobile Transport Layer : Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.

Database Issues: Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.

Data Dissemination: Communications asymmetry, classification of new data delivery mechanisms, push-based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques.

Mobile Ad hoc Networks (MANETs): Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs.

Protocols and Tools: Wireless Application Protocol-WAP. (Introduction, protocol architecture, and treatment of protocols of all layers), Bluetooth (User scenarios, physical layer, MAC layer, networking, security, link management) and J2ME.

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TEXT / REFERENCE BOOKS :

1. **Jochen Schiller**, “*Mobile Communications*”, Addison-Wesley. (Chapters 4,7,9,10,11), 2nd edition, 2004.
2. **Stojmenovic and Cacute**, “*Handbook of Wireless Networks and Mobile Computing*”, Wiley, 2002, ISBN 0471419028. (Chapters 11, 15, 17, 26 and 27)
3. **Reza Behravanfar**, “*Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML*”, ISBN: 0521817331, Cambridge University Press, October 2004,
4. **Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden, Schwiebert, Loren**, “*Fundamentals of Mobile and Pervasive Computing*”, ISBN: 0071412379, McGraw-Hill Professional, 2005.
5. **Hansmann, Merk, Nicklous, Stober**, “*Principles of Mobile Computing*”, Springer, 2nd edition, 2003.
6. **Martyn Mallick**, “*Mobile and Wireless Design Essentials*”, Wiley DreamTech, 2003.

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CS713: ADVANCED DATABASES

Code: CS713

Credits: 04

L-T-P: 3-1-0

Introduction: Review of relational Databases – Database tuning – Advanced Transaction Processing.

Distributed Databases: Introduction – Architecture – Design – Query Processing – Transaction Management – Concurrency control – Recovery – Parallel databases.

Object Oriented Databases: Introduction – Basic OO concepts – Modeling and design for Object Oriented databases – Persistence – Transaction, Concurrency, Recovery and Versioning.

Special Purpose Databases: Temporal databases – Active databases – Spatial and multimedia databases – Deductive databases – Mobile databases.

Current Trends : Data warehousing – OLAP – Data mining techniques – Databases and the World Wide Web – Decision support system.

Books/References:

1. *Silberschatz and Korth, Database system concepts, McGraw Hill.*
2. *Elmasri and Navathe, Fundamentals of database systems; Narosa Publishing Co.*
3. *John G Hughes, Object Oriented Databases; Prentice Hall Int nl Series in Computer Science*
4. *Andleigh and Thakrar, Multimedia Systems Design, Prentice Hall PTR*
5. *R Raghuramakrishnan & J Gehrke, Database Management System*
6. *Alhir, UML: In A Nutshell, O Reilly*

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CS714: PARALLEL COMPUTING

Code: CS714

Credits: 03

L-T-P: 3-0-0

Computational demands, advantages of parallel systems. Flynn's classification, controlled parallelism and scalability. Topologies: Mesh, binary tree, Hyper tree, Cube Connected cycles, shuffle-Connected Exchange; Uniform Memory Access (UMA & Non uniform Memory Access (NUMA) Multi processor System.

PARAM Model of Parallel Computation, PARAM Algorithms; Parallel Reductions, Prefix sum, List Ranking, Merging of Two Sorted List.

Mapping and Scheduling; mapping of Data from Topology to other (Ring to 2-D Mesh, Binomial trees to 2-D mesh, Rings & mesh into 2-D Mesh, Ring & Mesh into Hypercubes), Load balancing, Static scheduling on UMA multi processor systems.

Applications of parallel computing: Matrix Multiplication, Sorting (bitonic Merge sort, parallel quick sort, hyper quick sort), Searching a Graph (P-depth search, Breadth-Depth Search, Breath first search), parallel Brach and bound algorithms

Books and References:

1. *Michel J. Quinn, "Parallel Computing: Theory and Practice," McGraw-Hill*
2. *Kai Hwang, "Advanced Computer Architecture," McGraw-Hill.*

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CS715: DIGITAL SPEECH & IMAGE PROCESSING

Code: CS715

Credits: 04

L-T-P: 3-1-0

Introduction: Examples of fields that use digital image processing, fundamental steps in digital image processing, components of image processing system.. Digital Image Fundamentals: A simple image formation model, image sampling and quantization, basic relationships between pixels.

Image enhancement in the spatial domain: Basic gray-level transformation, histogram processing, enhancement using arithmetic and logic operators, basic spatial filtering, smoothing and sharpening spatial filters, combining the spatial enhancement methods.

Image restoration: A model of the image degradation/restoration process, noise models, restoration in the presence of noise—only spatial filtering, Weiner filtering, constrained least squares filtering, geometric transforms; Introduction to the Fourier transform and the frequency domain, estimating the degradation function.

Color Image Processing: Color fundamentals, color models, pseudo color image processing, basics of full-color image processing, color transforms, smoothing and sharpening, color segmentation.

Image Compression: Fundamentals, image compression models, error-free compression, lossy predictive coding, image compression standards.

Morphological Image Processing: Preliminaries, dilation, erosion, open and closing, hit or miss transformation, basic morphologic algorithms.

Image Segmentation: Detection of discontinuous, edge linking and boundary detection, thresholding, region-based segmentation.

Object Recognition: Patterns and patterns classes, recognition based on decision-theoretic methods, matching, optimum statistical classifiers, neural networks, structural methods – matching shape numbers, string matching.

TEXT BOOK :

1. Digital Image Processing, Rafael C.Gonzalez, Richard E.Woods, Second Edition, Pearson Education/PHI.

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REFERENCES :

1. *Image Processing, Analysis, and Machine Vision, Milan Sonka, Vaclav Hlavac and Roger Boyle, Second Edition, Thomson Learning.*
2. *Introduction to Digital Image Processing with Matlab, Alasdair McAndrew, Thomson Course Technology*
3. *Computer Vision and Image Processing, Adrian Low, Second Edition, B.S.Publications*
4. *Digital Image Processing using Matlab, Rafeal C.Gonzalez, Richard E.Woods, Steven L. Eddins, Pearson Education.*
5. *Digital Image Processing, William K. Prat, Wily Third Edition*
6. *Digital Image Processing and Analysis, B. Chanda, D. Datta Majumder, Prentice Hall of India, 2003.*

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CS716: PATTERN RECOGNITION

Code: CS716

Credits: 03

L-T-P: 3-0-0

Introduction: Pattern and features – Training and learning in pattern recognition systems – Pattern recognition approaches – Statistical pattern recognition – Syntactic pattern recognition – Neural pattern recognition – Reasoning driven pattern recognition – Discriminant functions – Linear and Fisher’s discriminant functions.

Statistical Pattern Recognition: Gaussian model – Supervised learning – Parametric estimation – Maximum likelihood estimation – Bayesian parameter estimation – Perceptron algorithm – LMSE algorithm – Problems with Bayes approach – Pattern classification by distance functions – Maximum distance pattern classifier.

Cluster Analysis: Unsupervised learning – Clustering for unsupervised learning and classification – C-means algorithm – Hierarchical clustering procedures – Graph theoretic approach to pattern clustering – Validity of clustering solutions.

Syntactics Pattern Recognition: Elements of formal grammar – String generation as pattern description – Recognition of syntactic description – Parsing – Stochastic grammar and applications – Graph based structural representation.

Features Extraction and Recent Advances: Entropy minimization – Karhunen –Loeve transformation – Neural network structures for pattern recognition – Unsupervised learning – Self organizing networks – Fuzzy pattern classifiers – Genetic algorithms – Application to pattern recognition.

TEXT BOOKS

1. Earl Gose, Richard Johnsonbaugh, Steve Jost, “Pattern Recognition and Image Analysis”, Prentice Hall of India Private Ltd., New Delhi – 110 001, 1999.
2. Duda R.O. and Hart P.E., “Pattern Classification and Scene Analysis”, Wiley, New York, 1973.
3. Morton Nadler and Eric Smith P., “Pattern Recognition Engineering”, John Wiley and Sons, New York, 1993.
4. Tou and Gonzalez R. “Patten Recognition Principles” Addison Wesley, 1974.

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REFERENCES

1. Robert J, Schalkoff, *“Pattern Recognition: Statistical, Structural and Neural Approaches”*, John Wiley & Sons Inc., New York, 1992.
2. Melanie Mitchell, *“An Introduction to Genetic Algorithms”*, Prentice Hall of India Private Ltd., New Delhi, 1998.

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CS717: CRYPTOGRAPHY AND NETWORK SECURITY

Code: CS717

Credits: 04

L-T-P: 3-1-0

Introduction: Introduction to Security attacks, services And mechanisms, Introduction to cryptology. Conventional Encryption model, classical encryption techniques-substitution ciphers & transposition ciphers, cryptanalysis, stereography, stream & block ciphers.

Modern Block ciphers: Block Ciphers principles, Shandars (DES), Strength of DES, Differential & Linear Cryptanalysis of DES, Block cipher model of operation, triple DES, IDEA encryption & decryption, Strength of IDDES, Confidentiality using conventional encryption, traffic confidentiality, key distribution, random number generation.

Principles of Public Key Cryptography: principle of public key cryptography, prime and relative prime numbers, modular arithmetic, RSA algorithm, security of RSA key management. Authentication recruitments, Authentications functions, and Message Authentication codes, Digital Signatures, authentication protocols Digital Signatures Standard (DSS), proof of digital signatures algorithm.

Electronics mail security: pretty good privacy (PGP), S/MIME IP security: IP security overview, architecture, Authentication header, encapsulating security payloads, combining security association, key management.

Web security: security socket layer & transport layer security, secure electronic transaction (SET)

System security: intruders, viruses and related threads, firewall design principles.

Books and References:

1. William Stalling “ Cryptography and networks security: Principles and Practice,” Prentice Hall, New jersey,
2. Johannes A Buchmann, “Introduction to cryptography,” Spiringer-verlag
3. Bruce Schiener, “Applied Cryptography”.

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CS718: GRAPH THEORY

Code: CS718

Credits: 03

L-T-P: 3-0-0

Graph: Incidence and degree; Handshaking Lemma; Isomorphism; Subgraphs and Union of graphs; Connectedness; Walks, Paths and Circuits; Components and Connectedness; Walks, Paths and Circuits; Components and Connectedness algorithms; Shortest Path Algorithms, Eulerian graph, Fleury's algorithm and Chinese postman problem; Hamiltonian graph - necessary and sufficient conditions; Traveling salesman; Bipartite graph.

Tree: Properties of trees; Pendant vertices in a tree; Center of a tree; Rooted binary trees; Spanning trees - Spanning tree algorithms; Fundamental circuits; Spanning trees of a weighted graph; cut-sets and cut-vertices; Fundamental cut-sets; Connectivity and separativity; network flow; max-flow min-cut theorem.

Planner graph: Combinatorial and geometric dual; Kuratowski's graph; detection of planarity; Thickness and crossings.

Matrix representations of graph: Incidence; Adjacency; matrices and their properties.

Colourings: Chromatic number; Chromatic polynomial; The six and five colour theorems; The four colour problem.

Directed graphs: Binary relations; Directed graphs and connectedness; directed trees; Aborecence; Polish method; Tournaments.

Counting of labeled trees: Cayley's theorem; Counting methods; Polya theory.

Books :

1. Deo, N.: *Graph Theory with Applications to Engineering and Computer Science.*
2. Harary : *Graph Theory, PHI (EEE)*

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CS811: ATM NETWORKS

Code: CS811

Credits: 03

L-T-P: 3-0-0

Introduction: ATM – Historical perspective – Protocol Architecture – Logical connections – Cells – Transmission of ATM cells – SDH – SONET – Switches.

ATM Protocol: Connection setup – Routing Switching, Signaling, ATM Service categories – QOS parameters – Adaptation Layer.

Routing Issues: Routing for high speed networks – RSVP, Traffic and Congestion control – Achieving QOS – Traffic shaping – Generic cell rate algorithms – Rate based congestion control – Connection admission control.

High Speed LANs: Fast Ethernet – ATM LAN's – LANE

Protocols over ATM: Multiple protocols over ATM, IP over ATM, TCP over ATM – Real time transport protocol – Wireless ATM – Current trends.

TEXT BOOK

1. Rainer Handel, Manfred N. Huber, Stefan Schroder, "ATM Networks", Addison Wesley, 1999.

REFERENCES

1. William Stallings, "High Speed Networks TCP/IP and ATM Design Principles", Prentice Hall International, 1998.
2. Uyles Black, "ATM Vol.1 and 2", PHPTR, 1999.
3. William Stalling, "ISDN with Broad Lane ISDN with frame relay and ATM", PH, 4th edition, 1999.

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CS812: ROBOTICS

Code: CS812

Credits: 03

L-T-P: 3-0-0

The scope of industrial Robotics – Definition of an Industrial Robot – Need for Industrial Robots – Applications – Fundamentals of Robot Technology – Automation and Robotics – Robot Anatomy – Work Volume – Precision of movement End effectors – Sensors.

Robot Programming – Methods – Interlocks textual languages – Characteristics of Robot level languages, characteristics of task level languages.

Puma Robot Arm Control – Computed Torque Technique – Near minimum time control – Variable structure control – Non-linear decoupled feedback control – Reserved motion control – Adaptive control.

Robot Cell Design and control – Remote center Compliance – Safety in Robotics.

Advanced Robotics, Advanced Robotics in Space – Specific features of Space Robotics systems -

Long term technical developments – Advanced Robotics in underwater operations – Robotics Technology of the future – Future applications.

TEXT BOOK:

1. Barry Leatham Jones, *“Elements of Industrial Robotics”* Pitman Publishing, 1987.

REFERENCE:

1. Mikell P. Groover, Mitchell Weiss, Roger N.Nagel, Nicholas G. Odrey, *“Industrial Robotics Technology, Programming And Applications”*, McGraw Hill Book Company, 1986.

2. Fu K.S., Gonzalez R.C and Lee C.S.G., *“Robotics – Control, Sensing, Vision and Applications”*, McGraw Hill International Editions, 1987.

3. Bernard Hodges and Paul Hallam, *“Industrial Robotics”*, British Library Cataloging in Publication, 1990.

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CS813: HIGH PERFORMANCE MICROPROCESSORS

Code: CS813

Credits: 03

L-T-P: 3-0-0

CISC Principles: Classic CISC microprocessors – Advanced processors of the Intel family – Architecture – Paging and Segmentation – Real and virtual mode execution – Protection mechanism – Task management.

CISC Microprocessor: Study of a current CISC microprocessor architecture – Operating modes – Bus cycles – Performance – Related features – Supporting devices – Bus system support.

RISC Principles: RISC processors – Principles – Architectural features of DEC Alpha / Power PC / Sun sparc / MIPS RX100 family.

RISC Microprocessor: Study of a current RISC microprocessor architecture – Performance related features – Supporting devices – Bus system support.

Case Studies: Case studies and comparison.

TEXT BOOK:

1. D.Tabak, “Advanced Microprocessors”, McGraw-Hill, 1996.

REFERENCES:

1. Barrey B.Brey, “The Intel Microprocessor 8086 / 8088, 80186 / 80188, 80286, 80386, 80486, Pentium and Pentium Proprocessor – Architecture, Programming and Interfacing”, PHI, 1997.
2. Microprocessor Manuals (Intel / DEC / SUN SPARC – available at respective Websites).
3. Barrey B. Brey, “Programming the 80286, 80386, 80486 and Pentium-based Personal Computer”, PHI, 1999.

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CS814: C# AND .NET FRAME WORK

Code: CS814

Credits: 03

L-T-P: 3-0-0

Introduction to .NET frame work-.NET objects- ASP .NET- .NET web services – Windows, Forms

Introduction to C#, Understanding C# in .NET, overview of C#, Literals, Variables, Data types.

Operators, Expressions, Branching and looping operations- Methods, Arrays, Strings.

Structures and Enumerations – Classes and Objects - Inheritance and Polymorphism, Multiple Inheritance.

Operator overloading, Events, console I/O operations and Exception.

TEXT BOOKS

1. E. Balagurusamy, “ *Programming in C#*”, Tata McGraw Hill, 2002
2. David S. Platt, “ *Introducing Microsoft .NET Microsoft Press*”, Saarc Edition, 2001

REFERENCES

Microsoft, “C# Language specifications”, Microsoft Press, 2001

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CS815: TCP / IP – DESIGN AND IMPLEMENTATION

Code: CS815

Credits: 03

L-T-P: 3-0-0

Internetworking Issues – routing – Internet Addressing – Address Resolution Protocol (ARP) – Reverse Address Resolution Protocol (RARP) - Packet format – Routing.

Fragmentation and Reassembly – Error Processing – Ipv6 – UDP – Basic Concepts – TCP Data Structures.

Finite State machine implementation – output Processing – Timer Management – Flow Control – Urgent Data Processing.

Core Gateway system – Autonomous systems and Considerations – Interior gateway Protocols, Transparent Gateways, DNS.

Sockets – RPC mechanisms – Telnet – Mail Systems.

TEXT BOOK

1. Comer D.E., “*Internetworking with TCP / IP – Vol.1*”, 3rd Edition, Prentice Hall of India, 1997.
2. Comer D.E & Stevens D.L., “*Internetworking with TCP / IP – Vol.2*”, 2nd Edition, Prentice Hall of India, 1997.
3. Comer D.E., “*Computer Networks and Internet*”, Prentice Hall of India, 1999

REFERENCE:

1. Comer D.E & Stevens D.L., “*Internetworking with TCP / IP – Vol.3*”, Prentice Hall of India, 1997.
- Stevens W.R., “*TCP/IP Illustrated – Vol.1, 2 & 3*”, Addison Wesley, 1999.

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CS816: SOFTWARE TESTING

Code: CS816

Credits: 03

L-T-P: 3-0-0

Introduction: Software testing – Role of software testing – A structural approach to testing – Test strategy – methods for developing test strategy Testing methodologies.

Life Cycle Testing Approach: Test plan – Requirements testing – Walk through test tool – Risk matrix test tool – Testing for requirements phase and design phase – Design review test tool – Test data and volume test tools.

Installation: Installation phase testing – Tools for acceptance test – Software acceptance process – Software maintenance – Methodologies for testing – Training and change installation.

Testing Methods: Tools and techniques – Cost estimate – For testing – Testing phase of life cycle – Point accumulation tracking system – Performance analysis of testing – Inspection plan and test plan documents.

Testing Strategy: Rapid prototyping – Spiral testing – Tool selection processes – Structural system testing – Documentation of test results – Test effectiveness evaluation – Test measurement process – Test metrics.

TEXT BOOK

1. William Perry, “Effective Methods for Software Testing”, John Wiley & Sons, USA, 1995.
2. Ron Patton, “Software Testing”, Techmedia.

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CS817: EMBEDDED SYSTEMS

Code: CS817

Credits: 03

L-T-P: 3-0-0

Embedded Computing: Introduction, Complex Systems and Microprocessor, The Embedded System Design Process, Formalisms for System Design, Design Examples.

The 8051 Architecture : Introduction, 8051 Micro controller Hardware, Input/Output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/Output, Interrupts.

Basic Assembly Language Programming Concepts: The Assembly Language Programming Process, Programming Tools and Techniques, Programming the 8051. Data Transfer and Logical Instructions. Arithmetic Operations, Decimal Arithmetic. Jump and Call Instructions, Further Details on Interrupts.

Applications: Interfacing with Keyboards, Displays, D/A and A/D Conversions, Multiple Interrupts, Serial Data Communication.

Introduction to Real – Time Operating Systems: Tasks and Task States, Tasks and Data, Semaphores, and Shared Data; Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment.

Basic Design Using a Real-Time Operating System : Principles, Semaphores and Queues, Hard Real-Time Scheduling Considerations, Saving Memory and Power, An example RTOS like uC-OS (Open Source); Embedded Software Development Tools: Host and Target machines, Linker/Locators for Embedded Software, Getting Embedded Software into the Target System;

Debugging Techniques: Testing on Host Machine, Using Laboratory Tools, An Example System.

Introduction to advanced architectures : ARM and SHARC, Processor and memory organization and Instruction level parallelism; Networked embedded systems: Bus protocols, I2C bus and CAN bus; Internet-Enabled Systems, Design Example-Elevator Controller.

TEXT BOOKS :

1. *Computers and Components, Wayne Wolf, Elseveir.*
2. *The 8051 Microcontroller, Third Edition, Kenneth J.Ayala, Thomson.*

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REFERENCES :

1. *Embedding system building blocks, Labrosse, via CMP publishers.*
2. *Embedded Systems, Raj Kamal, TMH.*
3. *Micro Controllers, Ajay V Deshmukhi, TMH.*
4. *Embedded System Design, Frank Vahid, Tony Givargis, John Wiley.*
5. *Microcontrollers, Raj kamal, Pearson Education.*
6. *An Embedded Software Primer, David E. Simon, Pearson Education.*