West Bengal University of Technology
BF-142,Salt Lake City,Kolkata-700064
Syllabus of B.Tech/B.E in IT

SECOND YEAR FIRST SEMESTER

A. Theory							
Sl. No.	**Code**	**Theory**	**Contacts Periods/Week**				**Credits**
			L	**T**	**P**	**Total**	
1	M 301	Mathematics	3	1	--	4	4
2	EE 301	Circuit Theory & Networks	3	1	--	4	4
3	M(CS) 312	Numerical Methods & Programming	3	0	--	3	3
4	EC 311	Electronic System Design	3	0	--	3	3
5	EC 312	Digital Electronics & Logic Design	3	1	--	4	4
6	CS 302	Data Structures & Algorithms	3	1	--	4	4
Total Theory						**22**	**22**
B. Practical							
1.	EC 382	Digital Electronics & Logic design Lab	-	--	3	3	2
2.	CS 392	Data Structure Lab	-	--	3	3	2
3.	M(CS) 382	Numerical Methods & Programming Lab	-	--	3	3	2
4.	EE 391	Circuits & Networks Lab	-	--	3	3	2
Total Practical						**12**	**8**
Total of Semester						**34**	**30**

West Bengal University of Technology
BF-142,Salt Lake City,Kolkata-700064
Syllabus of B.Tech/B.E in IT
SECOND YEAR SECOND SEMESTER

A.THEORY:

A. Theory							
Sl. No.	**Code**	**Theory**	**Contacts Periods/Week**				**Credits**
			L	**T**	**P**	**Total**	
1	M 401	Mathematics	3	1	0	4	4
2	IT 401	Analysis & Design of Information System	3	0	0	3	3
3	CS 404	Computer Organization & Architecture	3	0	0	3	3
4	EC 411	Principles of Communication Engineering	3	0	0	3	3
5	EE 411	Control System	3	1	0	4	4
Total Theory						**17**	**17**

B.PRACTICAL:

B. Practicals							
Sl. No.	**Code**	**Practicals**	**Contacts Periods/Week**				**Credits**
			L	**T**	**P**	**Total**	
1	EC 481	Communication Engineering laboratory	0	0	3	3	2
2	EE 481	Control Systems Lab	0	0	3	3	2
3	IT 491	Information System Design Lab	0	0	3	3	2
4	CS 494	Computer Organization & Architecture Lab	0	0	3	3	2
Total of Practical						**12**	**8**

C. SESSIONAL:

HU 481	Technical Report writing & / Language Practice Lab	0	0	0	3	2
	TOTAL OF SESSIONAL				3	2
	TOTAL of Semester :				**32**	**27**

West Bengal University of Technology
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Syllabus of B.Tech/B.E in IT

THIRD YEAR FIRST SEMESTER

A. THEORY

Sl. No.	Code	THEORY	Contact Periods/Week			Total	Credits
			L	T	P		
12	CS 501	Operating System	3	0	--	3	3
	CS 511	Operation Research & Optimization Techniqu	3	1	--	4	4
3		Formal Language & Automata Theory					
	CS 512		3	1	--	4	4
		Object Technology & UML					
4							
	IT 501	Microprocessor & Microcontrollers	3	0	--	3	3
5							
	EI 502		3	1	--	4	4
TOTAL THEORY						**18**	**18**

B. PRACTICAL

Sl. No.	Code	PRACTICAL	Contact Periods/Week			Total	Credits
			L	T	P		
1	CS 591	Operating System Lab	0	0	3	3	2
2	CS 581	Operation Research Lab	0	0	3	3	2
3	IT 591	Object Technology Lab	0	0	3	3	2
4	EI 592	Microprocessor & Microcontrollers Lab	0	0	3	3	2
TOTAL PRACTICAL						**12**	**8**

C. SESSIONAL

Sl. No.	Code	SESSIONAL				Total	Credits
			0	**0**	**0**	**0**	**0**
TOTAL OF SESSIONAL						**0**	**0**

TOTAL OF SEMESTER **30 26**

Sixth Semester

A. THEORY							
	Code	**Subjects**	**Contacts (periods/week)**				**Credit points**
			L	T	P	Total	
1.	IT 601	Software Engineering & Project Management	3	1	0	4	4
2.	IT 602	Management Information System	3	0	0	3	3
3.	IT 603	Data Communication & Networking	3	1	0	4	4
4.	IT 604	Database Management System	3	1	0	4	4
5.	IT 605	Multimedia Technology & Applications	3	1	0	4	4
		Total of Theory	15	4	0	19	19

B. PRACTICAL:

B. PRACTICAL							
	Code	**Subjects**	**Contacts (periods/week)**				**Credit points**
			L	T	P	Total	
1.	IT 693	Data Communication & Networking Lab	0	0	3	3	2
2.	IT 694	DBMS Lab	0	0	3	3	2
3.	IT 695	Multimedia Technology & Applications	0	0	3	3	2
Total of Practical						**9**	**6**

C. SESSIONAL:

C. SESSIONAL							
	Code	**Subjects**	**Contacts (periods/week)**				**Credit points**
			L	T	P	Total	
1.	IT 682	Gr. Discussion & Communication Skill	0	0	3	3	2
Total of Sessional							
Total of 6th Semester						**31**	**27**

Six Weeks Industrial Training During Summer Vacation

SEVENTH SEMESTER

A. THEORY

Sl. No.	**Code**	**THEORY**	**Contact Periods/Week**			**Total**	**Credits**
			L	**T**	**P**		
1.	IT 701	Internetworking	3	1	--	4	4
2.	IT702	Web Technology	3	1	--	4	4
3.	HU 701	Financial Management & Accounts	3	0	--	3	3
		Elective I					
4.	IT 703		3	0	--	3	3
TOTAL THEORY						**14**	**14**

B. PRACTICAL

Sl. No.	**Code**	**PRACTICAL**	**Contact Periods/Week**			**Total**	**Credits**
			L	**T**	**P**		
1.	IT 791	Internetworking Lab	0	0	3	3	2
2.	IT 792	Web Technology Lab	0	0	3	3	2
3.	IT 795	Assigned Project	0	0	6	6	4
TOTAL PRACTICAL						**12**	**8**

C. SESSIONAL

Sl. No.	**Code**	**SESSIONAL**				**Total**	**Credits**
			L	**T**	**P**		
1.	IT 781	Practical Training Evaluation	0	0	0	0	2
2.	IT 782	Seminar on Assigned / Selected Topic	0	0	3	3	2
TOTAL OF SESSIONAL						**3**	**4**

TOTAL OF SEMESTER **29 26**

ELECTIVE I
IT 703A Computer Graphics
IT 703B Image Processing & GIS
IT 703C Soft Computing
IT 703D Distributed Computing
IT 703E Information Theory & Coding

COURSE STRUCTURE IN INFORMATION TECHNOLOGY

FOURTH YEAR SECOND SEMESTER, SEMESTER VIII

A. THEORY							
	Code	**Subjects**	**Contacts (periods/week)**				**Credit points**
			L	T	P	Total	
1.	IT 801	E-Commerce	3	0	0	3	3
2.	IT 802	Elective- II	3	0	0	3	3
3.	HU-802	Industrial Management	3	0	0	3	3
3.	IT 803	Elective-III	3	0	0	3	3
		Total of Theory	**9**	**0**	**0**	**12**	**12**

B. PRACTICAL							
	Code	**Subjects**	**Contacts (periods/week)**				**Credit points**
			L	T	P	Total	
1.	IT 891	E-Commerce Lab	0	0	3	3	2
Total of Practical						**3**	**2**

C. SESSIONAL							
	Code	**Subjects**	**Contacts (periods/week)**				**Credit points**
			L	T	P	Total	
1.	Hu 881	Gr. Discussion on Professionalism	0	0	3	3	2
2.	IT 882	Grand Viva Voce	0	0	3	3	2
3.	IT 883	Assigned Project	0	0	12	12	8
Total of Sessional			0	0	9	**18**	**12**
Total of Eighth Semester						**33**	**26**

ELECTIVE II (any one)

IT 802A Data Warehousing and Data Mining
IT 802B Business Information System
IT 802C VLSI Design
IT 802D Mobile Communications

ELECTIVE III (any one)

IT 803A Data Compression and Cryptography
IT 803B Principles of Language Translation
IT 803C Design and Analysis of Algorithms
IT 803D Artificial Intelligence

West Bengal University of Technology
B.E/B.Tech in Information Technology

Mathematics
Code: M 301
Contact: 3L + IT
Credit: 4

Probability:

Random Experiment; Sample space; Random Events; Probability of events. Axiomatic definition of probability; Frequency Definition of probability; Finite sample spaces and equiprobable measure as special cases; Probability of Non-disjoint events (Theorems). Counting techniques applied to probability problems; Conditional probability; General Multiplication Theorem; Independent events; Bayes' theorem and related problems. 10L

Random variables (discrete and continuous); Probability mass function; Probability density function and distribution function. Distributions: Binomial, Poisson, Uniform, Exponential, Normal, t and χ^2. Expectation and Variance (t and χ^2 excluded); Moment generating function; Reproductive Property of Binomal; Poisson and Normal Distribution (proof not required). Transformation of random variables (One variable); Chebychev inequality (statement) and problems. 10L

Binomial approximation to Poisson distribution and Binomial approximation to Normal distribution (statement only); Central Limit Theorem (statement); Law of large numbers (Weak law); Simple applications. 6L

Statistics:

Population; Sample; Statistic; Estimation of parameters (consistent and unbiased); Sampling distribution of sample mean and sample variance (proof not required). 18L
Point estimate: Maximum likelihood estimate of statistical parameters (Binomial, Poisson and Normal distribution). Interval estimation.

Testing of Hypothesis:

Simple and Composite hypothesis; Critical Region; Level of Significance; Type I and Type II Errors; Best Critical Region; Neyman-Pearson Theorem (proof not required); Application to Normal Population; Likelihood Ratio Test (proof not required); Comparison of Binomial Populations; Normal Populations; Testing of Equality of Means; χ^2—Test of Goodness of Fit (application only).

Simple idea of Bivariate distribution; Correlation and Regression; and simple problems. 4L

Total 48L

Circuit Theory & Networks
Code: EE 301
Contact: 3L + IT
Credit: 4

Different types of systems & networks: continuous & Discrete, Fixed and Time varying, Linear and Non-linear, Lumped and distributed, Passive & Active Networks & Systems

Laplace transform of impulse and sinusoidal steps waveforms for RL, RC, LC and RLC Circuits. Transient analysis of different electrical circuits with and without initial conditions, Fourier Series and Fourier Transform

Network theorems and their applications in circuit analysis, Formulation of network equations, Source transformations, Loop variable analysis and node variable analysis

Graph of network, concept of tree branch, tree link. Incidence matrix, Tie-set matrix and loop currents, Cut set matrix and node pair potentials

Two port networks, Open circuit Impedance and Short circuit Admittance parameters, Transmission parameters, hybrid parameters, and their inter-relations

Indefinite admittance matrix- their applications to the analysis of active network

Active filter analysis and synthesis using operational amplifier

SPICE: How SPICE works. Model statement, models for passive and active device, D.C. circuits analysis, small signal analysis, capacitors and inductors in D.C. Circuits, steady state and transient, plotting and printing, input and output Impedance, D.C. sensitivity analysis, harmonic decomposition (Fourier Series), Harmonic re-composition, voltage controlled components

Text books :

1. Sudhakar:Circuits & Networks:Analysis & Synthesis 2/e TMH New Delhi
2. Valkenburg M. E. Van, "Network Analysis", Prentice Hall.
3.Engineering circuit analysis with PSPICE and probe-Roger
4.Engg Circuit Analysis,: Hayt 6/e Tata Mcgraw-Hill
5.A. Chakravarty: Networks, Filters & Transmission Lines
6.D.Chattopadhyay and P.C.Rakshit: Electrical Circuits
7.A.V. Oppenheimer and A.S.Wilsky: Signals & Systems, PHI
8.R.V.Jalgaonkar.: Network Analysis & Synthasis.EPH.
9.Sivandam- Electric Circuits Analysis,Vikas

References :

1. Reza F. M. and Seely S., "Modern Network Analysis", Mc.Graw Hill Book Company
2.Roy Choudhury D., "Networks and Systems", New Age International Publishers.
1. Kuo F. F., "Network Analysis & Synthesis", John Wiley & Sons.

Numerical Methods and Programming

Code: M(CS) 312
Contacts: 3L
Credits: 3

Computer Number Systems; Overflow and underflow;
Approximation in numerical computation; Truncation and round off errors; Propagation and control of round off errors; Chopping and rounding off errors; Pitfalls (hazards) in numerical computations (ill conditioned and well conditioned problems). 2L

Algorithmic Approach in C Language to all the Numerical Problems Discussed below must be followed:

Interpolation:
Lagrange's Interpolation, Newton's forward & backward Interpolation Formula. Extrapolation; Newton's Divided Difference Formula; Error; Problems. 4L

Numerical Differentiation:
Use of Newton's forward and backward interpolation formula only. 1L

Numerical Integration:
Trapezoidal formula (composite); Simson's 1/3rd formula (composite); Romberg Integration (statement only); Problems. 2L

Numerical Solution of System of Linear Equations:
Gauss elimination method; Matrix Inversion; Operations Count; LU Factorization Method (Crout's Method); Gauss-Jordan Method; Gauss-Seidel Method; Sufficient Condition of Convergence. 6L

Numerical Solution of Algebraic and Transcendental Equations:
Iteration Method: Bisection Method; Secant Method; Regula-Falsi Method; Newton-Raphson Method. 4L

Numerical solution of Initial Value Problems of First Order Ordinary Differential Equations:
Taylor's Series Method; Euler's Method; Runge-Kutta Method (4^{th} order); Modified Euler's Method and Adams-Moulton Method. 6L

C Language Overview:
Loop; Recursion; Function; Array; Pointers; Structures and Unions; Various types of File Access Methods: Sequential, Indexed Sequential, Random; Binary. 11L
Various types of Files in C and Various types of File Handling Statements in C

Total **36L**

Implementation above Numerical & Statistical Problems in C Language;

Text Books:

1 Numerical Analysis & Algorithms, Pradeep Niyogi, TMH, 1st ed.
2 C Language and Numerical Methods by C.Xavier
3 Introductory Numerical Analysis by Dutta & Jana
4 Numerical Method:Balagurusamy
5 Numerical Mathematical Analysis by J.B.Scarborough
6 Numerical Methods (Problems and Solution) by Jain, Iyengar , & Jain
7 Numerical Methods In Computer Applications – P.U.Wayse. EPH
8 Computer Oreinted Numerical Method- Dutta,N. ,Vikas
9 Numerical Methods with Programs in Basic Fortran Pascal & C++ - S.B.Rao, Universities Press
10 Computer Programming & Numerical Analysis – N.Dutta, Universities Press
11 Numerical Methods for Engineers – Gupta, New Age International
12 Numerical Solutions of Differential Equations – Jain M.K.,New Age International
13 Numerical Methods for Scientific & Engg Computation – Jain M.K.,New Age International
14 Numerical Analysis – Rao G.S.,New Age International
15 Discrete Mathematical Structures – Rao G.S., New Age International
16 Foundations of Discrete Mathematics – Joshi K.D., New Age International
17 Applied Discrete Structures – Joshi, New Age International
18 Groups, Rings & Modules with Applications – Adhikari, M.R.,Universities Press

Electronic System Design
Code: EC 311
Contact: 3L
Credit: 3
Various components for electronic system design:
Operational Amplifier: Inverting, non-inverting, differential & instrumentation amplifiers, differentiator, integrator, Log & anti log amplifiers, multiplier, divider, voltage to current (both live and zero based) converter- floating and grounded load current (both live and zero based) to voltage converter, precision rectifier, electronic analog computation
System design for physical parameter (viz. Temperature, strain, pH etc) measurements
Function Generators: sine, square, triangular, and saw tooth waveform
Comparators: inverting, non-inverting, Schmitt trigger and window comparator
Active filters design: first & second order low pass butterworth, first & second order high pass butterworth, band pass , band reject and all pass filter
IC 555 Timer: monostable, and astable multivibrator
V to F and F to V converter
Linear voltage regulators: fixed and adjustable
Text books:

1. Design with OP AMPs and Analog Ics- Franco S, Tata McGraw Hill Int.

2. Linear Integrated Circuites & Applications, Y.Venkatramani, ISTE/EXCEL BOOKS
3. OP AMPs and Linear Integrated Circuits- Gayakwad R.A., PHI
4. OP AMPs and Linear Integrated Circuits- Coughlin R.F. & Driscoll F.F,PHI
5. Operational Amplifier : Design and application- Tobey & Graene, Mc.Graw Hill
6. Linear Integrated Circuits.: Tusar Jadav.EPH.
6. Salivan- Digital Circuits and Design,Vikas

Digital Electronics & Logic Design
Code : EC 312
Contacts : 3L + 1T
Credits : 4

Data and number systems, Binary representation, Codes and their conversions: BCD, Octal, Hexadecimal, ASCII, EBDIC, Gray, Signed binary number representation with 1's and 2's complement methods, Binary arithmetic

Boolean algebra, Venn diagram, logic gates and circuits, Minimization of logic expressions by algebraic method, K-map method and Quine Mc Clauskey method

Combinational circuits- adder, subtractor, encoder, decoder, comparator, multiplexer, de-multiplexer, parity generator, etc
Design of combinational circuits-Programming logic devices and gate arrays

Sequential Circuits- Flip Flops, various types of Registers and counters and their design, Irregular counter, State table and state transition diagram, sequential circuits design methodology

Memory devices- ROM, RAM, EPROM, EEPROM, etc

Different types of A/D and D/A conversion techniques

Different Logic families- TTL, ECL, MOS and CMOS, their operation, design and specifications

Text books:
1. Givone:Digital Principles &design Tata McGraw Hill
2. Digital Logic Design- Morries Mano, PHI
3. Digital Electronics Dr. Saroj Rangnekar, ISTE/EXCEL BOOKS
4. Malvino :Digital principles & Application
5. Jain :Modern digital Electronics TMH
6.Digital Integrated Electronics- H.Taub & D.Shilling, Mc Graw Hill
7.Digital Technology- Virendra Kumar, New Age
8.Marcovitz:Intro to Logic design Mcgraw-Hill
9. Digital Circuits and Design,Vikas

Data Structures and Algorithms
Code: CS 302
Contact: 3L + IT
Credit: 4
Overview of C language
Time and Space analysis of Algorithms - Order Notations.
Linear Data Structures - Sequential representations - Arrays and Lists, Stacks, Queues and Dequeues, strings, Application.
Linear Data Structures, Link Representation, Linear linked lists, Circularly linked lists. Doubly linked lists, application.
Recursion - Design of recursive algorithms, Tail Recursion, When not to use recursion, Removal of recursion.

Non-linear Data Structure: Trees - Binary Trees, Traversals and Threads, Binary Search Trees, Insertion and Deletion algorithms, Height-balanced 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 and Radix Sort
File Structures - Sequential and Direct Access. Relative Files, Indexed Files - B+ tree as index. Multi-indexed Files, Inverted Files, Hashed Files.

Text book :

1. Data Structures and Algorithms, O.G. Kakde and U.A. Deshpandey, ISTE/EXCEL BOOKS
2. Aho Alfred V., Hopperoft John E., UIlman Jeffrey D., "Data Structures and Algorithms", Addison Wesley
3. Drozdek- Data Structures and Algorithms, Vikas
    1. Ajoy Agarwal.: Data Structures Through C, Cybertech.
    2. Lipschutz: Data Structures TMH

References :

1.Heileman :Datastructure Algorithims &OOP
2. Data Structure Using C – M.Radhakrishnan, V.Srinivasan, ISTE/EXCEL BOOKS
2.Weiss Mark Allen, "Algorithms, Data Structures, and Problem Solving with C++", Addison Wesley.
3. Horowitz Ellis & Sartaj Sahni, "Fundamentals of Data Structures", Galgotria Pub.
4.. Tanenbaum A. S. , "Data Structures using 'C' "

Digital Electronics & Logic Design Lab
Code: EC 382
Contact: 3P
Credit: 2

List of Experiments:

1.Realization of NOT, OR, AND, XOR, XNOR gates using universal gates
2. A. Gray to Binary conversion & vice-versa.
   B. Code conversion between BCD and EXCESS-3
3. A. ODD and even parity generation and checking.
   B. 4-bit comparator circuit
4. Design of combinational circuit to drive seven-segment display
5. Design of combinational circuits using multiplexer
6. A. Adder/Subtractor circuits using Full-Adder using IC and/ or logic gates.
   B. BCD Adder circuit using IC and/ or logic gates
7. Realization of RS , JK, and D flip flops using Universal logic gates
8. Realization of Asynchronous up/down counter
9. Realization of Synchronous Mod-N counter
10. Digital to Analog conversion

Data Structure Lab
Code: CS 392
Contact: 3P
Credit: 2

Experiments should include but not limited to:
Implementation of array operations
Stacks and Queues: adding, deleting elements Circular Queue: Adding & deleting elements Merging Problem: Evaluation of expressions operations on Multiple stacks & queues :
Implementation of linked lists: inserting, deleting, and inverting linked list. Implementation of stacks & queues using linked lists
Polynomial addition, Polynomial multiplication

Sparse Matrices: Multiplication, addition.
Recursive and Non-recursive traversal of Trees
Threaded binary tree traversal. AVL tree implementation.
Application of Trees, Application of sorting and searching algorithms
Hash tables implementation: searching, inserting and deleting, searching & sorting techniques.

Numerical Methods Lab
Code: M(CS) 382
Contact: 3P
Credit: 2

1. Assignments on Interpolation: Newton forward & backward, Lagrange.
2. Assignments on Numerical Integration: Trapezoidal Rule, Simson's 1/3rd Rule, Weddle's Rule.
3. Assignments on Numerical solution of a system of Linear Equations: Gauss elimination, Gauss Jordan, Matrix Inversion, Gauss Seidel.
4. Assignments on Solution of Algebraic Equations: Bisection, Secant, Regula-Falsi, Newton-Raphson Methods.
5. Assignments on Ordinary Differential Equations: Taylor Series, Euler's Method, Runge-Kutta (4^{th} Order).
6. Assignments on Statistical Problems: Mean, Median, Mode, Standard deviation (for simple & frequency type data), Linear Correlation & Regression.

Circuits & Networks Lab
Code: EE 391

Contact: 3P
Credit: 2

List of Experiments:

1. Transient response in R-L and R-C Network: Simulation/hardware
2. Transient response in R-L-C Series & Parallel circuits Network: Simulation/hardware
3. Determination of Impedance (Z) and Admittance(Y) parameters of two port network
4. Frequency response of LP and HP filters
5. Frequency response of BP and BR filters
6. Generation of Periodic, Exponential, Sinusoidal, Damped sinusoidal, Step, Impulse, Ramp signals using MATLAB in both discrete and analog form
7. Evaluation of convolution integral, Discrete Fourier transform for periodic & non-periodic signals and simulation of difference equations using MATLAB
8. Representation of poles and zeros in z-plane, determination of partial fraction expansion in z-domain and cascade connection of second order system using MATLAB
9. Determination of Laplace transform and inverse Laplace transformation using MATLAB
10. Spectrum analysis of different signals

Note: An Institution/College may opt for some other software or hardware simulation wherever possible in place of MATLAB

West Bengal University of Technology
B.E/B.Tech in Information Technology

Fourth Semester

INFORMATION TECHNOLOGY

Mathematics
M 401
Contact: 3L + IT
Credit: 4

Sets and functions : Groups, Semigroups and monoids, Cyclic semigroups and submonoids, Subgroups and Cosets, Congruence relations on Semigroups. Morphisms, Normal subgroups. Structure of cyclic groups, permutation groups, dihedral groups. Elementary applications in coding theory.

Rings and Boolean Algebra : Rings, Subrings, morphism of rings, ideals and quotient rings. Euclidean domains. Integral domains and fields. Boolean Algebra - direct product, Morphisms. Boolean sub-algebra. Boolean Rings. Applications of Boolean algebra in logic circuits and switching functions.

Recursion and Recurrence Relation : Basic idea, Sequence and discrete function. Generating functions and applications.

Graph Thoery : Graphs, Digraphs, Isomorphism, Walks, Paths, Circuits, Shortest Path Problem, Dijkstra's Algorithm, Trees, Properties of Trees, Cotrees and Fundamental Circuits, Shortest Spanning Trees - Kruskal's Algorithm,Prims Algorithm, DFS, BFS, Cut Sets, Fundamental Cut Sets and Cut Vertices, Planar and Dual Graphs, Metric Representation of Graphs, Networks, Flow Augmenting Path, Ford-Fulkerson Algorithm for Maximum Flow.

Text :

1. Liu C. L., "Introduction to combinatorial mathematics", McGraw Hill, 1968.
2 Mott J. L., Kandel A. and Baker T. P., "Discrete mathematics for Computer Scientists and Mathematicians", PH, 1986.
3 Rosen—Discrete Mathematics, 2/e,TMH
4 S.K. Mapa—Higher Algebra (Abstract & Modern)
5 Robert J. McElice , Robert B. Ash & Carol Ash, "Introduction to discrete Mathematics", Tata McGraw Hill
6 Deo N., "Graph Theory with Applications to Engineering and Computer Science", PHI, 1980
7 Tremblay and Manohar, "Discrete mathematical structures with applications to computer science", McGraw Hill, 1975
8 Kolamn, Busby and Ross, "Discrete mathematical structures", 3/ed, PHI, 1996.
9 Fraleigh J. B., "A first course in abstract algebra Narosa", 1990
10 Smullyan R. M., "First Order Logic Springer Verlag", 1968

Reference:

1.Lipschutz—2000 Solved Problems in Discrete Mathematics, TMH
2.Balakrishnan—Graph Theory (Schaum),MH
3.Hararay—Graph Theory

Analysis and Design of Information System
IT 401
Contact: 3L
Credit: 3

Information System-Systems development life cycle, Structured Systems Analysis and Design, Physical and Logical Data Flow Diagrams, Requirements Analysis, Design of New Systems. Data Modeling, data dictionary, entity relationship diagram, structure charts, Transform and Transaction Analysis. Coupling and Cohesion, process specification, Structured English, Decision tables, CASE tools, Structured programming, System implementation, Chief programmer Teams, Planning for coding and Testing, verification and validation, changeover phase, Project review and walk through, Alternate Life cycles, evolutionary Design and Prototyping.

Feasibility Study - Cost estimation, cost benefit analysis, input-output design, forms design, Dialogue design, File design, security and control, Codification and Classifications, Documentation.

Text Book :

1. Senn J., "Analysis and Design of Information Systems", McGraw Hill
2. P. Jalote—Software Engineering
3. Naik Kishore—System Analysis & Design
4. Rogers G Pressman—Software Engineering

References :

1.Whitten—System Analysios & Design Methods,5/e,TMH

2. Rajaraman V., "Systems Analysis and Design", PHI
3. Murdic RG., Rose J. and Claggtt JR., "Information Systems for Modern Management", PHI,
4. Wigardes K., Svensson A., Sehong L. A., Dahlgren G., "Structured Analysis and Design of Information Systems",
5. Thomas R. and Prince, "Information Systems for Planning and Control",

Computer Organization & Architecture
CS-404
Contacts: 3L
Credits: 3

Concepts & Terminology: Digital computer concepts; Von-Neumann concept ; Hardware & Software and their nature ; structure & functions of a computer system , Role of operating system.

Memory Unit : Memory classification , characteristics ; Organization of RAM , address decoding ROM/PROM/EEPROM ; Magnetic memories , recording formats & methods , Disk & tape units; Concept of memory map , memory hierarchy , Associative memory organization ; Cache introduction , techniques to reduce cache misses , concept of virtual memory & paging.

CPU Design: The ALU – ALU organization , Integer representation , 1s and 2s complement arithmetic ; Serial & Parallel Address; implementation of high speed Address Carry Look Ahead & carry Save Address; Multiplication of signed binary numbers-Booth's algorithm ; Divide algorithms-Restoring & Non-Restoring ; Floating point number arithmetic; Overflow detection , status flags.

Instruction Set Architecture- Choice of instruction set ; Instruction word formats ; Addressing modes.

Control Design – Timing diagrams; T-States , Controlling arithmetic & logic instruction , control structures ; Hardwired & Micro programmed, CISC & RISC characteristics.

Pipelining-general concept , speed up , instruction & arithmetic pipeline; Examples of some pipeline in modern processors , pipeline hazards; Flynn's classification –SISD ,SIMD , MISD , MIMD architectures-Vector and Array processors & their comparison , Concept of Multiprocessor; Centralized & distributed architectures.

Input/output Organization : Introduction to Bus architecture , effect of bus widths , Programmed & Interrupt I/O , DMA.

Text:

1.Hayes-- Computer Architecture & Organization,3/e ,MH
2.Carter—Computer Architecture (Schaum Series), TMH
3.Mano M.M—"Computer System Architecture"
4.Chaudhury P. Pal—" Computer Organization & Design" , PHI

Reference:

1.Hamacher—Computer Organization, 5/e, MH

2.Stallings W—" Computer Organization & Architecture" , MH

Principles of Communication Engineering
Code: EC 411
Contact: 3L
Credit: 3

Amplitude and Frequency Modulation – their generation and detection Bandwidth requirements Low Power and High Modulators and Modulated amplifiers. Superheterodyne detection. Signal to Noise ratio of A.M. and P.M. transmission.

A/D, D/A Converters. Shannon's sampling Theorem. PAM, PWM, PPM and PCM. Their generation and detection.

Digital Modulation : ASK, FSK, PSK performance evaluation. Time Division Multiplexing and Demultiplexing. Modems, Error control and coding, Channel capacity.

Data Transmission Synchronization, Data protection, error detection and correlation.

Elements of Satellite Communication tracking and control.

Text :

1. Taub H. and Shilling D. L., "Principles of Communication Systems", 2/e,TMH
2. Carlson R. B., "Communication Systems ,4/e, Mc.Graw Hill
3. Haykin S. S., "An Introduction to Analog and Digital Communication Systems", Wiley Eastern.
4. Lathi B. P., "Communication Systems", John Wiley.

Reference:

1.Kennedy—Electronic Communication Systems, 4/e , TMH

Control System
EE 411
Contact: 3L + IT
Credit: 4

Elementary control concepts. Open loop and close loop control
Transfer function of simple electrical and electromechanical systems. Poles and zeros.
Transient response of 1st and second order systems. Modeling Position Control and Velocity control systems. Case studies positional control systems: Servo Motor, Tacho, Potentiometer Characteristics.
Frequency response. Bode & Nyquist Diagram. Root Locus, Stability analysis. Routh Hurwitz Criteria, Nyquist Criteria. Gain margin & phase margin. Signal flow Graph, Masson's Gain formula .
Control Actions : P, PD, PI & PID Control.
Introduction to state variable modeling. Z transforms and discrete data systems.

Text books :

1. Madan Gopal—Control Systems , Principles & Application , 2/e ,TMH
2. Nagrath I. J. and Gopal M., "Control Systems Engineering", 3rd Edn., New Age International (P) Ltd.
3. Ogata K, "Modern Control Systems", 2nd Edn., Prentice Hall, Englewood Cliffs.
4. Benjamin C. Kuo, "Automatic Control Systems", 7th Edn., PHI

References :

1. Ogata K., "Discrete - Time Control Systems", Prentice Hall, Englewood Cliffs, N. J.

2. Dasgupta S. K., " Control Systems"

Communication Engg. Lab
EC 481
Contacts: 3 P
Credits:2

1. Study of Amplitude modulation & Demodulation technique.
2. Study of Double Side Band Suppressed Carrier (DSB-SC) & Demodulation technique.
3. Study of Single Side Band Suppressed Carrier (SSB-SC) & Demodulation technique.
4. Study of Frequency Modulation & Demodulation.
5. Study of Time Division Multiplexing (TDM) & Demultiplexing.
6. Study of Frequency Shift Keying (FSK).
7. Study of Pulse Amplitude Modulation (PAM).
8. Study of Pulse Width Modulation (PWM).
9. Study of VCO (Voltage controlled oscillator) & PLL (Phase Locked Loop).

Control System Lab
EE 481
Contacts: 3 P
Credits: 2

1. Familiarization with MATLAB- Control system tool box , MATLAB-SIMULINK tool box & PSPICE.
2. Determination of step response for First order & Second order System with unity feedback on CRO & calculation of control system specifications for variation of system design.
3. Simulation of step response & impulse response, for Type-0 , Type-1 & Type-2 system with unity feedback using MATLAB & PSPICE.
4. Determination of root-locus, Bode-plot, Nyquist plot, using MATLAB-Control system toolbox for a given 2^{nd} order transfers function & determination of different control system specifications.
5. Determination of PI, PD, PID controller action on 1^{st} order simulated process.
6. Determination of approximate transfer function experimentally using from Bode Plot.
7. Evaluation of steady-state error, setting time, percentage peak overshoots, gain margin, phase margin with addition of lead compensator & lag compensator in forward path transfer functions using MATLAB & PSPICE.
8. Study of position control system using servomotor.

Information System Design Lab
IT 491
Contacts: 3 P
Credit: 2

Case studies using any of the following items including relevant form design with the help of visual programming aids.

a) Payroll accounting system.
b) Library circulation management system.
c) Inventory control system.
d) University examination & grading system.
e) Patient information system.
f) Tourist information system.
g) Judiciary information system.
h) Flight reservation system.
i) Bookshop automation software.
j) Time management software.

Computer Organization & Architecture Lab
CS 494
Contacts: 3 P

Credit: 2

1. Review of the different logic design ckts., e.g.
   a) Flip/Flop(RS, JK, D, T), b)Register,(4/8 bit Synchronized Data Transfer),
   c)Tri-state logic Gates

2. Familiarity with state of art IC-chips, e.g.
   a. Multiplexer , b) Decoder, c) Encoder, d) Counter, e)Shift-Register, f)adder
   Truth Table verification and clarification from Data-book.
3. Design a BCD adder.
4. Design an Adder/Subtracter composite unit .
5. Design a carry-look ahead Adder.
6. Design a ripple counter and carry-look ahead counter and assess the complexity of both the ckts.

7. Use a multiplexer unit to design a composite ALU .
8. Design a multiplex display unit using counter, multiplexer, decoder etc.
9. Design a keyboard Encoder unit in 2 Dimension.
10. Test a RAM chip and cascade two chips for vertical and horizontal expansion. Use wired OR tri-state output interconnection.
11. Use ALU chip for multibit arithmetic operation.

TECHNICAL REPORT WRITING & / LANGUAGE PRACTICE LABORATORY
Code: HU 481

Contact: 3

Credits: 2

Topics to be covered and number of hours required for it:

1. Introductory lecture is to be given to the students so that they get a clear idea of the syllabus and understand the need for having such a practice lab in the first place(3 hours)
2. Conversion practice is done on given situation topics. The students are also made to listen to pre-recorded cassettes produced by British Council and also by the Universities of Oxford and Cambridge (6 hours)
3. Group Discussions:- The students are made to understand the difference between the language of conversion and group discussion. Strategies of such discussions are to teach to them. It is also helpful to use videocassettes produced by the U.G.C. on topics like group-discussion. After wards the class is divided into groups and the students have to discuss on given topics on current socio-economic-political-educational importance(12 hours)
4. Interview sessions-students are taught the do's and don'ts of facing a successful interview. They then have to face rigorous practices of mock-interviews. There simulations of real life interview sessions where students have to face an interview panel(12 hours)
5. Presentations: The secrets of an effective presentation are taught to the students. Then each and every student has to make lab presentations with the help of the Overhead projector/ using power point presentation and other audio-visual aids in the laboratory. They also have to face the question answer sessions at the end of their presentation (12 hours)
6. Classes are also allotted to prepare the students for competitive examinations like the T.O.E.F.L. by making the students listen to specially produced C.D. cassettes of such examinations (3 hours)

The overall aim of this course is to inculcate a sense of confidence in the students and help them to become good communicators in their social as well as professional lives.

Text:
1. Sharma—Business Correspondence & Report Writing, TMH
2. Prasad—Group Discussion & Interview (With Audio Cassette) , TMH

Reference:
1. Sashi Kumar—Spoken English (with Cassette) , TMH

Fifth Semester

Operating System
Code: **CS 501**
Contacts: **3L**
Credits: **3**
Allotted Hrs: **47L**

Introduction [4L]
Introduction to OS. Operating system functions, evaluation of O.S., Different types of O.S.: batch, multi-programmed, time-sharing, real-time, distributed, parallel.

System Structure[3L]
Computer system operation, I/O structure, storage structure, storage hierarchy, different types of protections, operating system structure (simple, layered, virtual machine), O/S services, system calls.

Process Management [17L]

Processes [3L]: Concept of processes, process scheduling, operations on processes, co-operating processes, inter-process communication.

Threads [2L]: overview, benefits of threads, user and kernel threads.

CPU scheduling [3L]: scheduling criteria, preemptive & non-preemptive scheduling, scheduling algorithms (FCFS, SJF, RR, priority), algorithm evaluation, multi-processor scheduling.

Process Synchronization [5L]: background, critical section problem, critical region, synchronization hardware, classical problems of synchronization, semaphores.
Deadlocks [4L]: system model, deadlock characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.

Storage Management [19L]

Memory Management [5L]: background, logical vs. physical address space, swapping, contiguous memory allocation, paging, segmentation, segmentation with paging.

Virtual Memory [3L]: background, demand paging, performance, page replacement, page replacement algorithms (FCFS, LRU), allocation of frames, thrashing.

File Systems [4L]: file concept, access methods, directory structure, file system structure, allocation methods (contiguous, linked, indexed), free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency & performance.

I/O Management [4L]: I/O hardware, polling, interrupts, DMA, application I/O interface (block and character devices, network devices, clocks and timers, blocking and nonblocking I/O), kernel I/O subsystem (scheduling, buffering, caching, spooling and device reservation, error handling), performance.

Disk Management [3L]: disk structure, disk scheduling (FCFS, SSTF, SCAN,C-SCAN) , disk reliability, disk formatting, boot block, bad blocks.

Protection & Security [4L]

Goals of protection, domain of protection, security problem, authentication, one time password, program threats, system threats, threat monitoring, encryption.

Text Books / References :

1. Milenkovie M., "Operating System : Concept & Design", McGraw Hill.
2. Tanenbaum A.S., "Operating System Design & Implementation", Practice Hall NJ.
3. Silbersehatz A. and Peterson J. L., "Operating System Concepts", Wiley.
4. Dhamdhere: Operating System TMH
5. Stalling, William, "Operating Systems", Maxwell McMillan International Editions, 1992.
6. Dietel H. N., "An Introduction to Operating Systems", Addison Wesley.

Operation Research and Optimization Techniques

Code: **CS 511**
Contacts: **3L + 1T**
Credits: **4**
Allotted Hrs: **45L**

Introduction [2L]

Introduction to OR modeling approach and various real life situations

Linear programming problems [2L]

Basic LPP and applications, Various components of LP problem formulation

Solving Linear Programming problem [17L]

Solving LPP using

- simultaneous equations and Graphical Method (2L)
  - Simplex Method and extensions. (7L)
- Sensitivity analysis , Duality theory (2L)
- Revised Simplex, Transportation and assignment problems. (6L)

Network Analysis [7L]

Shortest paths, Maximal flow including PERT-CPM

Integer programming [2L]

Basic concepts, formulation, solution and applications

Dynamic programming [4L]

Modeling, Optimization, Replacement

Game theory [4L]

Introduction, Decisions under risk, Decisions under uncertainty

Queuing Theory [7L]

Introduction, basic definitions and notations, axiomatic derivation of the arrival & departure distributions for Poission Queue, Poission Queuing Model, M/M/1 queues in series, application

Text Books :

1. Hamdy A. Taha, "Operations Research", Fifth edn. , Macmillan Publishing Company, 1992.
2. V.K. Kapoor – "Operations Research"
3. Kanti Swaroop – "Operations Research"
4. Hadley G., "Linear Programming", Narosa Publishers, 1987
5. Hillier F. & Liebermann G. J., "Introduction to Operations Research", 7/e (with CD), TMH
6. Hillier F. & Liebermann G. J., "Operation Research", Holder Day Inc, 1974
7. Mustafi: Operations Research, New Age International
8. Mital: Optimization Methods, New Age International

9. Shenoy: Operation Research for Management, New Age International
10. Mahapatra: Introduction to System Dynamics Modelling, Universities Press
11. Rao: Engineering Optimization, New Age International

References :

1. Schaum outline series – "Operations Research", MH

Formal Language & Automata Theory
Code: **CS 512**
Contacts: **3L + 1T**
Credits: **4**
Allotted Hrs: **45L**

Finite State Machines [4L]
Definition, concept of sequential circuits, state table & state assignments, concept of synchronous, asynchronous and liner sequential machines

Finite State Models [10L]
Basic definition, mathematical representation, Moore versus Mealy m/c, capability & limitations of FSM, state equivalence & minimization, machine equivalence, incompletely specified machines, merger graph & compatibility graph, merger table, Finite memory, definite, information lossless & inverse machines : testing table & testing graph.

Structure of Sequential Machines [3L]
Concept of partitions, closed partitions, lattice of closed partitions, decomposition : serial & parallel.

Finite Automation [9L]
Preliminaries (strings, alphabets & languages, graphs & trees, set & relations), definition, recognition of a language by an automata - idea of grammar, DFA, NFA, equivalence of DFA and NFA, NFA with e-moves, regular sets & regular expressions : equivalence with finite automata, NFA from regular expressions, regular expressions from DFA, two way finite automata equivalence with one way, equivalence of Moore & Mealy machines, applications of finite automata.

Closure Properties of Regular Sets [4L]
Pumping lemma & its application, closure properties minimization of finite automata : minimization by distinguishable pair, myhill-nerode theorem.

Context Free Grammars [4L]
Introduction, definition, derivation trees, simplification, CNF & GNF.

Pushdown Automata [5L]
Definition, moves, instantaneous descriptions, language recognised by PDA, deterministic PDA, acceptance by final state & empty stack, equivalence of PDA and CFL.

Closure Properties of CFLs [4L]
Pumping lemma & its applications, ogden's lemma, closure properties, decision algorithms.

Introduction to ZRL & CSL [2L]
Introduction to Z. Regular language properties and their grammars, Context sensitive languages.

Text Books :

1. Hopcroft JE. and Ullman JD., "Introduction to Automata Theory, Languages & Computation", Narosa.
2. K.L.P. Mishra & N. Chandrasekharan – "Theory of Computer Science", PHI
3. Ash & Ash – "Discrete Mathematics", TMH
4. Lewis H. R. and Papadimitrou C. H., "Elements of the theory of Computation", P.H.I.
5. Martin: Introduction to Languages and Theory of Computation", McGraw Hill.

References :

1. Kohavi ZVI, "Switching & Finite Automata", 2nd Edn., Tata McGraw Hill.
2. Linz Peter, "An Introduction to Formal Languages and Automata", Narosa
3. "Introduction to Formal Languages", Tata McGraw Hill, 1983.

Object Technology & UML
Code: IT 501
Contacts: 3L
Credits: 3
Allotted Hrs: 45L

Introduction [6 L]

Why object orientation, History and development of Object Oriented Programming language, concepts of object oriented programming language.

Object oriented design [12 L]

Major and minor elements, Object, Class, relationships among objects, aggregation, links, relationships among classes- association, aggregation, using, instantiation, meta-class, grouping constructs.

Basic concepts of object oriented programming using Java [15 L]

Object, class, message passing, encapsulation, polymorphism, aggregation, threading, applet programming, difference between OOP and other conventional programming-advantages and disadvantages.

Fundamentals of Object Oriented design in UML [12 L]

Static and dynamic models, why modeling, UML diagrams: Class diagram, interaction diagram: collaboration diagram, sequence diagram, state chart diagram, activity diagram, implementation diagram, UML extensibility- model constraints and comments, Note, Stereotype.

Text Books / References :

1. Ali Bahrami, - "Object –Oriented System Development" - Mc Graw Hill.
2. Rambaugh, James Michael, Blaha - "Object Oriented Modelling and Design" - Prentice Hall India
3. Patrick Naughton, Herbert Schildt – "The complete reference-Java2" - Tata Mc graw Hill.
4. Page Jones, Meiler - "Fundamentals of object oriented design in UML"
5. Priestley: Practical Object Oriented Design using UML TMH
6. Roff: UML: A Beginner's Guide TMH
7. Rajaram: Object Oriented Programming and C++, New Age International
8. Mahapatra: Introduction to System Dynamic Modelling, Universities Press

Microprocessor and Microcontrollers
Code: EI 502
Contacts: 3L + 1T
Credits:4

Introduction to 8085A CPU architecture-register organization, addressing modes and their features. Software instruction set and Assembly Language Programming. Pin description and features.

Instruction cycle, machine cycle, Timing diagram.

Hardware Interfacing: Interfacing memory, peripheral chips (IO mapped IO & Memory mapped IO).

Interrupts and DMA.

Peripherals: 8279, 8255, 8251, 8253, 8237, 8259, A/D and D/A converters and interfacing of the same.

Typical applications of a microprocessor.

16 bit processors: 8086 and architecture, segmented memory has cycles, read/write cycle in min/max mode. Reset operation, wait state, Halt state, Hold state, Lock operation, interrupt processing. Addressing modes and their features. Software instruction set (including specific instructions like string instructions, repeat, segment override, lock prefizers and their use) and Assembly Language programming with the same.

Brief overview of some other microprocessors (eg. 6800 Microprocessor).

References:

1. Microprocessor architecture, programming and applications with 8085/8085A, Wiley eastern Ltd, 1989 by Ramesh S. Gaonkar.
2. Intel Corp: The 8085 / 8085A. Microprocessor Book – Intel marketing communication, Wiley inter science publications, 1980.
3. An introduction to micro computers Vol. 2 – some real Microprocessor – Galgotia Book Source, New Delhi by Adam Osborne and J. Kane
4. Advanced Microprocessors by Ray and Bhurchandi - TMH
5. Intel Corp. Micro Controller Handbook – Intel Publications, 1994.
6. Microprocessors and Interfacing by Douglas V. Hall, McGraw Hill International Ed. 1992
7. Assembly Language Programming the IBM PC by Alan R. Miller, Subex Inc, 1987
8. The Intel Microprocessors: 8086/8088, 80186, 80286, 80386 & 80486, Bary B. Brey, Prentice Hall, India 1996.

Operating System Lab
Code: CS 591
Contacts: 3P
Credits: 2

1. **Shell programming [6P]:** creating a script, making a script executable, shell syntax (variables, conditions, control structures, functions, commands).
2. **Process [6P]:** starting new process, replacing a process image, duplicating a process image, waiting for a process, zombie process.
3. **Signal [9P]:** signal handling, sending signals, signal interface, signal sets.
4. **Semaphore [6P]:** programming with semaphores (use functions semctl, semget, semop, set_semvalue, del_semvalue, semaphore_p, semaphore_v).
5. **POSIX Threads [9P]:** programming with pthread functions(viz. pthread_create, pthread_join, pthread_exit, pthread_attr_init, pthread_cancel)
6. **Inter-process communication [9P]:** pipes(use functions pipe, popen, pclose), named pipes(FIFOs, accessing FIFO)

Operation Research Lab
Code: CS 581
Contacts: 3P
Credits: 2

Software based lab using C & FORTRAN

For FORTRAN:
1) Familiarization with FORTRAN (3)
2) Linear Programming (Transportation, Assignment, Duality, Simplex)

For C-language:
1) Shortest Path (Dijkstra's Floyd's algorithm)
2) Maximal Flow
3) PERT/CPM

4) Queuing Theory
5) Integer Programming Problem (Branch & Bound Problem)

N.B:- Familiarization with any OR package

Object Technology Lab
Code: IT 591
Contacts: 3P
Credits: 2

1. Assignments on class, constructor, overloading, inheritance, overriding
2. Assignments on wrapper class, vectors, arrays
3. Assignments on developing interfaces- multiple inheritance, extending interfaces
4. Assignments on creating and accessing packages
5. Assignments on multithreaded programming, handling errors and exceptions, applet programming and graphics programming

Note: Use Java for programming.

Microprocessor and Micro-controller Lab
Code: EI 592
Contacts: 3P
Credits: 2

Sl. No.	Name of the Experiments	No. of hours
1.	Familiarization with 8085 register level architecture and trainer kit components, including the memory map. Familiarization with the process of storing and viewing the contents of memory as well as registers.	**3**
2.	a) Study of prewritten programs on trainer kit using the basic instruction set (data transfer, Load/Store, Arithmetic, Logical) b) Assignments based on above.	**3**
3.	a) Familiarization with 8085 simulator on PC. c) Study of prewritten programs using basic instruction set (data transfer, Load/Store, Arithmetic, Logical) on the simulator. b) Assignments based on above	**3**
4.	**Programming using kit/simulator for** i) table look up ii) Copying a block of memory iii) Shifting a block of memory iv) Packing and unpacking of BCD numbers v) Addition of BCD numbers vi) Binary to ASCII conversion vii) String Matching viii) Multiplication using Booth's Algorithm	**9**
5.	**Program using subroutine calls and IN/OUT instructions using 8255 PPI on the trainer kit eg, subroutine for delay, reading switch state & glowing LEDs accordingly, finding out the frequency of a pulse train etc**	**3**
6.	**Interfacing any 8-bit Latch (eg, 74LS373) with trainer kit as a peripheral mapped output port with absolute address decoding**	**3**

7.	**Interfacing with I/O modules:** a) ADC b) Speed control of mini DC motor using DAC c) Keyboard d) Multi-digit Display with multiplexing e) Stepper motor	**12**
8.	**Writing programs for 'Wait Loop (busy waiting)' and ISR for vectored interrupts (eg, counting number of pulses within specified time period)**	**3**
9.	**Study of 8051 Micro controller kit and writing programs for the following tasks using the kit** a) Table look up b) Basic arithmetic and logical operations c) Interfacing of Keyboard and stepper motor	**6**
10.	**Familiarization with EPROM programming and Erasing**	**3**

Sixth Semester

Software Engineering & Project Management
Code : IT 601
Contact : 3L +1T
Credit : 4
Alloted Hrs: 45L

Software Quality [12L]
Software Quality Assurance, Software Metrics, Software Validation, Static and Dynamic Analysis, Symbolic Equation, Mutation Analysis, Dynamic Testing, Unit Testing, White-box and Black-box Testing, Test Case Generation, Integration Testing, Bottom-up and Top-down Testing, System Testing, Function Testing, Performance Testing, Acceptance Testing, Installation Testing, Theoretical Foundation of Testing, Formal Verification, Test tools.

User Interface [10L]
Module Introduction, Objectives of Usability, How to Approach Usability, Designing with Usability in mind, Measuring Usability, Guidelines for User Interface Design, User Interface Elements, Dialog Design, SSADM, Methodology for Dialog Design, Prototyping Tools.

Software Reliability [10L]
Reliability, Hazard, MTTF, Repair and Availability, Steady-State Availability, Estimation of Residual Errors, Reliability Models, Software Complexity, Cyclomatic Complexity, Halstead's Metrics.

Project Management [12L]
Issues in Project Management, Management Functions, Software Project Management Plan, Software Management Structure, Personnel Productivity, Software Project Complexity, Software Metrics – Basic Consideration, Size Oriented and Function Point Oriented; Software Cost Estimation Techniques, Algorithmic Cost Modeling, The COCOMO Model, Project Scheduling, Software Project Planning, Scheduling Risk Management.

BOOKS :

1. R.G. Pressman : Software Engineering,TMH
2. Behforooz, Software Engineering Fundamentals, OUP
3. C. Ghezzi, M. Jazayeri and D. Mandrioli : Fundamentals of Software Engineering, PHI
4. I. SomerVille : Software Engineering, Pearson Education

5. Uma,Essentials of Software Engineering, Jaico
6. Royce : Software Project Management, Pearson Education
7. P. James, Pedrycz and Witold : Software Engineering- An Engineering Approach, John Wiley
8. Humphrey : Managing the Software Process, Pearson Education

DATA COMMUNICATIONS AND NETWORKING

Code : IT 603
Contact : 3L + 1T
Credit : 4
Alloted Hrs: 45L

Overview of Data Communications and Networking [2L]
Introduction, Network Models

Physical Layer [8L]
Signals, Digital Transmission, Analog Transmission, Multiplexing, Transmission Media, Circuit Switching and Telephone Network.

Data Link Layer [9L]
Error Detection and Correction, Data Link Control and Protocol, Point to Point Access :PPP, Multiple Access, Local Area Networks : Ethernet, Wireless Lans, Connecting Lans, Backbone Networks, Virtual Lans, Cellular Telephone and Satellite Networks, Virtual Circuit Switching.

Network Layer [8L]
Host-to-Host Delivery :Internetworking, Addressing and Routing, Network Layer Protocols : ARP, IPv4, ICMP, IPv6, and ICMPv6, Unicast and Multicast Routing : Routing Protocols.

Transport Layer [5L]
Process-to-Process Delivery : UDP and TCP, Congestion Control and Quality of Service.

Application Layer [9L]
Client-Server Model : Socket Interface, Domain Name System (DNS), Electronic Mail (SMTP), and File Transfer (FTP), HTTP and WWW, Multimedia.

Security [4L]
Cryptography, Message Security, User Authentication, and Key Management, Security Protocols in the Internet.

BOOKS :

1.B A Forouzan : Data Communications and Networking, TMH, 2003
2.A S Tanenbaum : Computer Networks, PHI, 2004
3.W Stallings : Data and Computer Communications , PHI/Pearson

Database Management Systems
Code: IT 604
Contacts: 3L + 1T
Credits: 4
Allotted Hrs: 45L

Introduction [3L]
File & Data Base Concept , Overview of DBMS, Data Models, Database Administrator, Database Users, Schema. Data Independence

Entity-Relationship Model [3L]
Basic concepts , Keys, Entity-Relationship Diagram, Cardinality ratios, Strong & Weak Entity Sets, Specialization, Generalization, Aggregation.

Relational Model [4L]
Procedural & Non Procedural Languages, Relational Algebra, Extended Relational Algebra Operations, Views, Modifications Of the Database, Relational Calculus .

SQL [5L]
Basic Concepts, Set operations, Aggregate Functions, Null Values, assertions, views, Nested Sub-queries, Cursors, Stored procedures and triggers.

Integrity Constraints & Introduction to RDBMS [3L]
Domain Constraints, Referential Integrity Constraints, Codd's rule.
Functional Dependencies and Normalization [7L]
Functional Dependency, Armstrong's axioms, Canonical Cover, Closure , Full and Partial Functional dependencies, Prime & Non Prime attribute , 1NF, 2NF, 3NF, BCNF, Multi valued Dependency , 4NF, 5NF, DKNF .
Transaction & Concurrency Control [5L]
Transaction concept, ACID properties, Conflict & View serializabilty, Test for Conflict serializability, Concurrency Control, Lock base protocols, Two phase locking.
Storage Strategies [4L]
Single-Level Index (primary, secondary, clustering), Multi-level Indexes, Dynamic Multi-level Indexes, Hashing Techniques, B tree and B+ tree .
Query Optimization [4L]
Full Table scan, Indexed-based scan, Merge join, Nested loop join , Equivalence rules , Heuristic Optimization , Cost Based Optimization.
Backup & Recovery [3L]
Physical & Logical Backup , Transaction logs, Causes of failures , Recovery techniques.
Distributed Databases [4L]
Basic Concepts, Data Fragmentation, Replication and Allocation Techniques, Types of Distributed Database Systems, Query Processing, Overview of Client-Server Architecture and Its relationship to Distributed Databases.
Text Books:

1. Henry F. Korth and Silberschatz Abraham, "Database System Concepts", Mc.Graw Hill.
2. Elmasri Ramez and Novathe Shamkant, "Fundamentals of Database Systems", Benjamin Cummings Publishing. Company.
3. Date C. J., "Introduction to Database Management", Vol. I, II, III, Pearson
4. Ramakrishnan: Database Management System , McGraw-Hill
5. Kroenke, Database Processing, PHI

Reference:

1. Alexis Leon & Mathews Leon ,Database Management Systems , Leon Vikas .
2. Bipin C Desai , An Introduction to Database Systems , Galgotia .
3. "Database Management Systems", Arun K.Majumdar, Pritimay Bhattacharya, Tata McGraw Hill

Management Information Systems
Code: IT 602
Contacts: 3L
Credits: 3
Total Lectures: 45L

1. **Introduction(2L)**
   Definition of management, its definition, purpose, elements of science, patterns of management analysis.
   Functions of managers.

2. **People & organization. (6L)**
   People: psychological factors, worker's skill & abilities.
   Organization:Organizational characteristics, Organizational behavior, corporate culture, power inter-group conflict, intra-group dynamics, the MIS function in organization, MIS personal, computer operation personal, MIS management.

3. **System & models. (6L)**
   System: components of a system, environment, open Vs Closed systems.
   Models: modeling systems general vs specific models, levels of models, types of models. Models of organizational systems. A general model of organization and its internal environment. Strategic planning models.

4. **Management & decision making (5L)**
   Management: labels of management, managerial role, planning & control, Managerial styles,
   Managerial decision making: characteristics of types of decision

5. **Decision making process. (3L)**
   Intelligence, design, sol^{n} evaluation & choice.

6. **Evaluating decision making.(2L)**
   Effectiveness vs efficiency

7. **Transaction processing & management reporting systems.(5L)**
   A management information systems frame work:
   ----- Transaction processing framework
   ----- Management reporting system
   ----- Decision support system.
   ----- Knowledge based systems
   ----- Office systems
8. **Transaction processing.(2L)**
   - nature
   - function
   - role of IT in transaction processing
   - processing cycles
   - Transaction processing subsystem.

9. **Management reporting system. (2L)**
   Evaluation of management reporting system, types of reports, structuring report content.

10. **Decision support system (DSS). (3L)**
    Component of DSS
    DSS development
    DSS products
    DSS development tools
    User interfaces
    Executive information system (EIS)
    Executive roles & decision making.
    Executive decision making environment

11. **MIS in the functional areas of business. (3L)**

Financial information system,
Marketing MIS
Manufacturing MIS

12. **Enterprise resource planning (3L)**
    - Materials Requirement planning (MRP)
    - Closed loop MRP
    - Manufacturing Resource Planning (MRP – II)
    - ENTERPRISE RESOURCE PLANNING

    Functional architecture of ERP
    Benefits of ERP
    Business Process Reengineering and ERP
    ERP implementation
13. **Supply chain management (1L)**
    Introduction
    Definition of SCM
    Features of SCM
    SCM Stages
14. **Cases in MIS (2L)**
    Case study method
    - Analytical Case
    - Issue Case
    - Written Case Analysis
    - Illustrations

Text Books:

1. Davis, MIS, TMH
2. rles Parker, Thomas Cage, MIS strategy & action (Management Info System) – McGraw-Hill.
3. Kelkar, Management Information Systems- A concise study, PHI.
4. Post & Anderson, Management Information System, TMH.
5. Dr. Milind M.Okha, Management Information Systems, Everest Publishing House

Reference:

1. Laudon & Laudon, Management Information Systems, Managing the digital firm, PHI.
2. Leon, Enterprise Resource Planning, TMH.

Multimedia Technology & Applications
Code: IT605
Contacts: 3L + 1T
Credits: 4
Allotted hours: 45L

Introduction [2L]
Multimedia today, Impact of Multimedia, Multimedia Systems, Components and Its Applications

Text and Audio [6L]
Text: Types of Text, Ways to Present Text, Aspects of Text Design, Character, Character Set, Codes, Unicode, Encryption;
Audio: Basic Sound Concepts, Types of Sound, Digitizing Sound, Computer Representation of Sound (Sampling Rate, Sampling Size, Quantization), Audio Formats, Audio tools, MIDI

Image and Video (8L)

Image: Formats, Image Color Scheme, Image Enhancement; Video: Analogue and Digital Video, Recording Formats and Standards (JPEG, MPEG, H.261) Transmission of Video Signals, Video Capture, and Computer based Animation.

Synchronization [4L]
Temporal relationships, synchronization accuracy specification factors, quality of service

Storage models and Access Techniques [(4L]
Magnetic media, optical media, file systems (traditional, multimedia)
Multimedia devices – Output devices, CD-ROM, DVD, Scanner, CCD

Image and Video Database [8L]
Image representation, segmentation, similarity based retrieval, image retrieval by color, shape and texture; indexing- k-d trees, R-trees, quad trees; Case studies- QBIC, Virage. Video Content, querying, video segmentation, indexing

Document Architecture and Content Management [9L]
Content Design and Development, General Design Principles
Hypertext: Concept, Open Document Architecture (ODA), Multimedia and Hypermedia Coding Expert Group (MHEG), Standard Generalized Markup Language (SGML), Document Type Definition (DTD), Hypertext Markup Language (HTML) in Web Publishing. Case study of Applications

Multimedia Applications [4L]
Interactive television, Video-on-demand, Video Conferencing, Educational Applications, Industrial Applications, Multimedia archives and digital libraries, media editors.

Books:

1. Ralf Steinmetz and Klara Nahrstedt , Multimedia: Computing, Communications & Applications , Pearson Ed.
2. Nalin K. Sharda , Multimedia Information System , PHI.
3. Fred Halsall , Multimedia Communications , Pearson Ed.
4. Koegel Buford , Multimedia Systems , Pearson Ed.
5. Fred Hoffstetter , Multimedia Literacy , McGraw Hill.
6. Ralf Steinmetz and Klara Nahrstedt , Multimedia Fundamentals: Vol. 1- Media Coding and Content Processing , PHI.
7. J. Jeffcoate , Multimedia in Practice: Technology and Application , PHI.
8. Prabhat K. Andleigh & Kiran Thakrar , Multimedia Systems Design , PHI.

Data Communication Lab
Code: IT 693
Contact: 3P
Credits: 2

1.**UNDERSTANDING TCP/IP:** (IP ADDRESS,SUBNET MASK,DNS,GATEWAY,WINS CONFIG,NETBIOS)
2.**CASE STUDY ON ETHERNET**
3.**NETWORK CONFIGURATION:**
1. NETWORK O.S CONFIG(LINUX,WINDOWS)
2.CONFIG DNS,FTP(LINUX)
3. SHARING FILES IN LAN ON VARIOUS NODES IN LINUX/WIN 'NT OR FROM NETWORKING NEIGHBOURHOOD OF WIN' 98
4. **SOCKET PROGRAMMING:**
1.BASIC UNIX SYSTEM CALL RELATED WITH SOCKET

2.ECHO CLIENT,ECHO SERVER

3.TIME SERVER
4.WHOIS CLIENT AND WHOIS SERVER(client will access user information from remote machine)
5.CHAT CLIENT AND SERVER
6.PROCESS COMMUNICATION

5.**UNIX /LINUX NETWORK PROGRAMMING- RPC**

.

6.**HANDS OM ACTIVITY IN PHYSICAL LINKS**

DBMS Lab
Code: IT 694
Contacts: 3P
Credits: 2

SQL :

1. Creating , altering and dropping tables with integrity constraints.
2. Retrieving and modifying data from a database .
3. Retrieving data from database using IN, BETWEEN, LIKE , ORDER BY, GROUP BY and HAVING clause .
4. Use of scalar and aggregate functions.
5. Retrieving data from a database using Equi , Non Equi , Outer and Self Join.
6. Using subqueries , rowid and rownum for retrieving data.
7. Use of views , indexes and sequences.

PL/SQL:

8. Introduction to PL/SQL , using output from server.
9. Use of implicit & explicit cursors in data handling.
10. Exception handling – Oracle defined and User defined.
11. Use of stored procedures & functions in data manipulation.
12. Use of trigger in data manipulation.

Text Books:

1. Ivan Bayross , SQL , PL /SQL – The Programming Language of Oracle , BPB Press.
2. Steven Feuerstein , Oracle PL/SQL Programming, Shroff Publishers ,Calcutta.

Reference:

1. Kevin Loney & George Koch ,Oracle 9i – The Complete Reference , Oracle Press .

Multimedia Technology & Applications Lab
Code: IT 695
Contacts: 3P
Credits: 2

1. Sound capturing & editing using tools like SOUNDFORGE
2. Image editing using tools like Adobe Photoshop
3. Creating/editing motion video/animation clips (using tools like Flash / Adobe Premier)
4. Creation of Content using HTML (basic tags, table form, frame, link to other Image)
5. Creating stylesheet using DHTML
6. Home Page creation using HTML, DHTML.

Books

1. Adobe , Adobe Photoshop 6.0: Classroom in a book Pearson Ed.
2. Anushka Wirasinha , Flash in a Flash- Web Development , PHI
3. Macromedia Flash5 fast and easy Web Development, Design, PHI
4. Castro, HTML4 for the World Wide Web, Pearson Ed.
5. Schurman & Purdi , Dynamic HTML in Action, Second Edition , PHI
6. Lozano, Multimedia- Sound & Video , PHI

Group Discussion & Communication Skills.
Code: IT 682
Contacts: 3P
Credits: 2

Sessions related to
Group Discussion: Methodology, Performance evaluation, Interviews

Communication Skills: Oral communication with respect to functions & situations, Professional communication, Spoken English.

Books:

1. T M Farhatullah , Communication skill for technical students, Orient Longman .
2. Parvin S R Bhatia, A M sheikh, Professional communication skills , S Chand & co.
3. H M Prasad, Group Discussion & interviews , TMH.

Internetworking
Code: IT 701
Contacts: 3L +1T
Credits: 4
Allotted Hrs: 45L

An Overview on Internet [4L]
The need for an Internet, The TCP/IP Internet, Internet services, Internet protocols and standardization, Review of Network technologies.

Internetworking Concepts [6L]
Architectural model introduction, Application level interconnection, Network level interconnection, Properties of the Internet, Internet Architecture, Interconnection through IP Gateways or routers, Internet and Intranet.

Internet Address [5L]
Introduction, Universal identifiers, Three primary classes of IP addresses, Classless IP address, Network and Broadcast addresses, Mapping internet addresses to physical addresses (ARP), ARP protocol format, Transport Gateways and subnet addressing, Multicast addressing.

Internet Protocol [6L]
Internet Architecture and Philosophy, The concept of unreliable delivery, Connectionless delivery system, The Internet Datagram, Routing direct and indirect delivery, Table driven IP routing, Protocol layering, Reliable stream transport, TCP performance, Bootstrap protocol (BOOTP).

Routing [7L]
The origin of Gateway routing tables, Original Internet Architecture and Cores, Core Gateways, Automatic route propagation, Vector distance (Bellman-Ford), routing, Gateway to Gateway Protocol (GGP), Autonomous system concept, Exterior Gateway Protocol (EGP), Interior Gateway Protocol (RIP, OSPF, HELLO), Routing Information Protocol (RIP), Combining RIP, HELLO, and EGP, Routing with partial information.

Enterprise Networking [7L]
Corporate networking, Broadband at the Metropolitan area level, High speed dedicated WAN services and switched WAN services, ISDN, BISDN and ATM services, Frame relay technology and services, Virtual private network concepts PPTP protocol.

Internet Servers [4L]
DNS, DHCP Servers, FTP, TELNET, E-Mail

Firewall & Networking [6L]
Introduction, Implementation of Firewall, Activities of Firewall, Configuration of firewall, Firewalls & SSL, SSL implementation, Bit implementation of SSL, Use of SSL.

Books

1. Computer Networks and Internets - Douglas E. Comer; PE.
2. Communication Networks - Leon-Garcia-Widjaja; TMH.
3. Internetworking with TCP / IP - Douglas E .Comer; PE.
4. TCP/IP protocol suite - Forouzan Behrouz A; TMH.
5. Computer Networks – Andrew S. Tanenbaum; PHI.
6. Data and Computer Communication - William Stallings; PHI.
7. The Complete reference of Networking - Craig Zacker; TMH.

Web Technology
Code: IT 702
Contacts: 3L +1T
Credits: 4
Allotted Hrs: 45L

Static Web Pages [6L]
Web Pages - types and issues, tiers; comparisons of Microsoft and java technologies, WWW-Basic concepts, web client and web server, http protocol (frame format), universal resource locator (url), HTML-different tags, sections, image & pictures, listings, tables, frame, frameset, form.

Dynamic Web Pages [2L]
The need of dynamic web pages; an overview of DHTML, cascading style sheet (css), comparative studies of different technologies of dynamic page creation.

Active Web Pages [2L]
Need of active web pages; java applet life cycle.

Java Script [3L]
Data types, variables, operators, conditional statements, array object, date object, string object.

Java Servlet [4L]
Servlet environment and role, HTML support, Servlet API, The servlet life cycle, Cookies and Sessions.

JSP [15L]
JSP architecture, JSP servers, JSP tags, understanding the layout in JSP, Declaring variables, methods in JSP, inserting java expression in JSP, processing request from user and generating dynamic response for the user, inserting applets and java beans into JSP, using include and forward action, comparing JSP and CGI program, comparing JSP and ASP program; Creating ODBC data source name, introduction to JDBC, prepared statement and callable statement.

J2EE[7L]

An overview of J2EE web services, basics of Enterprise Java Beans, EJB vs. Java Beans, basics of RMI, JNI.

XML [6L]
Extensible Markup Language (XML), basics of XML, elements and attributes, document type definition, XML parsers, sequential and tree approach.

Books:

1. Web Technologies - Godbole A. S. & Kahate A., TMH.
2. Web Technology & Design - Xavier C., New Age Publication.
3. Java Server Programming, J2EE edition. (VOL I and VOL II); WROX publishers.

Financial Management & Accounts
Code: HU 701
Contacts: 3L
Credits: 3
Allotted Hrs: 45L

Introduction [3L]
Financial Management, Financial Planning and Capitalization- definitions, objectives, changing roles and functions, Financial Decision.

Capital Budgeting [7L]
Nature of Investment decision, Importance of Capital Budgeting, The Capital. Budgeting Process - Investment Criterion, Pay-back period, Accounting, ROR (Rate of Return) Method, Discounting Cash flow method, Net – present value method, IRR (Internal Rate of Return) method, The benefit-Cost Ratio method.

Management of Working Capital [7L]
Various concepts, Elements, Classification, Financing and importance of working capital, Investment analysis, Cash flow determination, cost of capital, capital budgeting methods.

Budgeting Control Technique [5L]
Concepts of Budget, budgeting and budgetary control, Objectives, Functions, Uses, Advantages, Limitations; Master Budget and Report.

Cost – Volume – Profit Analysis [8L]
Classification of costs, Allocation, apportionment and absorption, Cost centers, different costing systems, Cost analysis for managerial decisions, Meaning of Linear CVP analysis, Objectives, Assumptions, Break – Even analysis, determining the Break-Even point profit, Volume graph profit, Volume ratios margin of Safety.

Introduction to Accounting [8L]
Basic accounting concepts, important definitions, uses, limitations, advantages; types of Accounting, Financial statements, introduction to Journal Accounting; different types of Vouchers, double entry bookkeeping, different types of transactions related to Financial Accounting.

Financial Control [7L]
Posting of Ledgers and preparation of Trial Balance; preparation of Balance Sheet and Profit and Loss Accounts; Controlling other departments by Financial Accounting (A practical Approach).

Books:

1. Financial Management and Accounting - P. K. Jain, S. Chand & Co.
2. Management & Accounting: Principles and Practice - R. K. Sharma & Shashi Kumar Gupta, Kalyani Publishers.
3. Advanced Management Accounting - Kaplan & Atkinson, PHI.
4. Fundamentals of Financial Management – Van Home, PE.
5. Financial Mgmt Accounting, Gupta,Pearson
6. Financial Mgmt, I.M. Pandey, Vikas
7. Financial Mgmt., Khan & Jain, TMH
8. Financial Mgmt , Mcmenamin, OUP
9. Financial Mgmt & Policy, Van Horne, PHI
10. Financial Mgmt,Kulkarni & Satyaprasad, Himalaya

Computer Graphics
Code: IT 703 A
Contacts: 3L
Credits: 3
Allotted Hrs: 45L

Introduction to Computer Graphics & Graphics Systems [4L]
Overview of CG, definitions of CG, types of CG, storage tubes displays, CRT technologies - Raster Scan Display, Computer graphics software.

Scan Conversion [6L]
Points & lines, Line drawing algorithms; DDA algorithm, Bresenham's line algorithm, Circle generation algorithm; Ellipse generating algorithm; scan line polygon, fill algorithm, boundary fill algorithm, flood fill algorithm.

2D Transformation [8L]
Basic transformations: translation, rotation, scaling; Matrix representations & homogeneous coordinates, transformations between coordinate systems; reflection shear; Transformation of points, lines, parallel lines, intersecting lines.

Viewing [4L]
Viewing pipeline, Window to Viewport co-ordinate transformation, clipping operations, point clipping, line clipping, clipping circles, polygons & ellipse.

3D Transformation & Viewing [10L]
3D transformations: translation, rotation, scaling & other transformations. Rotation about an arbitrary axis in space; reflection through an arbitrary plane; general parallel projection transformation; clipping, Viewport clipping, 3D viewing, perspectives & Depth Cueing.

Curves and Fractals [4L]
Curve representation, surfaces, designs, Bezier curves, B-spline curves, end conditions for periodic B-spline curves, rational B-spline curves.

Hidden Surfaces [4L]
Depth comparison, Z-buffer algorithm, Back face detection, BSP tree method, the Printer's algorithm, scan-line algorithm; Hidden line elimination, wire frame methods, fractal - geometry.

Color & Shading Models [5L]
Introduction, Modeling Light Intensities and Sources, Diffuse Reflection, Lambert's Cosine Law, Specular Reflection, Halftoning, Color Models - RGB Color, CMY Color..

Books:

1. Computer Graphics (C version 2nd Ed.) – Hearn D, Baker M P , Pearson.
2. Computer Graphics –A programming Approach– Harrington,Steven; McGraw Hill
3. Computer Graphics – principles and practice - Foley, Van Dam, Feiner and Huges; Pearson.
4. Computer Graphics (2nd Edition) - Hearn D, Banker M.P.;.PHI
5. Schaum's outlines Computer Graphics(2nd Ed)- Z. Xiang, R. Plastock; TMH
6. Introduction to Computer Graphics – A. Mukhopadhyaya, A. Chattopadhyay; Vikas Publishing House Pvt. Ltd

Image Processing & GIS

Code: IT 703 B
Contacts: 3L
Credits: 3
Allotted Hrs: 45L

Introduction [5L]
Background, Digital Image Representation, Fundamental steps in Image Processing, Elements of Digital Image Processing - Image Acquisition, Storage, Processing, Communication, Display.

Digital Image Formation [3L]
A Simple Image Model, Geometric Model- Basic Transformation (Translation, Scaling, Rotation), Perspective Projection, Sampling & Quantization - Uniform & Non uniform.

Mathematical Preliminaries [4L]
Neighbour of pixels, Connectivity, Relations, Equivalence & Transitive Closure; Distance Measures, Arithmetic/Logic Operations, Fourier Transformation, Properties of The Two Dimensional Fourier Transform, Discrete Fourier Transform, Discrete Cosine & Sine Transform.

Image Enhancement [6L]
Spatial Domain Method, Frequency Domain Method, Contrast Enhancement –Linear & Nonlinear Stretching, Histogram Processing; Smoothing - Image Averaging, Mean Filter, Low-pass Filtering; Image Sharpening. High-pass Filtering, High-boost Filtering, Derivative Filtering, Homomorphic Filtering; Enhancement in the frequency domain - Low pass filtering, High pass filtering.

Image Restoration [6L]
Degradation Model, Discrete Formulation, Algebraic Approach to Restoration - Unconstrained & Constrained; Constrained Least Square Restoration, Restoration by Homomorphic Filtering, Geometric Transformation - Spatial Transformation, Gray Level Interpolation.

Image Segmentation [6L]
Point Detection, Line Detection, Edge detection, Combined detection, Edge Linking & Boundary Detection - Local Processing, Global Processing via The Hough Transform; Thresholding - Foundation, Simple Global Thresholding, Optimal Thresholding; Region Oriented Segmentation - Basic Formulation, Region Growing by Pixel Aggregation, Region Splitting & Merging.

An Overview of GIS [4L]
Definition of GIS, Features & Functions, GIS as an Information System, GIS & Cartography, GIS data feeds, Historical development of GIS.

GIS Concepts & Spatial Data Model [5L]
Automated Cartography versus GIS, Database, Remote Sensing, Concept of Data model, Raster Data Model, Indexing & Hierarchical Data Structure, Vector Data Model, TIN Data Model

Remote Sensing [6L]
Concepts, GPS Satellite Signals, GPS data, GPS surveying, GPS error source, Differential GPS technique Techniques & Concepts, Electromagnetic Spectrum, RS Platforms, Visual Interpretation.

Books

1. Digital Image Processing - Gonzalez R.C.& Woods R.E.; Pearson
2. Getting Started with GIS- Clarke Keith. C; PE.
3. Fundamentals Of Digital Image Processing - Jain A.K; PHI/ Pearson.
4. Digital Image Processing Techniques - Ekstrom M.P.; Academic Press
5. Concepts & Techniques of GIS - Lo C.P, Albert, Yeung K.W- PHI.

Soft Computing
Code: IT 703 C
Contacts: 3L
Credits: 3
Allotted Hrs: 45L

Artificial Neural Network [3L]
Basic concept of Soft Computing; Basic concept of neural networks, Mathematical model, Properties of neural network, Typical architectures: single layer, multilayer, competitive layer; Different learning methods: Supervised, Unsupervised & reinforced; Common activation functions; Feed forward, Feedback & recurrent N.N; Application of N.N; Neuron.

Pattern Recognition [4L]
Pattern Classification, Pattern Association, Clustering, Simple Clustering algorithm, k-means & k-medoid based algorithm.

Models Of Neural Network [10L]
Architecture, Algorithm & Application of -- McCulloh-Pitts, Hebb Net, Perceptron (with limitations & Perceptron learning rule Convergence theorem), Backpropagation NN, ADALINE, MADALINE, Discrete Hopfield net, BAM, Maxnet , Kohonen Self Organizing Maps, ART1,ART2.

Fuzzy Sets & Logic [8L]
Fuzzy versus Crisp; Fuzzy sets—membership function, linguistic variable, basic operators, properties; Fuzzy relations—Cartesian product, Operations on relations; Crisp logic—Laws of propositional logic, Inference; Predicate logic—Interpretations, Inference; Fuzzy logic—Quantifiers, Inference; Fuzzy Rule based system; Defuzzification methods; FAM;

Genetic Algorithm [10L]
Basic concept; role of GA in optimization, Fitness function, Selection of initial population, Cross over(different types), Mutation, Inversion, Deletion, Constraints Handling; Evolutionary Computation; Genetic Programming; Schema theorem; Multiobjective & Multimodal optimization in GA; Application—Travelling Salesman Problem, Graph Coloring problem;

Hybrid Systems [10L]
Hybrid systems, GA based BPNN(Weight determination, Application); Neuro Fuzzy Systems—Fuzzy BPNN--fuzzy Neuron, architecture, learning, application; Fuzzy Logic controlled G.A;

Books:

1. Neural Networks- A Comprehensive foundation, Simon Haykin, 2nd Ed; Pearson
2. Neural Networks, Fuzzy Logic & Genetic Algorithms – Synthesis & applications, T.S. Rajasekaran & G.A. Vijaylakshmi Pai, PHI
3. Genetic Algorithm & fuzzy Logic Systems - Sanchez, Takanori, Zadeh; World Scientific
4. Genetic Algorithm, Goldberg David E.; Pearson
5. Fuzzy Set Theory & Its Applications - Zimmermann H. J.; Allied Publishers Ltd.
6. Fundamentals of Neural Networks, architectures, algorithms & applications --- Laurence Fausett; Prentice Hall, Englewood Clifts.
7. Fuzzy Sets & Fuzzy Logic, Klir & Yuan, PHI.

Distributed Computing
Code: IT 703 D
Contacts: 3L
Credits: 3
Allotted Hrs: 45L

Fundamentals [4L]
Introduction, Models and Features, Concept of distributed operating system, Issues in design of a distributed operating system.

Message Passing [8L]
Good message passing system, IPC, Synchronization, Buffering, Multi datagram messages, Encoding & decoding techniques, Process addressing, Failure handling, Group communication; Remote procedure calls (RPC) - Models, Communication protocols, RPC, Lightweight RPC.

Distributed Shared Memory [4L]
Architecture, Thrashing, Granularity, Advantages.

Synchronization [4L]
Introduction, Clock Synchronization, Event handling, Mutual Exclusion; Deadlock – Conditions, Avoidance, Prevention, Recovery.

Resource & process Management [8L]
Features of a good scheduling algorithm, Task assignment approach, Load balancing & load sharing approach, Introduction to process management, Process migration, Threads.

Distributed Files Systems [8L]
Introduction, Features, Models, Accessing models; sharing Semantics & caching schemes, replication, Fault Tolerance, Atomic transactions.

Naming [5L]
Introduction, Features, Fundamental Terminologies & concepts, System oriented names, Human oriented names, Name caches.

Security [4L]
Potential attacks to computer system, Cryptography, Authentication, digital signatures, Access Control.

Books

1. Distributed operating Systems, Concepts & design - Sinha Pradeep K.; PHI.
2. Distributed Operating System - Tanenbaum Andrews S. – Pearson.
3. Distributed Systems, Concepts & design - Coulouris George, Dollimore Jean, Kindberg Tim; Pearson.
4. Operating System Concepts - Silberschatz Galvin; John Wiley, 5th Edition.

Information Theory & Coding
Code: IT 703 E
Contacts: 3L
Credits: 3
Allotted Hrs: 45L

Source Coding [7L]
Uncertainty and information, average mutual information and entropy, information measures for continuous random variables, source coding theorem, Huffman codes.

Channel Capacity And Coding [7L]
Channel models, channel capacity, channel coding, information capacity theorem, The Shannon limit.

Linear And Block Codes For Error Correction [8L]
Matrix description of linear block codes, equivalent codes, parity check matrix, decoding of a linear block code, perfect codes, Hamming codes.

Cyclic Codes [7L]
Polynomials, division algorithm for polynomials, a method for generating cyclic codes, matrix description of cyclic codes, Golay codes.

BCH Codes [8L]
Primitive elements, minimal polynomials, generator polynomials in terms of minimal polynomials, examples of BCH codes.

Convolutional Codes [8L]
Tree codes, trellis codes, polynomial description of convolutional codes, distance notions for convolutional codes, the generating function, matrix representation of convolutional codes, decoding of convolutional codes, distance and performance bounds for convolutional codes, examples of convolutional codes, Turbo codes, Turbo decoding.

Books

1. Information theory, coding and cryptography - Ranjan Bose; TMH.
2. Information and Coding - N Abramson; McGraw Hill.
3. Introduction to Information Theory - M Mansurpur; McGraw Hill.
4. Information Theory - R B Ash; Prentice Hall.
5. Error Control Coding - Shu Lin and D J Costello Jr; Prentice Hall.

Internetworking Lab
Code : IT 791
Contacts : 3P
Credit : 2

1. Implementation of protocols (eg. Sliding window, Go-back-N etc. using rmi/ socket).
2. Implementation of Routing algorithms (eg. Flooding, Distance-vector Routing, Link-state Routing etc.).
3. Configuration of DNS, DHCP, FTP.
4. Implementation of firewall & proxy server (Winproxy)/ SQUID.
5. Configuration of firewall.
6. Telnet connection and chatting between two clients.
7. Web server configuration and Host (PWS/IIS4).
8. Control of access privilege in server.
9. Browser configuration.

Books

1. The Complete reference of Networking - Craig Zacker; TMH.
2. Communication Networks - Leon-Garcia-Widjaja; TMH.
3. Internetworking with TCP / IP - Douglas E .Comer; Pearson.
4. Data & Computer Communication - William Stallings; Pearson.

Web Technology Lab
Code: IT 792
Contacts: 3P
Credits: 2

1. Basic use of html tag, linking image table, frame, form design.
2. DHTML- inline styles, creating style sheets with the style element, linking external style sheet, positioning elements, user style sheet.
3. Creating event handler that respond to mouse and keyboard event: Onload, onmouseover, onmouseout, onfocus, onblur, onsubmit, onresult, onclick, onchange.
4. Structuring data with xml, xml parser, extensible style language (xsl); customising markup language.
5. Configuring apache-tomcat server.
6. Building simple jsp: Declaring variables and methods in jsp, inserting java expression in jsp, processing request from user, generating dynamic response for the user. Accessing database from jsp, inserting applet into jsp.

Books:-

1. JAVA Server Pages - Hans Bergstein – O'Reilly.
2. Web Technologies - Godbole A. S. & Kahate A., TMH.
3. Web Technology & Design - Xavier C., New Age Publication.
4. Java Server Programming, J2EE edition. (VOL I and VOL II); WROX publishers.

E-Commerce
IT 801
Contact: 3L
Credit: 3
Allotted Hrs: 39L

Introduction to E-Commerce [6L]: Definition, Scope of E-Commerce, Hardware requirements, E-Commerce and Trade Cycle, Electronic Markets, Electronic Data Interchange and Internet Commerce.
Business to Business E-Commerce [7L]: Electronic Markets, Electronic Data Interchange (EDI): Technology, Standards (UN/EDIFACT), Communications, Implementations, Agreements, Security, EDI and Business, Inter-Organizational E-commerce.
Legal issues [5L]: Risks: Paper Document vs. Electronic document, Authentication of Electronic document, Laws, Legal issues for Internet Commerce: Trademarks and Domain names, Copyright, Jurisdiction issues, Service provider liability, Enforceable online contract.
Security Issues [6L]: Security Solutions: Symmetric and Asymmetric Cryptosystems, RSA, DES, and Digital Signature, Protocols for secure messaging, Secure Electronic Transaction (SET) Protocol, Electronic cash over internet, Internet Security.
Business to Consumer E-Commerce [8L]: Consumer trade transaction, Internet, Page on the Web, Elements of E-Commerce with VB, ASP, SQL.
E-business [7L]: Internet bookshops, Software supplies and support, Electronic Newspapers, Internet Banking, Virtual Auctions, Online Share Dealing, Gambling on the net, E-Diversity, Case studies through internet.

Books:

1. E-Commerce-Strategy, Technologies & Applications by David Whitley, TMH
2. E-Commerce- The cutting edge of business by Kamlesh K. Bajaj, TMH
3. E-Commerce through ASP by W Clarke- BPB
4. Beginning E-Commerce with VB, ASP, SQL Server 7.0 & MTS by Mathew Reynolds, Wrox Publishers
5. Global Electronic Commerce- Theory and Case Studies by J. Christopher Westland and Theodore H. K Clark, University Press

Industrial Management

Code: HU 802
Contact: 3L
Credits: 3

Allotted Hrs: 39L

Human Resource Management: [8L

Recruitment and selection, Performance appraisal, Industrial Relations, Trade Union, Collective Bargaining

Organizational Behaviour: [8L

Different Schools of Management Thought : Scientific Management, Administrative Theory, Theory of Bureaucracy, Human Relations Theory(Elton Mayo).
Motivation: Concept, Different Theories (Maslow, ERG, Herzberg,)
Communication: Purpose, process, Barriers to effective communication, Guidelines to make communication effective.
Perception: Process, Importance, Factors influencing perception, Shortcuts for judging people- Halo effect, Stereotyping, Projection.

Quality Management: **[6L**

Concept, Dimensions for goods and services, Cost of Quality, Statistical Quality Control, Control Charts, Acceptance Sampling (single).
Total Quality Management: Concept, benefits, Criticism.
New Quality Tools: Kaizen, Six Sigma, Quality Circles.

Productions Management: [5L

Concept. Difference from Operations Management, Types of Production(Mass, Batch, Project), Functions of Production Management.
Productivity: Concept, Different Inputs and Productivity Measures, Effeciency and Effectiveness, Measures to increase Productivity.

Marketing Management: [6L

Basic Concepts of Marketing, Difference between Selling and Marketing, Elements of Marketing Mix- the 4 P's.
Marketing Environment: Mega Environment, Micro Environment, Internal Environment, Relevant Environment.
Simple Marketing Strategies: SWOT Analysis, BCG Matrix, Industry Matrix.

Materials Management: [6L

Concept, Functions, EOQ Models- Wilson model, model with shortage, model with quantity discount, model without shortage , Selective Inventory Control—ABC, VED, FSN analysis

Books:

1. Industrial Management, Vol.1 L.C. Jhamb, EPH
2. Industrial Relations, Trade Unions & Labour Legislation - Sinha, Pearson Education Asia
3. Organizational Behaviour, S.P. Robbins, Prentice Hall
4. Productions and Operations Management, S. N. Chary, TMH
5. Marketing Management, Phillip Kotler, Prentice Hall/Pearson Education.
6. Productions and Operations Management, Joseph Monks,TMH

Data Warehousing and Data Mining
IT 802A

Contact: 3L

Credit: 3

Allotted Hrs: 39L

Introduction [2L] : Data warehousing – definitions and characteristics, Multi-dimensional data model, Warehouse schema.

Data Marts [4L] : Data marts, types of data marts, loading a data mart, metadata, data model, maintenance, nature of data, software components; external data, reference data, performance issues, monitoring requirements and security in a data mart.

Online Analytical Processing [4L] : OLTP and OLAP systems, Data Modeling, LAP tools, State of the market, Arbor Essbase web, Microstrategy DSS web, Brio Technology, star schema for multi dimensional view, snowflake schema; OLAP tools.

Developing a Data Warehousing [4L] : Building of a Data Warehousing, Architectural strategies & organizational issues, design considerations, data content, distribution of data, Tools for Data Warehousing

Data Mining [4L] : Definitions; KDD(Knowledge Discovery database) versus Data Mining; DBMS versus Data Mining, Data Mining Techniques; Issues and challenges; Applications of Data Warehousing & Data mining in Government.

Association Rules [4L] : A priori algorithm, Partition algorithm, Dynamic inset counting algorithm, FP – tree growth algorithm; Generalized association rule.

Clustering Techniques [4L] : Clustering paradigm, Partition algorithms, CLARA, CLARANS; Hierarchical clustering, DBSCAN, BIRCH, CURE; Categorical clustering, STIRR, ROCK, CACTUS.

Decision Trees [4L] : Tree construction principle, Best split, Splitting indices, Splitting criteria, Decision tree construction with presorting.

Web Mining [4L] : Web content Mining, Web structure Mining, Web usage Mining, Text Mining.

Temporal and Spatial Data Mining [5L] : Basic concepts of temporal data Mining, The GSP algorithm, SPADE, SPIRIT, WUM.

Books:

1. Data Warehousing –Concepts, Techniques, products, application; Prabhu; PHI.
2. Data Mining Techniques; A. K. Pujari; Universities Press.
3. Data Warehousing, Data Mining and OLAP; Alex Berson and Stephen J Smith; TMH.
4. Data Warehousing in the real world; Anahory; Pearson Education.
5. Data Mining Introductory & Advanced Topic; Dunham; Pearson Education.

Business Information System
IT 802B
Contact: 3L
Credit: 3
Allotted Hrs: 39L

Introduction [6L]: Introduction to BIS and Mainframe Computer, Hardware configuration, 360/370 family: Processor, Multiprogramming, Channels, Input-Output device, Application, Characteristics of Mainframe Operating System: Batch processing, Virtual Storage, Spooling, Timesharing, Multiprogramming, Mainframe configuration : Small Mainframe configuration , 3090 configuration

COBOL Programming [10L]: Organization & Structure of COBOL program, Coding format, Identification and Environment Division- Configuration section, Input-Output section, Data Division- File section, Working storage section, Usage clause, synchronized clause, justified clause, redefines clause, renames clause, sign clause. Procedure Division- Structure of procedure division, data movement, arithmetic, sequence control, input output & conditional verbs. Table Handling- OCCURS clause and subscripting, multidimensional table, Perform, Set, Search verbs, index table and indexing, sorting a table. Structure of COBOL subroutines; Calling Subroutines, State of subroutines and CANCEL statement.

COBOL Files [8L]: Sequential file characteristics, File-control entries, File description –Fixed length record, Statements for sequential files, Sequential files with variable length record, Features for unit record files, special features for magnetic-tape files, I-O-CONTROL paragraph. Sort & merge verbs, File updating, Same sort area clause, Memory size clause; Direct Access Files- Relative files, Indexed sequential files; Creating reports.

Job Control Language (JCL) [7L]: Introduction to JCL : Mainframe information representation & Storage , Sequential data set , Partition data Set , Index file , Structure of JCL , JOB statement, EXEC statement, DD statement, Procedures & symbolic parameters, Compile – Link – Execute JCL, IBM utility: IEBGENER, IEBCOPY, IEHPROGM, IEBCOMPR .

VSAM [2L]: Introduction to VSAM, AMS, Defining & loading KSDS, ESDS, RRDS.

An Overview of DB2 [6L]: Introduction, Environment, Major components of DB2, DBRM, BIND, PLANS, DB2 internals: DB2 objects, optimizers, DB2 catalog & directory, Data locking.

Books:

1. COBOL programming; M.K Roy,D Ghosh dastidar; TMH.
2. IBM Mainframe and JCL; Alex Leon; TMH.
3. Information Systems through COBOL; Phillipakis and Kazmier, TMH.
4. Cobol for beginners, Thomas Worth, EEE.

VLSI Design

IT 802C

Contact: 3L
Credit: 3
Allotted Hrs: 39L

Introduction [3L] : VLSI technology, MOS Transistor & Switches, Layout of basic devices- Inverter, NAND, NOR, Compound gates, Multiplexer, Memory-Latches & Register.
VLSI Physical Design Automation [5L] :VLSI Design cycle: System specification; Design- Functional, Logic, Circuit, Physical; Fabrication, Design methodologies, Packaging; Design styles- Full custom, Standard cell, Gate arrays & Sea of gates, FPGA; Design rules.
Partitioning [5L] : Problem formulation, Approximation of hypergraphs with graphs, Kerninghan-Lin & Fiduccia- Mattheyses heuristic algorithm, Ratio cut, Simulated annealing.
Placement [5L] : Cost function, Force directed methods, Partitioning placement, Resistive network, Regular & linear placement.
Floorplanning [5L] : Problem formulation, Hierarchical approach, Rectangular dualization, Floorplan sizing, Floorplannig based on simulated annealing.
Routing [8L] : Global- Problem formulation; Fundamentals- Maze running, Line searching, Steiner trees; Lee & line probe algorithm, Hierarchical approach, Multicomodity Flow based technique, Randomized routing; Detailed- Problem formulation, Channel routing & Switchbox routing, Hierarchical approach, Greedy algorithm; Single layer- General river routing algorithm; Two layer- Left edge algorithm (Basic & Dogleg); Constraint graph- Yoshimura & Kuh algorithm; FPGA- Array & Row based.
Testing [4L] : Need for testing- Functionality & Manufacturing test; Manufacturing test principles- Stuck At, short & open circuit, Observability, controlability, Fault coverage; Automatic test pattern generation, Statistical fault analysis; Design strategies for test- Scan based, Self test, IDDQ.
VHDL [4L] :Introduction to VHDL, VHDL Terms, Describing Hardware in VHDL –Entity, Architecture, Concurrent Signal Assignment, Structural Design, Sequential Behavior, Behavioral Modeling, Generics, Data Types, Sequential Statements- IF, CASE, LOOP, EXIT, ASSERT,WAIT.

Books:

1. Principles of CMOS VLSI Design: Weste & Esraghian, PE.
2. An Introduction to VLSI Physical Design: M Sarafzadeh&C.K.Wong,TMH.
3. VLSI Design: Sujata Pandey & Manoj Pandey, Dhanpati Rai & Co.
4. A VHDL Primer: Bhasker, PE.
5. Algorithms For VLSI Physical Design Automation: Naved A. Sherwani, Kulwer Academic Publisher
6. VHDL Programming by Example: Douglas L. Pery,TMH

Mobile Communications
IT 802D
Contact: 3L
Credit: 3
Allocated Hrs: 39L
Introduction [6L]: A General Overview: History, Transmission Medium, Need, Advantages, Disadvantages and Different Standards. AMPS, GSM, GPRS, 3G.
Wireless LANs [8L]: Characteristics, IEEE 802.11: Architecture, Physical Layer, MAC Layer, MAC Management, 802.11a and 802.11b. HIPERLAN: History, WATM, BRAN and HiperLAN2. Bluetooth: Architecture, Radio Layer, Baseband Layer, Link Management Protocol, L2CAP and Security.

Mobile Transport and Network Layer [12L]: Introduction, Traditional TCP: Congestion Control, Slow Start, Fast Retransmit and Implications of Mobility. Classical TCP Improvements: Indirect TCP, Snooping TCP, Mobile TCP and Fast Retransmit. Mobile IP: Introduction, IP Packet Delivery, Agent Discovery, Registration, Tunneling and Encapsulation, Optimizations and Reverse Tunneling. Mobile Ad-hoc Networks: Routing, Destination Sequence Distance Vector, Dynamic Source Routing and Alternative Metrics.

Cellular Networks [9L]: Cellular Concept, Frequency Reuse, Channel Allocation Management, Call Setup, Location Management, Cell Handoffs, Interference: Co-channel and Adjacent Interference. System Capacity, Improving Cell Capacity and Coverage: Cell Splitting, Sectoring, Repeaters and Microcell Zone Concept.

Wireless Application Protocol [4L]: Introduction (WAP), Protocol Stack, Connections.

Books:

1. J. Schiller, Mobile Communications, Addison –Wesley, 2003
2. T. S. Rapport, Wireless Communications, Principle and Practices
3. Forouzan, Data Communications and Networking, TMH

Data Compression and Cryptography
IT 803A

Contact: 3L

Credit: 3

Allotted Hrs: 39L

Introduction [4L]: Need for data compression, Fundamental concept of data compression & coding, Communication model, Compression ratio, Reqirements of data compression, Classification.

Methods of Data Compression [8L]: Data compression-- Lossless & Lossy; Entropy encoding-- Repititive character encoding, Run length encoding, Zero/Blank encoding; Statistical encoding-- Huffman, Arithmatic & Lempel-Ziv coding; Source encoding-- Vector quantization(Simple vector quantization & with error term); Differential encoding—Predictive coding, Differential pulse code modulation, Delta modulation, Adaptive differential pulse code modulation; Transform based coding : Discrete cosine transform & JPEG standards; Fractal compression.

Introduction To Security [5L]: Need for security, Security approaches, Principles of security, Types of attacks.

Crytographic Techniques [5L]: Plaintext, Cipher text, Substitution & Transposition techniques, Encryption & Decryption, Types of attacks, Key range & Size.

Symmetric & Assymetric Key Cryptography [8L]: Algorithm types & Modes, DES, IDEA, Differential & Linear Cryptanalysis, RSA, Symmetric & Assymetric key together, Digital signature, Knapsack algorithm.

User Authenticattion Mechanism [4L]: Authentication basics, Passwords, Authentication tokens, Certificate based & Biometric authentication, Firewall .

Case Studies Of Cryptography [5L]: Deniel of service attacks, IP spoofing attacks, Secure inter branch payment transactions.

Books:

1. The Data Compression Book, Nelson, BPB.
2. Digital Image Processing & Analysis : B.Chanda & D. Dutta Mazumdar,PHI.
3. Digital Image Processing, Gonzalez & Woods, Pearson Education.
4. Cryptography & Network Security: Atul Kahate, TMH.

Principles of Language Translation
IT 803B
Contact: 3L
Credit: 3
Allotted Hrs: 39L

Introduction [4L]: Types of translators – Preprocessor, Compiler, Interpreter, Macro processor, Assembler; Programming language concepts- their characteristics and applications. Basic concepts of Compilers- Phases of the Compiler, Cross-Compiler, Compiler- Writing tools, Bootstrapping.
Lexical Analysis [5L]: Role of Lexical Analyzer**,** Tokens- Specifications & Recognition, Input buffering, Design of Lexical Analyzer generator.
Syntax Analysis [8L]: Parsing techniques- Top–Down and Bottom–Up parsing; Basic concepts of Left-recursions and Left – factoring; Formation of FIRST and FOLLOW sets and checking for the LL(1) acceptance. Basic concepts of Handles, Viable prefixes, Operator precedence parsing, LR parsers- SLR, Canonical LR(1), LALR. Error recovery strategies for different parsing techniques.
Syntax Directed Translation [5L]: Syntax Directed Translation Scheme SDTS-
Definitions, Different rules for writing semantic actions and their applications; Construction of Syntax trees, Definition of Abstract Translation Scheme (ATS) and its application. Bottom-Up evaluation of inherited attributes.
Run Time Environments [4L]: Source language issues - Activation trees, Control stack, Scope of declaration, Binding of names. Storage organization -Subdivision of run-time memory, Activation records. Storage allocation strategies, Parameter passing - call by value, call by reference, copy restore, call by name. Symbol tables, Dynamic storage allocation techniques.
Intermediate Code generation [6L]: Intermediate languages, Basic statement formation, Graphical representation, Three-address code, Implementation of three address statements - Quadruples, Triples, Indirect triples. Boolean expressions, Case statements, Backpatching.
Code Optimization and Generation [7L]: Introduction, Basic blocks & flow graphs, Transformation of basic blocks, DAG representation of basic blocks, Types of optimization - Loops in flow graph, Dataflow analysis using GEN and KILL, forming the IN and OUT of basic blocks; Peephole optimization; Simple code generator; Code generation from DAGs; Allocation of Registers required for the generation.

Books:

1. Aho, Ullman – "Compiler Principles and Design" – Narosa Publication
2. Aho, Sethi, Ullman - "Compiler Principles, Techniques and Tools" - Pearson Education.
3. D. M. Dhamdhare, "Compiler Construction", BPB Publications.

Design & Analysis of Algorithm
IT 803C
Contact: 3L
Credit: 3
Allotted Hrs: 39L

Models of computation [4L]: Random Access Machine, Relationship between Turing Machine and RAM, Time and Space Complexity.
Complexity analysis [8L]: Asymptotic notations, Recurrence for divide and conquer and its solution, Merge sort, Heap sort, Quick sort and their complexity.
Dynamic Programming [4L]: Basic method, Matrix-chain multiplication, All pair shortest paths, Single-source shortest path, Travelling Salesman problem.
Greedy Method [5L]: Basic method, Knapsack problem, Job sequencing with deadlines, Minimum spanning tree by Prim's and Kruskal's algorithms.
Disjoint Set Manipulation [4L]: Set manipulation algorithm like UNION-FIND, Union by rank, Path compression.
Graph Traversal Algorithms [5L]: BFS and DFS, Backtracking and its use in solving Knapsack and Eight queens problem.
Matrix Manipulation Algorithms [6L]: Strassen's Matrix-multiplication algorithm and its applications in Solution of simultaneous linear equations using LUP decomposition, Inversion of Matrix and Boolean Matrix multiplication.
Notion of NP-completeness [5L]: P class, NP-hard class, NP-complete class, Circuit Satisfiability problem.
Approximation Algorithms [4L]: Vertex cover problem, Travelling salesman problem, Set covering problem.

Books:

1. A.Aho, J.Hopcroft and J.Ullman "The Design and Analysis of algorithms", PE.
2. T Cormen, C Leiserson and R Rivest "Introduction to Algorithms", PHI.
3. Fundamentals of Algorithms- G.Brassard,P.Bratlay, PHI.
4. Horowitz Ellis, Sahani Sartaz, R. Sanguthevar " Fundamentals of Computer Algorithms".

Artificial Intelligence

IT 803D

Contact: 3L

Credit: 3

Allotted Hrs: 39L

Introduction [2L] Overview of AI, Problems of AI, AI techniques; Problem Solving - Problem space and search, Defining the problem as state space search, Problem characteristics; Tic-Tac-Toe problem.
AI languages [4L] Basic knowledge of programming languages like Prolog and Lisp.
Basic Search Techniques [4L] Solving problems by searching; Uniform search strategies: breadth first search, depth first search, depth limited search, bidirectional search, comparing search strategies in terms of complexity.
Special Search Techniques [6L] : Heuristic Search- greedy best-first search, A* search; Hill climbing search, Simulated annealing search; Genetic algorithms; Constraint satisfaction problems; Adversarial search - Games, Optimal decisions and strategies in games, Minimax search, Alpha-beta pruning.
Symbolic Logic [5L] Syntax and semantics for propositional logic, Syntax and semantics of FOPL, Properties of WFF, Clausal form, Unification, Resolution.
Reasoning Under Inconsistencies and Uncertainties [3L] Non-monotonic reasoning, Truth maintenance systems, Default reasoning & closed world assumption, Predicate completion and circumscription, Fuzzy logic.
Probabilistic Reasoning [3L] Bayesian probabilistic inference, Representation of knowledge in uncertain domain, Semantics of Bayesian networks, Dempster-Shafer theory.
Structured Knowledge [4L] Associative networks, Conceptual graphs, Frame structures.
Expert Systems [4L] Rule based systems, Nonproduction systems: decision tree architectures, blackboard system architectures, neural network architectures.
Learning [4L] Types of learning, general learning model, Learning by induction: generalization, specialization; example of inductive learner.

Books:

1. Artificial Intelligence, Ritch & Knight, TMH
2. Introduction to AI & Expert Systems, Patterson, PHI
3. Artificial Intelligence: A Modern Approach, Russel and Norvig, PE
4. Logic & Prolog Programming, Saroj Kaushik, New Age

E-Commerce Lab
IT 891
Contact: 3P
Credit: 2

Following E-Commerce experiments are to be implemented using either VB, ASP, SQL or JAVA, JSP, SQL.

- **Creating E-Commerce Site [3P]:** Designing and maintaining WebPages. Advertising in the Website, Portals and Vortals.

- **E-Commerce Interaction [6P]:** Comparison Shopping in B2C, Exchanges Handling in B2B, Interaction Examples: Virtual Shopping Carts.
- **E-Commerce Applications [6P]:** Online Store, Online Banking, Credit Card Transaction Processing.

Books:

1. E-Commerce through ASP by W Clarke- BPB
2. Beginning E-Commerce with VB, ASP, SQL Server 7.0 & MTS by Mathew Reynolds, Wrox Publishers
3. Professional Java Server Programming J2EE 1.3 Edition By Allamaraju et al, SPD.

Gr. Discussion on Professionalism
HU-881
Contact: 3S
Credit: 2

Each class may be divided into two groups. Each group may meet once a week and discuss topics mentioned below under HU-881 and IT-881, in alternate weeks.

HU-881

- Professionalism: Professional characteristics, professional education, professional development in Industry.

- Values and Ethics in Profession: Value system- goodness, means and ends; Ethics- ethical premises, expectations, conflicts and practices; Moral and ego, Ethics and morality.

- Right, virtue, ethics and justice, utility and justice; Privacy, Challenges to privacy, Privacy on the Internet.

- Professional Competence: Important technical topics covered in Semesters III-VII as well as topics of current professional interest.

Books:

1. Ethics and Engineering ----by Martin and Schinizger, TMC.
2. Issues and Ethics—by Correy G.Correy , Brooks & Cole Pub.
3. Ethics and Professionalism ---by John Kultgen
4. Ethics and the conduct of business-- by John R.Boatright, PE.