Syllabus for B.Tech(Computer Science & Engineering) Up to Fourth Year

Revised Syllabus of B.Tech CSE (for the students who were admitted in Academic Session 2010-2011)

Third Year - Fifth Semester

Sl. No	Field	Theory	Contact Hours/Week				Cr. Pts
			L	T	P	Total	
A. THEORY							
1	**HU501**	Economics for Engineers	3	0	0	3	3
2	**CS501**	Design & Analysis of Algorithm	3	**1**	0	4	4
3	**CS502**	Microprocessors & Microcontrollers	3	**1**	0	4	4
4	**CS503**	Discrete Mathematics	3	0	0	3	3
5	**Free Elective** **CS504A** **CS504B** **CS504C** **CS504D**	Circuit Theory & Network (ECE) Data Communication (ECE) Digital Signal Processing (ECE Object Oriented Programming (IT)	3	**0/1**	0	3/4	3/4
		Total of Theory				**17/18**	**17-18**
B.PRACTICAL							
6	**CS591**	Design & Analysis of Algorithm	0	0	3	3	2
7	**CS592**	Microprocessors & Microcontrollers	0	0	3	3	2
8	**CS593**	Programming Practices using C++	1	0	2	3	2
9	**F.E.** **CS594A** **CS594B** **CS594C** **CS594D**	 Circuit Theory & Network (ECE) Data Communication (ECE) Digital Signal Processing (ECE) Object Oriented Programming (IT)	0	0	3	3	2
		Total of Practical				**12**	**8**
		Total of Semester				**29/30**	**25-26**

SEMESTER – V

Theory

Economics for Engineers
HU-501
Contracts: 3L
Credits- 3

Module-I

1. Economic Decisions Making – Overview, Problems, Role, Decision making process.
2. Engineering Costs & Estimation – Fixed, Variable, Marginal & Average Costs, Sunk Costs, Opportunity Costs, Recurring And Nonrecurring Costs, Incremental Costs, Cash Costs vs Book Costs, Life-Cycle Costs; Types Of Estimate, Estimating Models - Per-Unit Model, Segmenting Model, Cost Indexes, Power-Sizing Model, Improvement & Learning Curve, Benefits.

Module-II

3. Cash Flow, Interest and Equivalence: Cash Flow – D iagrams, Categories & Computation, Time Value of Money, Debt repayment, Nominal & Effective Interest.
4. Cash Flow & Rate Of Return Analysis – Calculations, Treatment of Salvage Value, Annual Cash Flow Analysis, Analysis Periods; Internal Rate Of Return, Calculating Rate of Return, Incremental Analysis; Best Alternative Choosing An Analysis Method, Future Worth Analysis, Benefit-Cost Ratio Analysis, Sensitivity And Breakeven Analysis. Economic Analysis In The Public Sector - Quantifying And Valuing Benefits & drawbacks.

Module-III

5. Inflation And Price Change – Definition, Effects, Causes, Price Change with Indexes, Types of Index, Composite vs Commodity Indexes, Use of Price Indexes In Engineering Economic Analysis, Cash Flows that inflate at different Rates.
6. Present Worth Analysis: End-Of-Year Convention, Viewpoint Of Economic Analysis Studies, Borrowed Money Viewpoint, Effect Of Inflation & Deflation, Taxes, Economic Criteria, Applying Present Worth Techniques, Multiple Alternatives.
7. Uncertainty In Future Events - Estimates and Their Use in Economic Analysis, Range Of Estimates, Probability, Joint Probability Distributions, Expected Value, Economic Decision Trees, Risk, Risk vs Return, Simulation, Real Options.

Module-IV

8. Depreciation - Basic Aspects, Deterioration & Obsolescence, Depreciation And Expenses, Types Of Property, Depreciation Calculation Fundamentals, Depreciation And Capital Allowance Methods, Straight-Line Depreciation Declining Balance Depreciation, Common Elements Of Tax Regulations For Depreciation And Capital Allowances.
9. Replacement Analysis - Replacement Analysis Decision Map, Minimum Cost Life of a New Asset, Marginal Cost, Minimum Cost Life Problems.
10. Accounting – Function, Balance Sheet, Income Sta tement, Financial Ratios Capital Transactions, Cost Accounting, Direct and Indirect Costs, Indirect Cost Allocation.

Readings

1. James L.Riggs,David D. Bedworth, Sabah U. Randhawa : Economics for Engineers 4e , Tata McGraw-Hill
2. Donald Newnan, Ted Eschembach, Jerome Lavelle : Engineering Economics Analysis, OUP
3. John A. White, Kenneth E.Case,David B.Pratt : Principle of Engineering Economic Analysis, John Wiley
4. Sullivan and Wicks: Engineering Economy, Pearson
5. R.Paneer Seelvan: Engineering Economics, PHI
6. Michael R Lindeburg : Engineering Economics Analysis, Professional Pub

Design & Analysis of Algorithm
Code: CS501
Contact: 3L + 1T
Credits: 4

Complexity Analysis:[2L]
Time and Space Complexity, Different Asymptotic notations – their mathematical significance
Algortihm Design Techniques:
Divide and Conquer: [3L]
Basic method, use, Examples – Binary Search, Merg e Sort, Quick Sort and their complexity.
Heap Sort and its complexity [1L]
Dynamic Programming: [3L]
Basic method, use, Examples – Matrix Chain Manipu lation, All pair shortest paths, single source shortest path. Backtracking: [2L]
Basic method, use, Examples – 8 queens problem, Graph coloring problem. Greedy Method: [3L]
Basic method, use, Examples – Knapsack problem, Job sequencing with deadlines, Minimum cost spanning ree by Prim's and Kruskal's algorithm.

Lower Bound Theory: [1L]
O(nlgn) bound for comparison sort

Disjoint set manipulation: [2L]
Set manipulation algorithm like UNION-FIND, union by rank.

Graph traversal algorithm: Recapitulation [1L]
Breadth First Search(BFS) and Depth First Search(DFS) – Classification of edges - tree, forward, back and cross edges – complexity and comparison

String matching problem: [3L]
Different techniques – Naive algorithm, string matching using finite automata, and Knuth, Morris, Pratt (KMP) algorithm with their complexities.

Amortized Analysis: [3L]
Aggregate, Accounting, and Potential Method.

Network Flow: [3L]
Ford Fulkerson algorithm, Max-Flow Min-Cut theorem (Statement and Illustration)

Matrix Manipulation Algorithm: [3L]
Strassen's matrix manipulation algorithm; application of matrix multiplication to solution of simultaneous linear equations using LUP decomposition, Inversion of matrix and Boolean matrix multiplication

Notion of NP-completeness: [3L]
P class, NP class, NP hard class, NP complete class – their interrelationship, Satisfiability prob lem, Cook's theorem (Statement only), Clique decision problem

Approximation Algorithms: [3L]
Necessity of approximation scheme, performance guarantee, polynomial time approximation schemes, vertex cover problem, travelling salesman problem.

Text Book:
1. T. H. Cormen, C. E. Leiserson, R. L. Rivest and C. Stein, "Introduction to Algorithms"

2. A. Aho, J.Hopcroft and J.Ullman "The Design and Ana lysis of

Algorithms" D.E.Knuth "The Art of Computer Programming", Vol. 3

Jon Kleiberg and Eva Tardos, "Algorithm Design"

Reference:
2.5 K.Mehlhorn , "Data Structures and Algorithms" - Vol . I & Vol. 2.
2.6 S.Baase "Computer Algorithms"
2.7 E.Horowitz and Shani "Fundamentals of Computer Algor ithms"
2.8 E.M.Reingold, J.Nievergelt and N.Deo- "Combinational Algorithms- Theory and Practice", Prentice Hall, 19 97

Microprocessors & Microcontrollers
Code: CS502
Contact: 3L + 1T
Credits: 4

Module -1: **[8L]**
Introduction to Microcomputer based system. History of evolution of Microprocessor and Microcontrollers and their advantages and disadvantages. [1L]
Architecture of 8085 Microprocessor, Pin description of 8085. [2L]
Address/data bus Demultiplexing , Status Signals and the control signals. [1L]
Instruction set of 8085 microprocessor, Addressing modes, [3L]
Timing diagram of the instructions (a few examples). [1L]

Module -2: **[9L]**
Assembly language programming with examples, Counter and Time Delays,
Stack and Subroutine, [6L]
Interrupts of 8085 processor(software and hardware), I/O Device Interfacing-I/O Mapped I/O and Memory Mapped I/O , Serial (using SID and SOD pins and RIM, SIM Instructions) and Parallel data transfer,
[3L]

Module 3: **[10L]**
The 8086 microprocessor- Architecture, Addressing modes, Interrupts [3L]
Introduction to 8051 Microcontroller –Architecture, Pin Details. [3L]
Addressing modes, Instruction set, Examples of Simple Assembly Language. [4L]

Module -4: **[9L]**
Memory interfacing with 8085, 8086 [2L]
Support IC chips- 8255 ,8251,8237/8257,8259 [4L]
Interfacing of 8255 PPI with 8085 and Microcontroller 8051. [2L]
Brief introduction to PIC microcontroller (16F877) [1L]

Learning Outcome:
Additional Tutorial Hours will be planned to meet the following learning outcome.

Through this course, the students will be exposed to hardware details of 8085 microprocessor with the related signals and their implications. They will also learn programming and interfacing of 8085. The students will understand the difference between the architecture of 8085 and 8086. They will also be aware of the 8051 architecture and its programming. Lastly the students will have a basic idea on PIC microcontroller (16F877)

TEXTS :
1. Microprocessors and microcontrollers - N. Senthil Kumar, M. Saravanan and
Jeevananthan (Oxford university press)
2. 8051 Microcontroller – K. Ayala (Cengage learning)
3. MICROPROCESSOR architecture, programming and Application with 8085 - R.Gaonkar (Penram international Publishing LTD.)
4.Microcontrollers:Principles&Applications , Ajit Pal, PHI 2011.
5.Naresh Grover, "Microprocessor comprehensive stud ies Architecture, Programming and Interfacing"Dhanp at Rai, 2003
6. 8051 Microprocessor –V. Udayashankara and M.S Ma llikarjunaswami (TMH).
7. Microprocessor 8085 and its Interfacing—S Mathur(PHI)
8. An Introduction to Microprocessor and Applications –Krishna Kant (Macmillan)

Reference:
1. 8086 Microprocessor –K Ayala (Cengage learning)
2. The 8085 Microprocessor, Architecture, Programming and Interfacing- K Uday Kumar, B
.S Umashankar (Pearson)
3. The X-86 PC Assembly language, Design and Interfacing - Mazidi, Mazidi and Causey (PEARSON)
4. The 8051 microcontroller and Embedded systems - Mazidi, Mazidi and McKinley (PEARSON)
5. Microprocessors – The 8086/8088, 80186/80386/804 86 and the Pentium family – N. B. Bahadure (PHI).
6. The 8051 microcontrollers – Uma Rao and Andhe Pal lavi (PEARSON).

Discrete Mathematics
Code: CS503
Contact: 3L
Credits: 3

Module I: Introduction to Propositional Calculus: Propositions, Logical Connectives, Conjunction, Disjunction, Negation and their truth table. Conditional Connectives, Implication, Converse, Contrapositive, Inverse, Biconditional statements with truth table, Logical Equivalence, Tautology, Normal forms-CNF, DNF; Predicates and Logical Quantifications of propositions and related examples. 10L

Module II: Theory of Numbers: Well Ordering Principle, Divisibility theory and properties of divisibility; Fundamental theorem of Arithmetic; Euclidean Algorithm for finding G.C.D and some basic properties of G.C.D with simple examples; Congruences, Residue classes of integer modulo $n(Z_n)$ and its examples.Order, Relation and Lattices: POSET, Hasse Diagram, Minimal , Maximal, Greatest and Least elements in a POSET, Lattices and its properties, Principle of Duality, Distributive and Complemented Lattices. 10L

Module III: Counting Techniques: Permutations, Combinations, Binomial coefficients, Pigeon- hole Principle, Principles of inclusion and exclusions; Recurrence relations: Formulation/Modelling of different counting problems in terms of recurrence relations, Solution of linear recurrence relations with constant coefficients (upto second order) by (i) The iterative method (ii) Characteristic roots method (iii) Generating functions method. 10L

Module IV: Graph Coloring: Chromatic Numbers and its bounds, Independence and Clique Numbers, Perfect Graphs-Definition and examples, Chromatic polynomial and its determination, Applications of Graph Coloring.

Matchings: Definitions and Examples of Perfect Matching, Maximal and Maximum Matching, Hall's Marriage Theorem (Statement only) and related problems. 6

Texts:

1. Russell Merris, Combinatorics, Wiley-Interscience series in Discrete Mathematics and Optimisation
2. N. Chandrasekaran and M. Umaparvathi, Discrete Mathematics, PHI
3. Gary Haggard, John Schlipf and Sue Whitesides, Discrete Mathematics for Computer Science, CENGAGE Learning
4. Gary Chartrand and Ping Zhang – Introduction to Gra ph Theory, TMH

References:

8. J.K. Sharma, Discrete Mathematics, Macmillan
9. Winfried Karl Grassmann and Jean-Paul Tremblay, Logic and Discrete Mathematics, PEARSON.
10. S. K. Chakraborty and B. K. Sarkar, Discrete Mathematics, OXFORD University Press.
11. Douglas B. West, Introduction to graph Theory, PHI

Free Elective

Circuit Theory & Network
Code: CS504A
Contact: 3L + 1T
Credits: 4

Module	Content	Hrs
1.	**a) *Resonant Circuits***: Series and Parallel resonance [1L], (*) ***Impedance and Admittance Characteristics, Quality Factor, Half Power Points, Bandwidth [2L], Phasor diagrams, Transform diagrams [1L], Practical resonant and series circuits, Solution of Problems [Tutorial - 1L]***. **b) Mesh Current Network Analysis**: Kirchoff's Voltage law, Formulation of mesh equations [1L], Solution of mesh equations by Cramer's rule and matrix method [2L], Driving point impedance, Transfer impedance [1L], Solution of problems with DC and AC sources [1L].	4 6
2.	**a) Node Voltage Network Analysis**: Kirchoff's Current law, Formulation of Node equations and solutions [2L], driving point admittance, transfer Admittance [1L], Solution of problems with DC and AC sources [1L]. **b) Network Theorems**: Definition and Implication of Superposition Theorem [1L], Thevenin's theorem, Norton's theorem [1L], Reciprocity theorem, Compensation theorem [1L], maximum Power Transfer theorem [1L], Millman's theorem, Star delta transformations [1L], Solutions and problems with DC and AC sources [1L].	4 6
3.	***Graph of Network***: Concept of Tree and Branch [1L], tree link, junctions, ***(*) Incident matrix, Tie set matrix [2L], Determination of loop current and node voltages [2L]***. **Coupled Circuits**: Magnetic coupling, polarity of coils, polarity of induced voltage, concept of Self and mutual inductance, Coefficient of coupling, Solution of Problems. **Circuit transients**: DC transients in R-L and R-C Circuits with and without initial charge, ***(*) R-L-C Circuits, AC Transients in sinusoidal R-L, R-C and R-L-C Circuits, Solution of Problems [2L].***	4 4 2
4.	**Laplace transform**: Concept of Complex frequency [1L], transform of f(t) into F(s) [1L], transform of step, exponential, over damped surge, critically damped surge, damped and un-damped sine functions [2L], properties of Laplace transform [1L], linearity, real differentiation, real integration, initial value theorem and final value theorem [1L], inverse Laplace transform [1L], application in circuit analysis, Partial fraction expansion, Heaviside's expansion theorem, Solution of problems [1L].	8

	(*) Laplace transform and Inverse Laplace transform [2L]. **Two Port Networks**: Relationship of Two port network variables, short circuit admittance parameters, open circuit impedance parameters, transmission parameters, relationship between parameter sets, network functions for ladder network and general network.	4

Old module 9 viz. SPICE deleted for consideration in Sessional Subject.

Problems for Module 1a:

Ex. 1. A parallel RLC Circuit has R= 100 K Ohms, L= 10 mH, C= 10 nF. Find resonant frequency, bandwidth and Quality factor.

Ex. 2. Two coils one of R= 0.51 Ohms,L= 32 mH, other of R= 1.3 Ohms, L= 15 mH, and two capacitors of 25 micro F and 62 micro F are in series with a resistance of 0.24 Ohms. Determine resonance frequency and Q of each coil.

Ex. 3. In a series circuit with R= 50 Ohms, l= 0.05 Ohms and C= 20 micro F, frequency of the source is varied till the voltage across the capacitor is maximum. If the applied voltage is 100 V, find the maximum voltage across the capacitor and the frequency at which this occurs. Repeat the problem with R= 10 Ohms.

Problems for Module 1b and 2:

Examples for mesh current in networks like T, π, bridged T and combination of T and π.

See Annexure-1 for the figures

Problems for Module- 2a:

Ex.1. The network of Fig.1 – Mod.4 is in the zero stat e until t= 0when switch is closed. Find the current i1(t) in the resistor R3.

Hints: the Fig.1 – Mod.4 shows the same network in terms of transform impedance with the Thevenin equivalent network.

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Ex.2. Find the Norton's equivalent circuit for the circuit Fig.2 – Mod.4.

Hints: As a 1st. step, short the terminals ab. This results in the Circuit of Fig.2.(a). By applying KCL at node a, we have, (0-24)/4+ isc = 0; i.e isc= 9 A. To find out the equivalent Norton's impedance RN, deactivate all the independent sources, resulting in a circuit of Fig.2.(b), RN= (4x12)/(4+12) = 3 Ohms. Thus we obtain Norton equivalent circuit of Fig.2 (c).

Problems for Module – 2b:

Ex.1. Draw the graph, one tree and its co tree for the circuit shown in Fig.1 – mod.5.

Hints: In the circuit there are four nodes (N= 4) and seven branches (B= 7). The graph is so drawn and appears as in Fig. 1 (a). Fig.1(b) shows one tree of graph shown in Fig. 1(a). The tree is made up of branches 2, 5 and 6. The co tree for the tree of Fig.1 (b) is shown in Fig. 1(c). The co tree has L= B-N+1 = 7-4+1 = 4 Links.

Ex.2. (a). For the circuit shown in Fig.2- Mod.5, construct a tree so that i1 is a link current. Assign a complete set of link currents and find i1 (t).

(b). Construct another tree in which v1 is a tree branch voltage. Assign a complete set of tree branch voltages and v1 (t).

Take i(t) = 25 sin 1000t A, v(t)= 15 cos 1000t.

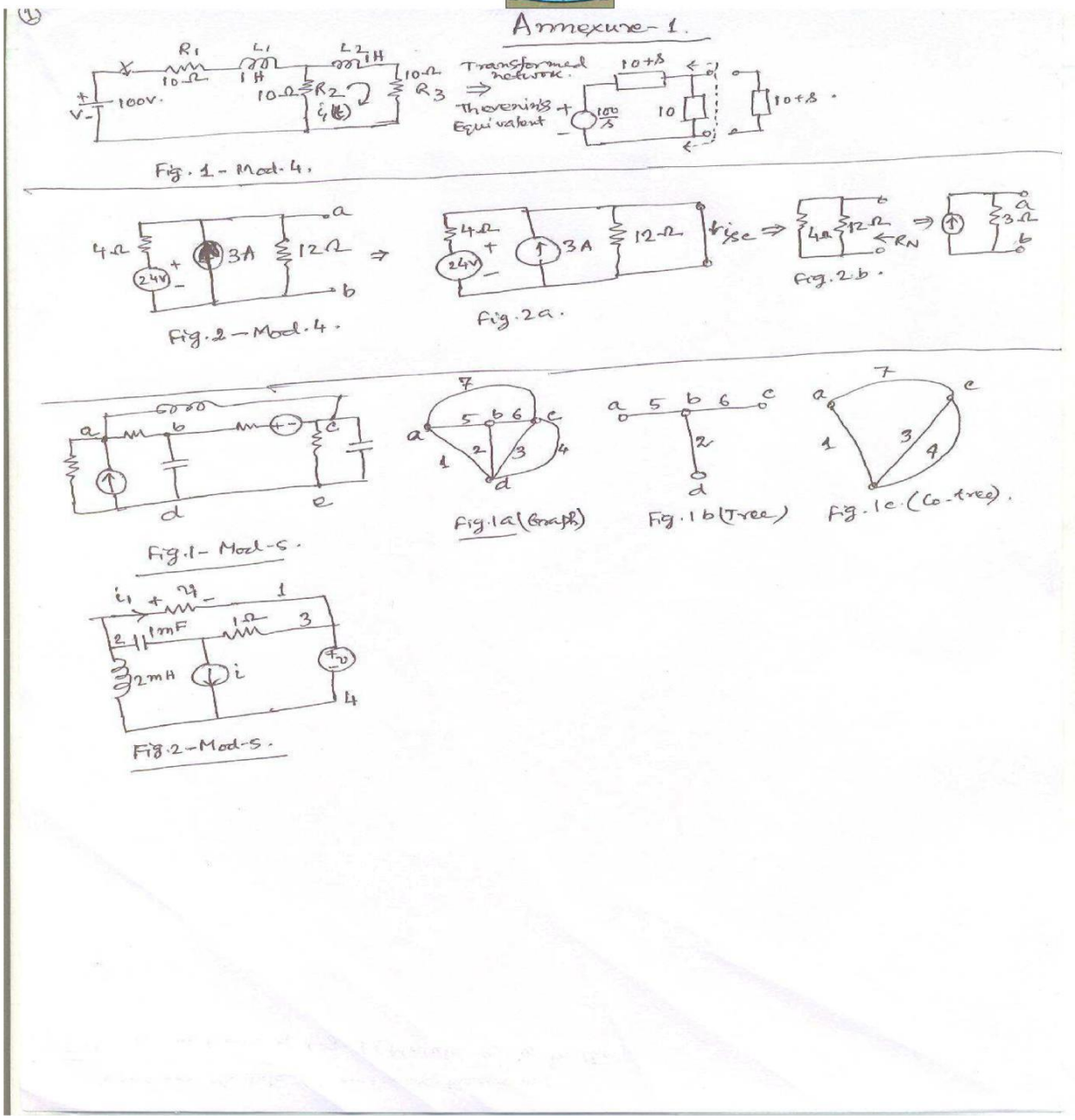
Tutorials: (*):Bold and Italics.

Text Books:

1. Valkenburg M. E. Van, "Network Analysis", Prenti ce Hall./Pearson Education
2. Hayt "Engg Circuit Analysis" 6/e Tata McGraw-Hill
3. D.A.Bell- Electrical Circuits- Oxford

Reference Books:

1. A.B.Carlson-Circuits- Cenage Learning
2. John Bird- Electrical Circuit Theory and Technology- 3/e- Elsevier (Indian Reprint)
3. Skilling H.H.: "Electrical Engineering Circuits", John Wiley & Sons.
4. Edminister J.A.: "Theory & Problems of Electric Circuits", McGraw-Hill Co.
5. Kuo F. F., "Network Analysis & Synthesis", John Wiley & Sons.
6. R.A.DeCarlo & P.M.Lin- Linear Circuit Analysis- Oxford
7. P.Ramesh Babu- Electrical Circuit Analysis- Scitech
8. Sudhakar: "Circuits & Networks:Analysis & Synthes is" 2/e TMH
9. M.S.Sukhija & T.K.NagSarkar- Circuits and Networks-Oxford
10. Sivandam- "Electric Circuits and Analysis", Vika s
11. V.K. Chandna, "A Text Book of Network Theory & Cir cuit Analysis",Cyber Tech
12. Reza F. M. and Seely S., "Modern Network Analysi s", Mc.Graw Hill .
13. M. H. Rashid: "Introduction to PSpice using OrCAD for circuits and electronics", Pearson/PHI
14. Roy Choudhury D., "Networks and Systems", New Ag e International Publishers.
15. D.Chattopadhyay and P.C.Rakshit: "Electrical Circui ts" New Age



Data Communication
Code: CS504B
Contact: 3L + 1T
Credits: 4

Module I:
Data Communication Fundamentals: Layered Network Architecture; Mode of communication, topology, Data and Signal; Transmission Media: Guided, Unguided; Transmission Impairments and Channel Capacity; Transmission of Digital Data: Interfaces-DTE-DCE, MODEM, Cable MODEM; The telephone network system and DSL technology; **[10L] Module II:**

Data Link Control: Interfacing to the media and synchronization; Error Control: Error Detection and Correction (Single bit, Multi bit); Flow control: Stop-and-Wait ARQ, Go-Back-N ARQ, Selective-Repeat ARQ
Data Link Protocols: Synchronous, Asynchronous Protocols, Point-to-Point Protocol(PPP). **[12L]**
Module III:

Switching Communication Networks: Circuit switching; Packet switching; Routing in packet switched networks; X.25; Frame Relay; ATM, SONET. **[07L**]

Module IV:

Communication Network: Topology; Medium Access Control Techniques; IEEE CSMA/CD based LANs; IEEE Ring LANs; High Speed LANs – Token Ring Bas ed(FDDI); High Speed LANs – CSMA/CD based; Wireless L ANs: Bluetooth; **[07L]**

Network Security: Introduction to Cryptography; User Authentication; Firewalls. **[04L]**

References:

a) Data Communications and Networking, Behrouz A. Forouzan, TMH
b) Data and Computer Communications, William Stallings, PHI
c) Computer Networks, Andrew S. Tanenbaum, PHI

Digital Signal Processing
Code: CS504C
Contact: 3L + 1T
Credits: 4

MODULE – I: 9L

Discrete-time signals:

Concept of discrete-time signal, basic idea of sampling and reconstruction of signal, sampling theorem, sequences – periodic, energy, power, unit-sample, unit-step, unit-ramp, real & complex exponentials, arithmetic operations on sequences. 3L

LTI Systems:

Definition, representation, impulse response, derivation for the output sequence, concept of convolution, graphical, analytical and overlap-add methods to compute convolution supported with examples and exercises, properties of convolution, interconnections of LTI systems with physical interpretations, stability and causality conditions, recursive and non-recursive systems. 6L

MODULE –II: 11L

Z-Transform:

Definition, mapping between s-plane and z-plane, unit circle, convergence and ROC, properties of Z-transform, Z-transform on sequences with examples and exercises, characteristic families of signals along with ROCs, convolution, correlation and multiplication using Z-transform, initial value theorem, Perseval's relation, inverse Z-transform by contour integration, power series & partial-fraction expansions with examples and exercises. 6L

Discrete Fourier Transform:

Concept and relations for DFT/IDFT, Twiddle factors and their properties, computational burden on direct DFT, DFT/IDFT as linear transformations, DFT/IDFT matrices, computation of DFT/IDFT by matrix method, multiplication of DFTs, circular convolution, computation of circular convolution by graphical, DFT/IDFT and matrix methods, linear filtering using DFT, aliasing error, filtering of long data sequences – Overlap-Save and Overlap- Add methods with examples and exercises. 5L

Fast Fourier Transform:

Radix-2 algorithm, decimation-in-time, decimation-in-frequency algorithms, signal flow graphs, Butterflies, computations in one place, bit reversal, examples for DIT & DIF FFT Butterfly computations and exercises. 4L

MODULE – III: 5L

Filter Design:

Basic concepts of IIR and FIR filters, difference equations, design of Butterworth IIR analog filter using impulse invariant and bilinear transforms, design of linear phase FIR filters, no. of taps, rectangular, Hamming and Blackman windows. 5L

MODULE – IV: 7L

Digital Signal Processor:

Elementary idea about the architecture and important instruction sets of TMS320C 5416/6713 processor, writing of small programs in Assembly Language. 4L

FPGA:

Architecture, different sub-systems, design flow for DSP system design, mapping of DSP algorithms onto FPGA. 3L

TEXT BOOKS:

3. Digital Signal Processing – Principles, Algorithms and Applications, J.G.Proakis & D.G.Manolakis, Pearson Ed.
4. Digital Signal processing – A Computer Based Approach , S.K.Mitra, TMH Publishing Co.
5. Digital Signal Processing Signals, Systems and Filters, A. Antoniou, TMH Publishing Co.
6. VLSI Digital Signal Processing Systems Design and Implementation, Wiley International Publication.
7. Digital Signal Processing with Field Programmable Gate Arrays, U.Meyer-Baese, Springer.

REFERENCE BOOKS:

3. Digital Signal Processing, P. Rameshbabu, Scitech Publications (India).
4. Digital Signal Processing, S.Salivahanan, A.Vallabraj & C. Gnanapriya, TMH Publishing Co.

5. Digital Signal Processing; A Hands on Approach, C. Schuler & M.Chugani, TMH Publishing Co.
6. Digital Signal Processing, A. Nagoor Kani, TMH Education
7. Digital Signal Processing S. Poornachandra & B. Sasikala, MH Education
8. Digital Signal Processing; Spectral Computation and Filter Design Chi-Tsong Chen, Oxford University Press
9. Texas Instruments DSP Processor user manuals and application notes.
10. Digital Signal Processing – A practical Approach (s econd Edition) – Emmanuel C. Ifeacher & Barrie W. Je rvis, Pearson Education
11. Xilinx FPGA user manuals and application notes.

Object Oriented Programming
Code: CS504D
Contact: 3L + 1T
Credits: 4

Object oriented design [10 L]
Concepts of object oriented programming language, Major and minor elements, Object, Class, relationships among objects, aggregation, links, relationships among classes-association, aggregation, using, instantiation, meta-class, grouping constructs.
Object oriented concepts [4 L]
Difference between OOP and other conventional programming – advantages and disadvantages. Class, object , message passing, inheritance, encapsulation, polymorphism
Basic concepts of object oriented programming using Java [22 L] Implementation of Object oriented concepts using Java.

Language features to be covered:
Class & Object proprieties [6L]
Basic concepts of java programming – advantages of j ava, byte-code & JVM, data types, access specifiers, operators, control statements & loops, array, creation of class, object, constructor, finalize and garbage collection, use of method overloading, this keyword, use of objects as parameter & methods returning objects, call by value & call by reference, static variables & methods, garbage collection, nested & inner classes, basic string handling concepts- String (discuss charAt() , compareTo(), equals(), equalsIgnoreCase(), indexOf(), length() , substring(), toCharArray() , toLowerCase(), toString(), toUpperCase() , trim() , valueOf() methods) & StringBuffer classes (discuss append(), capacity(), charAt(), delete(), deleteCharAt(), ensureCapacity(), getChars(), indexOf(), insert(), length(), setCharAt(), setLength(), substring(), toString() methods), concept of mutable and immutable string, command line arguments, basics of I/O operations – keyboard input using BufferedReader & Scanner classes.

Reusability properties[6L] – Super class & subclasses including multilevel hi erarchy, process of constructor calling in inheritance, use of super and final keywords with super() method, dynamic method dispatch, use of abstract classes & methods, interfaces. Creation of packages, importing packages, member access for packages.
Exception handling & Multithreading [6L] – Exception handling basics, different types of ex ception classes, use of try & catch with throw, throws & finally, creation of user defined exception classes.
Basics of multithreading, main thread, thread life cycle, creation of multiple threads, thread priorities, thread synchronization, inter-thread communication, deadlocks for threads, suspending & resuming threads.

Applet Programming (using swing) [4L] – Basics of applet programming, applet life cycle, difference between application & applet programming, parameter passing in applets, concept of delegation event model and listener, I/O in applets, use of repaint(), getDocumentBase(), getCodeBase() methods, layout manager (basic concept), creation of buttons (JButton class only) & text fields. Textbooks/References:

1. Rambaugh, James Michael, Blaha – "Object Oriented Modelling and Design" – Prentice Hall, India
2. Ali Bahrami – "Object Oriented System Development " – Mc Graw Hill
3. Patrick Naughton, Herbert Schildt – "The complet e reference-Java2" – TMH
4. R.K Das – "Core Java For Beginners" – VIKAS PUBLISHI NG
5. Deitel and Deitel – "Java How to Program" – 6th Ed. – Pearson
6. Ivor Horton's Beginning Java 2 SDK – Wrox
7. E. Balagurusamy – " Programming With Java: A Prim er" – 3rd Ed. – TMH

Practical

Design & Analysis Algorithm Lab
Code: CS591
Contact: 3P
Credits: 2
Programming Language used :C
Lab :1 : Divide and Conquer :
> Implement Binary Search using Divide and Conquer approach

> Implement Merge Sort using Divide and Conquer approach

Lab :2 : Divide and Conquer :

> Implement Quick Sort using Divide and Conquer approach
> Find Maximum and Minimum element from a array of integer using Divide and Conquer approach

Lab :3 : Dynamic Programming :

> Find the minimum number of scalar multiplication needed for chain of matrix

Lab :4 : Dynamic Programming :

>Implement all pair of Shortest path for a graph (Floyed- Warshall Algorithm)

>Implement Traveling Salesman Problem

Lab :5 : Dynamic Programming :

>Implement Single Source shortest Path for a graph (Dijkstra , Bellman Ford Algorithm)

Lab :6 : Brunch and Bound :

>Implement 15 Puzzle Problem

Lab :7 : Backtracking :

>Implement 8 Queen problem

Lab :8 : Backtracking (implement any one of the following problem):

>Graph Coloring Problem
>Hamiltonian Problem

Lab :9 : Greedy method(implement any one of the following problem) :

>Knapsack Problem
>Job sequencing with deadlines

Lab :10 : Greedy method (implement any one of the following problem) :

>Minimum Cost Spanning Tree by Prim's Algorithm
>Minimum Cost Spanning Tree by Kruskal's Algorithm

Lab :11 : Graph Traversal Algorithm :

>Implement Breadth First Search (BFS)

>Implement Depth First Search (DFS)

Microprocessor & Microcontroller Lab
Code: CS592
Contact: 3P
Credits: 2

Sl. No.	Experiment Name	No of Hours
1	Study of Prewritten programs on 8085 trainer kit using the basic instruction set (data transfer, Load/Store, Arithmetic, Logical). **Or,** Familiarization with 8085 simulator on PC. Programs using basic instruction set (data transfer, Load/Store, Arithmetic, Logical) on the simulator.	**3**
2	**Programming using kit or Simulator for:** 5. Table look up 6. Copying a block of memory 7. Shifting a block of memory iv) Packing and unpacking of BCD numbers 8. Addition of BCD numbers 9. Binary to ASCII conversion and vice-versa (Using Subroutine Call) 10. BCD to Binary Conversion and vice-versa vii) String Matching, Multiplication	**18**
3	Program using IN/OUT instructions and 8255 PPI on the trainer kit e.g. subroutine for delay, x. Glowing all the LEDs one by one with particular delay xi. Reading switch state and glowing LEDs accordingly.	**3**
4	Serial communication between two trainer kits	**3**
5	Study of Prewritten programs on 8051 Microcontroller Kit using the basic instruction set (data transfer, Load/Store, Arithmetic, Logical). **Or,** Familiarization with 8051 Simulator on PC. Study of prewritten programs using basic instruction	**3**

	set (data transfer, Load/Store, Arithmetic, Logical).	
	Total 30 hours (10 classes each of 3 periods)	

Programming Practices Using C++
Code: CS593
Contact: 3P(1L+2P)
Credits: 2

Introduction of UNIX/Linux Operating System which includes preliminary commands, start-up & shutdown methodology, file handling as well as introduction to editors like Vi editor, introduction to GNU C & C++ compiler, as well as introduction to GNU & GDB script. **[4P]**

Introduction to C++, basic loop control, executing programs, writing functions, selection statements, review of functions and parameters, command line arguments, recursion, I/O streams, arrays and string manipulation, pointers, structures & unions**. [6P]**

Object-Oriented Programming in C++, fundamentals of classes, constructors-destructors. Dealing with member functions, operator overloading and polymorphism (both static & dynamic). **[6P]**

Dealing with inheritance, derived class handling, abstract class, virtual class, overriding, template class, name-space & exception handling. **[4P]**

Dynamic memory allocation, implementation of Linked Lists, using C++. **[4P]**

Note: GNU C++ can be used for the programming, since it is free and has no licensing anomaly

Circuits and Networks Lab
Code: CS594A
Contacts: 3P
Credits: 2

3. Characteristics of Series & Parallel Resonant circuits
4. Verification of Network Theorems
5. Transient Response in R-L & R-C Networks ; simulation / hardware
6. Transient Response in RLC Series & Parallel Circuits & Networks ; simulation / hardware
7. Determination of Impedance (Z), and Admittance (Y) parameters of Two-port networks
8. Generation of periodic, exponential, sinusoidal, damped sinusoidal, step, impulse, and ramp signals using MATLAB
9. Representation of Poles and Zeros in s-plane, determination of partial fraction expansion in s-domain and cascade connection of second-order systems using MATLAB
10. Determination of Laplace Transform, different time domain functions, and Inverse Laplace
11. Transformation using MATLAB

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

Data Communication Lab
Code:CS594B
Contact: 3P
Credits: 2

List of Experiments

1. To study different types of transmission media
2. Familiarization with Networking cables (CAT5, UTP), Connectors (RJ45, T-connector), Hubs, Switches. Configuration of a HUB/Switch.
3. PC-to-PC Communication with the Data Communication Trainers for
   File Transfer.
   Error detection codes, Data Encryption etc.
4. Experiments using LAN Trainer kit for
   Point-to-Point Communication
   Multicast/Broadcast Communication
   Data Encryption and security protocols
5. To make inter-connections in cables for data communication in LAN and install LAN using (a) Tree topology (b)

STAR topology (c) Bus topology (d) Token-Ring topology
6. Study of MODEMs: (a) configure the modem of a computer (b) Study Serial Interface RS-232 and its applications (c) Study the Parallel Interface and its applications

DSP Lab
Code: CS594C
Contact: 3P
Credits: 2

Simulation Laboratory using standard Simulator:

c) Sampled sinusoidal signal, various sequences and different arithmetic operations.
d) Convolution of two sequences using graphical methods and using commands- verification of the properties of convolution.
e) Z-transform of various sequences – verification of the properties of Z-transform.
f) Twiddle factors – verification of the properties.
g) DFTs / IDFTs using matrix multiplication and also using commands.
h) Circular convolution of two sequences using graphical methods and using commands, differentiation between linear and circular convolutions.
i) Verifications of the different algorithms associated with filtering of long data sequences and Overlap –add and Overlap-save methods.
j) Butterworth filter design with different set of parameters.
k) FIR filter design using rectangular, Hamming and Blackman windows.

Hardware Laboratory using either 5416 or 6713 Processor and Xilinx FPGA:

3. Writing & execution of small programs related to arithmetic operations and convolution using Assembly Language of TMS320C 5416/6713 Processor, study of MAC instruction.
4. Writing of small programs in VHDL and downloading onto Xilinx FPGA.
5. Mapping of some DSP algorithms onto FPGA.

OOP Lab
Code: CS594D
Contact: 3P
Credits: 2

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

Note: Use Java for programming
Preferably download "**java_ee_sdk-6u4-jdk7-windows.exe**" from
http://www.oracle.com/technetwork/java/javaee/downloads/java-ee-sdk-6u3-jdk-7u1-downloads-523391.html