

COURSES OFFERED DURING ODD SEMESTER

<i>B. Tech. Computer Science & Engineering</i>					
<i>S. No.</i>	<i>Course Code</i>	<i>Course Title</i>	<i>Credits</i>	<i>Course Type</i>	<i>Slot</i>
<i>3rd Semester B. Tech. (Computer Science)</i>					
1	MAL201	Integral Transforms & Partial Differential Equations (IT &PDE)	6	DC	C
2	ECL209	Digital Circuits & Logic Design	6	DC	G
3	EEL210	Electrical Sciences	6	DC	H
4	PHL201	Physics - II	6	DC	F
5	CSL213	Data Stru. & Prog. Des. - I	8	DC	D
6			6	OC/HM	
<i>5th Semester B. Tech. (Computer Science)</i>					
1	CSL301	Microprocessor Based Systems	8	DC	G
2	CSL302	Computer Organization	6	DC	D
3	ECL322	Signals & Systems	6	DE	F
4	CSL308	Software Engineering	6	DC	C
5	CSP310	Software Lab. - I	2	DC	B
6	CSL304	Neuro Fuzzy Techniques	6	DE	E
7	CSL305	Computer Graphics	6	DE	H
8			6	OC/HM	
<i>7th Semester B. Tech. (Computer Science)</i>					
1	CSL402	Analysis of Algorithms	6	DC	H
2	CSL404	Language Processors	8	DC	D
3	CSL403	Database Management Systems	8	DC	C
4	CSL401	Project Pahse- I	4	DC	G
5	CSL412	Artificial Intelligence	6	DE	E
6	CSL408	Topics in Embedded Systems	6	DE	F
<i>Open Courses</i>					
1	CSL221	Fundamental Topics in Computing	6	OC	B
2	CSL207	Web Technology (for Mizoram Students)	6	OC	A

3rd Semester B. Tech. (Computer Science) :

Course Code & Title: - MAL201 : Integral Transforms & Partial Differential Equations (DC)

(Maths Dept.) (L-T-P-C: 3-0-0-6)

Pre-requisite :

- **Laplace Transforms:** Definition of Laplace Transforms, Linearity property, condition for existence of Laplace Transform, first and second shifting properties, transforms of derivatives and integrals, evaluation of integrals by Laplace Transform. Inverse Laplace Transform, convolution theorem, Laplace Transform of periodic functions, unit step function and Dirac delta function. Applications of Laplace Transform to solve ordinary differential equations.
- **Fourier Series and Fourier Transforms:** Fourier series, half range sine and cosine series expansions, exponential form of Fourier series.
- Fourier integral theorem, Fourier transform, Fourier Sine and cosine Transforms, Linearity, scaling, frequency shifting and time shifting properties, convolution theorem.
- **Z-transform:** Z - transform, Properties of Z-transforms, Convolution of two sequences, inverse Z-transform, Solution of Difference equations.
- **Partial differential equations:** Formation of first and second order equations, Solution of first order linear equations: Lagrange's equation, particular solution passing through a given curve. Higher order equations with constant coefficients, classification of linear second order PDEs, method of separation of variables, Solution of One dimensional wave equation, heat equation, Laplace equation (Cartesian and polar forms), D'Alembert solution of wave equation.

Text/References:

- Advanced Engineering Mathematics : Kreyszig, E, John Wiley & Sons, (Eighth Edition)
- Advanced Engineering Mathematics: Jain, R.K. and Iyengar, S.R.K, Narosa Publishers
- Calculus and Analytic Geometry: Thomas, G.B. and Finney, R.L.; Addison Wesley Longman, Inc .

Course Code & Title: - ECL209 : Digital Circuits & Logic Design (DC)

(L-T-P-C: 3-0-0-6)

Pre-requisite:

- Motivation for digital logic and digital circuits/systems, Analog vs. Digital Systems, basic concepts on SSI, MSI, VLSI circuit classification. Boolean algebra, Postulates and Theorems. Binary Codes: Weighted, non weighted, error detecting and error correcting codes
- Basics of PN Junction Diode, Diode applications in digital circuits, Basics of Transistor , CMOS characteristics, Standard Logic Families Diode Logic, TTL, CMOS Logic.
- Logic Gates, Truth tables, Sum of products, product of sums, Minimization of functions, Karnaugh maps and Simplification of logical functions using Quine-Mcclusky method.

- Combinational Circuit: Adders (ripple and carry look-ahead addition) and subtractors Decoders/Encoders, multiplexers/ Demultiplexers, code converters, realizing functions using Decoders, Multiplexers
- Sequential Circuits: Flip-flops and latches: D, T, J/K flip-flops, Master Slave Flip flops, shift registers. Counters (Synchronous/Asynchronous), different module counters with reset/clear facility, asynchronous and synchronous design using state and excitation tables. FSM implementation (Sequence Detector) .
- Overview of VLSI design process. PAL, PLAs, PROMS, CPLD, FPGA,ASIC structure overview. Hardware description language for digital circuit implementation(VHDL). Structural level implementation, Behavioral implementation and dataflow method.

Text/References:

- Kohavi Zvi, "Switching & Finite Automata Theory", TMH
- M.Morris Mano, "Digital Design", Pearson education
- Stephen Brown , Vranesic Z, "Fundamentals of Digital Logic with VHDL Design", TMH
- Bhaskar J, "VHDL Primer", B.S. Publication

Course Code & Title: - EEL210 : Electrical Sciences (DC) (L-T-P-C: 3-0-0-6)

Pre-requisite:

- Nodal analysis, Mesh analysis, Source transformation, Duality.
- Theorems: Superposition theorem, Reciprocity theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem.
- Two port network: Two port network parameters, their inter-relation, Interconnection of 2-Two port networks.
- Measurement of low, medium and high resistances, Elementary methods of measurement of inductances & capacitances, Generalised theory of A.C.Bridges, their uses for measurement of inductance and capacitance.
- Measuring instruments: Classification, Absolute and secondary instruments.
- Electronic instruments: Digital voltmeters, Digital multimeter, Cathode ray Oscilloscope, Syncroscope, etc.
- Generalized principle of operation of Alternators, Armature reaction, Principle of operation of Synchronous motors, Starting methods, Stepper motor.

Text/References:

Sawhney, A.K.; A Course in Electrical and Electronics Measurements and Instrumentation; (Eleventh Edition) Dhanpat Rai & Sons, Delhi.

1. Van Valkenburg ; Network analysis (Third Edition); Prentice Hall of India Private Ltd, 1. Delhi.

2. Kelkar A.R., Pandit P.S.; Network Analysis ; Prathibha Publications ; Nagpur
3. Theraja.B.L and Theraja A.K.; A Text book of Electrical Technology (Vol-II) ;
- 2.S.Chand and Company ; New Delhi

Course Code & Title: - PHL201 : Physics II (DC) (L-T-P-C: 3-0-0-6)

Pre-requisite:

Dielectric properties of insulators in static fields, Polarization, Dielectric constant, Dielectric behavior of mono atomic & polyatomic gases, liquid and solids, Polar and non- polar dielectrics, Clausius-Massotti equation, Ferroelectric, Piezoelectric and Pyroelectric materials. Ferroelectric memories, Magnetic Materials: Spin and orbital magnetic dipole moment of electron , classification of magnetic materials , diamagnetic , paramagnetic , ferromagnetic , spontaneous magnetization , ferromagnetic domains , ferrite , antiferromagnetic materials ,soft and hard magnetic materials, magnetic anisotropy, magnetostriction , applications , magneto-optic effect.

Elementary ideas of sensors, thermal sensors, dielectric constant and refractive index, thermo sensors, linear variable differential transformer, position sensor, accelerometer, transducer elements.

Lasers: Introduction to optical radiation processes, Basic concept, Laser characteristics, types of laser, CO₂ Laser, Nd: YAG Laser, Argon ion laser, Application of lasers in Metrology, Medical science, optical communications, holography and in industry.

Information, Entropy, probabilities, constraints, maximum entropy, Lagranges multipliers

Introduction to Quantum computing.

Text / Reference Books:

1. A.J.Dekkar, Electrical Engineering Materials, Prentice Hall India, 19th Edition, 1997
2. Kenneth Krane, Modern Physics, John Wiley Eastern, 2nd Edition, 1998.
3. Francis A. Jenkins and Harvey E. White, Fundamentals of Optics, Mc Graw Hill ,4th Edition
4. D.Patranabis , Sensors and transducers , Prentice Hall India , 2nd Edition ,2003.

Reference Books:

1. S.O.Pillai , Solid State Physics , New Age International Publishers , 3rd edition , 1999.
2. Albert D. Helfrick and William D.Cooper , Modern Electronics Instrumentation and Measurement Techniques, Prentice Hall India, 13th edition, 2003.

Course Code & Title: - CSL213 : Data Structures & Program Design – I (DSPD-I) (L-T-P-C: 3-0-0-6)

Pre-requisite: CSL101 : Computer Programming

Types and operations, Iterative constructs and loop invariants, Quantifiers and loops, Structured programming and modular design, Illustrative examples, Scope rules, parameter passing mechanisms, recursion, program stack and function invocations including recursion, Overview of arrays and array based algorithms - searching and sorting, Divide and Conquer – Mergesort, Quicksort, Binary search, Introduction to Program complexity (Big Oh notation), Recurrence relations. Sparse matrices.

Structures (Records) and array of structures (records). Database implementation using array of records. Dynamic memory allocation and deallocation. Dynamically allocated single and multi-dimensional arrays.

Concept of an Abstract Data Type (ADT), Lists as dynamic structures, operations on lists, implementation of linked list using arrays and its operations. Introduction to linked list implementation using self-referential-structures/pointers.

Stack, Queues and its operations. Implementation of stacks and queues using both array-based and pointer-based structures. Uses of stacks in simulating recursive procedures/ functions. Applications of stacks and queues.

Files, operations on them, examples of using file.

Reference Books

1. The C programming language: Brian Kerninghan and Dennis Ritchie, PHI-EEE (or Pearson)
2. How to Solve it by Computer: R. G. Dromey, Pearson Education
3. Data Structures & Program Design in C : Robert Kruse, G. L. Tondo and B. Leung PHI-EEE.

5th Semester B. Tech. (Computer Science) :

**Course Code & Title: - CSL301 : Microprocessor Based Systems (DC) (MBS)
(L-T-P-C: 3-0-0-6)**

Pre-requisite: Data

8085 based Microprocessor organization, memory, I/o organization, Address decoding, memory I/O interfacing concepts.

8085 addressing modes, Instruction set, basic timing diagram, assembly language programming, 8085 Interrupts, priorities.

8085 Interfacing with 8255, stepper motor control, Introduction to DMA using HOLD/HLDA signals. 8085 interfacing with PIC 8259, timer 8254.

Simple, matrix keyboard , 7 segment LED, 16 x 2 line LCD interface to 8085, keyboard / display controller - 8279

8051 architecture, code/data memory interfacing, I/o interfacing, Address decoding logic, Interrupts.

8051 timer operation , serial data communication, UART operation, 8051 Instruction set, timing diagram, addressing modes and assembly language programming.

Text/ References :

1. Microprocessor Architecture, Programming and Applications with 8085/8080A, Gaonkar R.S: Wiley Eastern Ltd.
2. The 8051 Microcontroller , Architecture, programming & applications: Ayala K.J, Penram International, 2nd Edition

Course Code & Title: - CSL302: Computer Organization (DC) (L-T-P-C: 3-0-0-6)**Pre-requisite:**

Addressing methods, their application in implementation of HLL constructs and data

structures, instruction formats, expanding opcode method, subroutine linkage in PDP-11 and 68000, zero address machine such as HP3000.

Processing unit, bus architecture, execution of a complete instruction, sequencing of control signals, microprogrammed control, microinstruction format, microinstruction sequencing, bit slice concept.

Arithmetic, number representations and their operations, design of fast adder, signed multiplication, Booth's Algorithm, bit-pair recording, division , floating point numbers and operations, guard bits and rounding.

Main memory organization, various technologies used in memory design, higher order memory design, multimodule memories and interleaving, cache memory , concept of cache memory, mapping functions, replacement algorithms. Input-output organization, I/O mapped I/O and memory mapped I/O, Direct Memory Access, interrupts and interrupt handling mechanisms, device identification, vectored interrupts, interrupt nesting, I/O interfaces, synchronous vs. asynchronous data transfer, I/O channels.

Computer peripherals, I/O devices such as video terminals, video displays, graphic input devices, printers, magnetic disk, magnetic tape , CDROM systems.

RISC philosophy, pipelining, basic concepts in pipelining, delayed branch, branch prediction, data dependency, influence of pipelining on instruction set design, multiple execution units, performance considerations, basic concepts in parallel processing & classification of parallel architectures

Text/ References :

1. Computer Organization , Hamacher, Carl V. et al, McGraw Hill
2. Structured Computer Organization , Tanenbaum A.S, Prentice Hall of India Ltd
3. Computer Organization & Design, The Hardware/ Software Interface, Patterson D. A ,Hennessy J. L. Harcourt Asia, Second Edition.

Course Code & Title: - ECL322: Signals & Systems (DE) (L-T-P-C: 3-0-0-6)

Pre-requisite:

Elements of Signal Space Theory: Different types of signals, Linearity, Time invariance and causality, Impulse sequence, Impulse functions and other singularity functions.

Convolution: Convolution sum, Convolution integral and their evaluation, Time domain representation and analysis, of LTI systems based on convolution and differential equations.

Multi Input-Output Discrete and Continuous Systems: State model representation, Solution of state, equations, State transition matrix.

Transform Domain Considerations: Laplace transforms and Z-transforms, Application of transforms to discrete and continuous systems analysis, Transfer function, Block diagram representation, DFT.

Fourier Series and Fourier Transform: Sampling theorem, Discrete Fourier transform (DFT), Estimating Fourier Transform using (DFT).

Text/ References :

1. Signals and Systems - Continuous and Discrete:: Ziemer, R.F., Tranter, W.H. and Fannin, JD.R, Prentice Hall ; 1998.: 4th Edition
2. Signals and Systems: Oppenheim, A.V., Willsky, A.S. and Young, I.T, Prentice Hall ; 1983
3. Signals and Systems : Roberts, M.J, Tata McGraw-Hill ; 2003.

Course Code & Title: - CSL302: Software Engineering (DC) (L-T-P-C: 3-0-0-6)

Pre-requisite:

Software Engineering Process & Management : Generic view, Capability Maturity Model, Process models- waterfall, evolutionary, incremental etc., unified process, agile view, project management, metrics estimation, project scheduling, risk management. Software engineering Principles and Practice : Communication, planning and modeling practices, system Engineering and modeling, business process engineering requirement analysis, system analysis- flow Oriented and class oriented modeling using data modeling concepts. Software Design Engineering : Design Concepts : Abstraction Architecture, pattern modularity, information hiding, design classes, refactoring etc., Design of web application, architectural design, component level design, user interface design.

Software Testing and Quality Management : Testing strategies, testing for object oriented software testing for web applications, validation testing etc. Black box testing, white box testing, Basis path testing. Testing for specialized environments, architectures and application. Quality concepts, quality assurance, software reviews, statistical quality assurance.

Software configuration management and advance topics : Elements of configuration management system, process configuration for web engineering, component-based development, clean room software engineering, formal methods, software reengineering, Software Maintenance. z

Text/References:

1. Software Engineering - A Practitioner's Approach : Pressman, R.S, McGraw Hill
2. Software Engineering : Sommerville Ian, Addison-Wesley

Course Code & Title: - CSL304 : Neuro Fuzzy Techniques (NFT)

Neural Networks: History, overview of biological Neuro-system, Mathematical Models of Neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta, Back Propagation Algorithm, Multilayer Perceptron Model, Hopfield Networks, Associative Memories, Applications of Artificial Neural Networks.

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

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

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

Introduction of Neuro-Fuzzy Systems, Architecture of Neuro Fuzzy Networks.

Application of Fuzzy Logic: Medicine, Economics etc.

Genetic Algorithm: An Overview of GA, GA operators, GA in problem solving, Implementation of GA.

Text/ References :

1. Soft Computing and Its Applications : R.A. Aliev, R.R. Aliev
2. Neural Networks and Fuzzy Systems : Bar Kosko , PHI
3. An Introduction to Genetic Algorithms (Complex Adaptive Systems): Melanie Mitchell, MIT Press

Course Code & Title: - CSL305 : Computer Graphics (DE) (L-T-P-C: 3-0-0-6)

Pre-requisite:

Basic fundamentals of random scan, raster-scan devices, LCD displays - point and line drawing techniques and algorithms - input/output devices and interactive techniques.

Polygon filling methods: Seed fill, edge flag algorithm etc. - scan conversion techniques - anti aliasing techniques - clipping algorithms, Polygon clipping, Viewing transformation, Windowing transformation.

Linear transformation: rotation, scaling, translation in 3D -homogeneous coordinates - normalized device coordinates - windowing and viewporting, Cartesian Coordinates, Word view etc.

Curve generation - cubic splines, Beziers, blending of curves- other interpolation techniques, Displaying Curves and Surfaces, Shape description requirement, parametric function.

Review of 3D vector algebra - parallel and perspective projections and transformation - hidden line/ surface elimination - shading and rendering - ray tracing techniques.

Graphics software packages - segmentation and display files - graphics standards - graphics and computer networks - basic principles of X windows, X terminals, Functions for segmenting display files.

Text / References :

1. Procedural Elements of Computer Graphics : Rogers : McGraw Hill.
2. Principles of Interactive Computer Graphics : Newman, Sproull, McGraw Hill
3. Computer Graphics : Hearn, Baker, PHI, India
4. Introduction to Computer graphics: Foley, Vanpam, Hughes, Philips, Foley, Vanpam, Hughes, Philips

7th Semester B. Tech. (Computer Science)

Course Code & Title: CSL402 : Analysis of Algorithm (Credits : 3-0-0-6)(DC)

Pre-requisite:

Mathematical foundations, summation of arithmetic and geometric series, Σn , Σn^2 , bounding summations using integration, recurrence relations, solutions of recurrence relations using technique of characteristic equation and generating functions.

Asymptotic notations of analysis of algorithms, analyzing control structures, worst case and average case analysis, amortized analysis, sorting algorithms such as selection sort, insertion sort, bubble sort, heap sort, lower bound proof, elementary and advanced data structures with operations on them and their time complexity.

Divide and conquer basic strategy, binary search, quick sort, merge sort, Fast Fourier Transform etc. Greedy method - basic strategy, application to job sequencing with deadlines problem, minimum cost spanning trees, single source shortest path etc.

Dynamic Programming basic strategy, multistage graphs, all pairs shortest path, single source shortest paths, optimal binary search trees, traveling salesman problem.

Basic Traversal and Search Techniques, breadth first search and depth first search, connected components. Backtracking basic strategy, 8-Queen's problem, graph coloring, Hamiltonian cycles etc. NP-hard and NP-complete problems, basic concepts, non deterministic algorithms, NP-hard and NP-complete, Cook's Theorem, decision and optimization problems, polynomial reduction

- **Text/ References:**

1. Introduction to Algorithms : Cormen T.H. et.al : Prentice Hall of India
2. Computer Algorithms : Horowitz, Sahani, Rajsekharan , Galgotia Publications Pvt.Ltd
3. Fundamentals of Algorithms : Brassard, Bratley , Prentice Hall

Course Code & Title: - CSL404: Language Processors (DC)
(L-T-P-C: 3-0-2-8)

Pre-requisite:

Introduction to compilers, compilers and translators, phase structure of a typical compiler, Number of passes, ideas about lexical analysis, syntax analysis, code optimization and code generation, design of lexical analyzer.

Syntax specification of programming languages, Design of top-down parser, bottom up parsing technique, LR parsing algorithm, Design of SLR, LALR,LR parsers. Dealing with ambiguity of the grammar.

Study of syntax directed definitions and syntax directed translation schemes as notational frame work to specify the translations. Using syntax directed translation schemes for translation of expressions, controls structures, declarations , procedure calls.

Storage allocation and run time storage administration, symbol table management, Error detection and recovery, error recovery in LR parsing, error recovery in LL parsing, Automatic error recovery in YACC. Introduction to Important code optimization techniques, loop optimization, control flow analysis, data flow analysis, setting up data flow equations to compute reaching definitions, available expressions, Live variables. Problems in code generation , simple code generator code generation from DAG, Peephole optimization

- **Text/ References :**

1. Principles and practice of compiler writing : Aho, Sethi , Ullman , Addison Wesley
2. Compiler Design in C : Alan Holub , PHI
3. Crafting a compiler : Fischer and LeBlanc , Addison Wesley
4. Principles of Compiler Design : Aho A. V., Ullman J.D , Narosa Publishing House.

Course Code & Title: - CSL403 : Database Management Systems (DC)
(L-T-P-C: 3-0-2-8)

Pre-requisite :

Database system concepts and Architecture - concept of relational database, Relational data model , Relational algebra, SQL-the relational database standard, ER and EER model.

Database design theory - Functional dependencies and normalization, relational database design algorithms, practical database design and demoralization, Relational constants, programmatic ways for implementing constraints, triggers, Chase algorithm.

Physical database design - Concept of physical and logical hierarchy, storage structures like cluster, index organized table, partitions, various table storage parameters and block storage parameters, concept of index, B-trees, hash index, function index, bitmap index.

Process and memory management in database - Various types of tasks in database, database buffer management, log buffer management code reuse, concept of two tier and N-tier architecture, data dictionary and catalog information database recovery technique. Arier Algorithm for recovery.

Query optimization and performance tuning - Various techniques for query optimization, strong and weak equivalence, cost base optimization, Use of different storage structures in query optimization.

Transaction Processing - Transaction and system concepts, Desirable properties of transaction, Schedules and recoverability, serializability of schedules, concurrency control, lock base protocols and time stamp based protocols, read consistency.

Text & References :

1. Fundamentals of Database Systems : Elmasiri and Navathe, Addison Wesley, 2000
2. Principles of Database Systems : Ullman , Golgotia Publications 1988

Course Code & Title: - CSD401: Project Phase – I (L-T-P-C: 0-0-0-4)

Course Code & Title: - CSL412 : Artificial Intelligence (DE) (L-T-P-C: 3-0-0-6)

Pre-requisite Course :

Intelligent Agents : Problem Solving : Solving Problems by Searching, Informed Search and Exploration, Adversarial Search Constraint Satisfaction Problems .

Knowledge and Reasoning – Logical Agents, First-Order Logic, Inference in First-Order Logic, Knowledge Representation

Planning

Uncertain Knowledge and Reasoning – Uncertainty, Probabilistic Reasoning

Text / References :

1. Artificial Intelligence a Modern Approach : Russel and Norvig , Pearson Education, 2nd
2. Artificial Intelligence – A Practical Approach : Patterson , Tata McGraw Hill, 3rd

Course Code & Title: - CSL408 : Topics in Embedded Systems (DE)
(L-T-P-C: 3-0-0-6)

Pre-requisite Course :

- Embedded systems overview, Hardware / Software co-design, Examples of embedded systems, Components of Embedded systems – sensors, actuators, micro-controller processor Technology, IC technology, Issues in Design Technology
- Scheduling Paradigms for real time systems - Static Priorities, Static Schedules, Dynamic Scheduling, Pre-emptive, Non-pre-emptive, Rate Monotonic, EDF
- Real World Issues like - Task Assignment, CPU utilization, Blocking, Unpredictability, performance Measures
- Hard & Soft Real Time Systems, Real Time Operating System – concepts, RTOS services, capabilities, Resource Management
- Programming Languages for Embedded Systems - Desired Language Characteristics,
- Tools for building Embedded systems, Embedded Software Development Methodology
- Issues in real time databases, real time communications, Fault Tolerant Techniques –
- Fault Types, Detection, Recovery
- **Text/References:**
 - Frank Vahid, "Embedded System Design- A Unified Hardware / Software Introduction", John Wiley & Sons
 - Krishna C.M. , Kang G. Shin, "RTS : Real Time Systems", McGraw Hill
 - David Simon, "An Embedded Software Primer", Addison Wesley, -2000

OPEN COURSES OFFERED BY THE DEPARTMENT

Course Code & Title: - CSL207 : Web Technology (OC)
(L-T-P-C: 3-0-0-6) (FOR NIT MIZORAM)

Pre-requisite:

History of the Internet and World Wide Web – HTML 4 protocols – HTTP, SMTP, POP3, MIME, IMAP. Introduction to JAVA Scripts – Object Based Scripting for the web. Structures – Functions – Arrays – Objects.

Introduction – Object refers, Collectors all and Children. Dynamic style, Dynamic position, frames, navigator, Event Model – On check – On load – Onerror – Mouse rel – Form process – Event Bubblers – Filters – Transport with the Filter – Creating Images – Adding shadows – Creating Gradients – Creating Motion with Blur – Data Binding – Simple Data Binding – Moving with a record set – Sorting table data – Binding of an Image and table.

Audio and video speech synthesis and recognition - Electronic Commerce – E-Business Model – E- Marketing – Online Payments and Security – Web Servers – HTTP request types – System Architecture – Client Side Scripting and Server side Scripting – Accessing Web servers – IIS – Apache web server.

Database, Relational Database model – Overview, SQL – ASP – Working of ASP – Objects – File System Objects – Session tracking and cookies – ADO – Access a Database from ASP – Server side Active-X Components – Web Resources – XML – Structure in Data – Name spaces – DTD – Vocabularies – DOM methods.

Introduction – Servlet Overview Architecture – Handling HTTP Request – Get and post request – redirecting request – multi-tier applications – JSP – Overview – Objects – scripting – Standard Actions – Directives.

Text / References :

1. Internet and world wide web – How to Program : Deitel & Deitel, Goldberg , Pearson Education Asia, 2001.
2. Using HTML 4, XML and JAVA : Eric Ladd, Jim O’ Donnel , Prentice Hall of India – QUE , 1999
3. Web Programming: Desktop Management : Aferganatel, PHI, 2004
4. Web Technology: Rajkama , Tata McGraw-Hill, 2001

**Course Code & Title: - CSL221 : Fundamental Topics in Computing (OC)
(L-T-P-C: 3-0-0-6)**

Pre Requisite :

Symbols and representation – binary logic and logic expressions –instantiation of symbols using physical entities – gates and evolution of digital computer – what 'programming' is – why high level languages to express algorithms.

Basics of digital logic, truth tables – combinatorial and sequential circuits – some idea of how arithmetic operations are performed – elementary treatment of control unit of a digital computer – state machine as a model of computation.

Propositional logic – its laws and limitations – first order predicate logic and its laws – existential and universal quantifiers – use of predicates for design of algorithms – testing vs. verification of algorithms.

'Algorithm' as a central idea in computing- its two important characteristics – asymptotic analysis of algorithms – recursion and recursive algorithms –recurrence relations and solutions of simple relations – P and NP problems –'algorithmic gap'.

Sets, alphabet and languages – need for grammars - Chomsky hierarchy – duality of grammar and automata – implications for translators – finite-state machines and regular expressions – brief mention of CFGs and PDAs – Turing machines – Turing machine as an algorithm – Church-Turing thesis.

Text / References :

1. Algorithmics: The Spirit of Computing : David Harel , Pearson Education
2. Introduction to Automata Theory, Languages and Computation : John Martin, Tata McGraw Hill
3. Elements of the Theory of Computation: Lewis Papadimitrou, Prentice Hall

COURSES OFFERED FOR OTHER DEPARTMENTS

Course Code & Title: - CSL311 : Computer Architecture & Organization (DC) (L-T-P-C: 3-0-0-6)

Pre-requisite:

Basic Structure of Computers, Functional units, software, performance issues software, machine instructions and programs, Types of instructions, Instruction sets: Instruction formats, Assembly language, Stacks, Ques, Subroutines.

Processor organisation, Information representation, number formats.

multiplication & division ALU design, Floating Point arithmetic, IEEE 754 floating point formats

Control Design, Instruction sequencing, Interpretation, Hard wired control - Design methods, and CPU control unit. Microprogrammed Control - Basic concepts, minimizing microinstruction size, multiplier control unit. Microprogrammed computers - CPU control unit

Memory organization, device characteristics, RAM, ROM, Memory management, Concept of Cache & associative memories, Virtual memory,.

System organization, Input - Output systems, Interrupt, DMA, Standard I/O interfaces

Concept of parallel processing, Pipelining, Forms of parallel processing, interconnect network

Text/References:

1. Computer Organisation , V.Carl Hammacher, Fifth Edition.
2. Structured Computer Organisation, A.S.Tanenbum, PHI. Third edition
3. Computer Organisation and Microprogramming, Y.Chu, II, Englewood Chiffs, N.J. Prentice Hall
4. Computer System Architecture, M.M.Mano

Course Code & Title: - CSL101 Computer Programming (DC) (1st Year B. Tech.) All branches (Section W,X,Y,Z N) in Odd Sem and (Section R,S,T,U,L in Even Semester) (L-T-P-C: 3-0-2-8)

Pre-requisite:

- **Introduction:** Flow charts, data types and storage classes, scope of variables, arithmetic operators, assignment, conditional, arithmetic expressions, enumerated data types, decision making, branching, looping, Switch concept, function and parameter passing, recursive functions, macros.
- **Basic programming algorithms:** Programs to illustrate basic language constructs in C like - Factorial, Sine/cosine and other mathematical series, Fibonacci series, calculating square-root of a number,

calculating GCD of 2 integers (Euclid's method and otherwise), Calculating LCM of 2 integers and similar such programs.

- **Arrays and applications:** Introduction to one dimensional and 2-D array with examples. Representing a polynomial using 1-D array and polynomial operations, Use of 2-D array to represent a matrix and matrix operations. Character arrays (strings): String related functions (strlen, strcpy, strcat, strcmp, atoi, itoa, reverse, strstr etc) and their function definitions. Searching and Sorting methods: Selection sort, Bubble sort, Insertion sort, Linear and binary search, partitioning an array, merging of 2 sorted arrays. Introduction to "Divide and Conquer" via Mergesort and Quicksort.
- **Structures and Unions:** Basic concept, array of structures and its applications.
- **Pointers:** Introduction (declaration and initialization), pointers and arrays, concept of dynamic memory allocation, use of pointers to represent variable-sized 1-D and 2-D arrays, pointers to structures.
- **File Management in C:** Open, close, read and write operations, Sequential and text files.
- **Text/References:**
 - Kerninghan; Ritchie, "C programming Language", PHI
 - Balguruswamy, "Programming in ANSI C", Tata Mcgraw Hill Publishing
 - Kakde and Deshpande, "C and data Structure", Charles River Media Publisher
 - R G Dromey, "How to Solve it by Computer", PHI

COURSES OFFERED DURING EVEN SEMESTER

<i>B. Tech. Computer Science</i>					
<i>S. No.</i>	<i>Course Code</i>	<i>Course Title</i>	<i>Credits</i>	<i>Course Type</i>	<i>Slot</i>
<i>4th Semester B. Tech. (Computer Science)</i>					
1	MAL205	Numerical Methods and Probability Theory	6	DC	D
2	CSL202	Discrete Maths & Graph Theory	6	DC	D(Sec A)/ H (Sec B)
3	CSL214	Data Structures and Program Design – II	8	DC	F
4	CSL204	Concepts in Programming Languages	6	DC	C
5	CSLI205	Business Information Systems	6	DE	B
6	ECL208	Analog Circuits	6	DE	G

6th Semester B. Tech. (Computer Science)					
1	CSL309	Operating Systems	6	DC	E
2	CSL307	Theory of Computation	6	DC	F
3	CSL306	System Programming	8	DC	H
4	CSL313	Computer Networks	6	DC	G
5	CSP314	Software Lab. - II	2	DC	D
6	HML301	Technical Communication	6	DE	D
7	EEL311	Control Systems	6	DE	C
8	ECL304	Digital Signal Processing(Sec. B)	6	DE	B

8th Semester B. Tech. (Computer Science)					
1	CSD402	Project Phase- II	8	DC	F
2	CSL406	Network Security	6	DE	F
3	CSL407	Data Mining & Data Warehousing	6	DE	E
4	CSL409	Topics in Distributed Systems	6	DE	G
5	CSP430	Seminar	2	DE	C

C COURSES OFFERED FOR OTHER DEPARTMENT					
B. Tech. (Electronics and Communication Engineering)					
1	CSL312	Concepts in Operating System	6	DE	D

4th Semester B. Tech. (Computer Science) :

**Course Code & Title: - MAL205: Numerical Meth. & Prob. Theory (DC)
(L-T-P-C: 3-0-0-6)**

Pre-requisite:

Numerical Analysis: Solutions of algebraic and transcendental equations by Iteration method, method of false position, Newton-Raphson method and their convergence.

Solutions of system of linear equations by Gauss elimination method, Gauss Seidal method, LU decomposition method. Newton-Raphson method for system of nonlinear equations.

Eigen values and eigen vectors : Power and Jacobi methods.

Numerical solution of ordinary differential equations: Taylor's series method, Euler's modified method, Runge-Kutta method, Adam's Bashforth and Adam's Moulton, Milne's predictor corrector method.

Boundary value problems: Shooting method, finite difference methods.

Probability theory:

Random variables, discrete and continuous random variable, probability density function; probability distribution function for discrete and continuous random variable joint distributions.

Definition of mathematical expectation, functions of random variables, The variance and standard deviations, moment generating function other measures of central tendency and dispersion, Skewness and Kurtosis.

Binomial, Geometric distribution, Poisson distribution, Relation between Binomial and Poisson's distribution, Normal distribution, Relation between Binomial and Normal distribution.

Random processes, continuous and discrete, determinism, stationarity, ergodicity etc. correlation functions, autocorrelation and cross-correlation, properties and applications of correlation functions.

Text Books:

1. Jain, Iyengar and Jain : Numerical Methods for Engineers and Scientists, Wiley Eastern
2. V.K. Rohatgi and A.K.M. Eshanes Sateh: An Introduction to Probabability and Statistics, John Wiley & Sons.

Reference Books

3. S. D. **Cante** and **C. de Boor**, Elementary Numerical Analysis, an algorithmic approach, McGraw-Hill.
4. Gerald and Wheatley : Applied Numerical Analysis, Addison-Wesley.
5. Spiegel, M.R.; Theory and problems of Probability and statistics; McGraw-Hill Book Company; 1980.
6. K.S. Trivedi: Probability Statistics with Reliability, Queuing and Computer Science applications, Prentice Hall of India Pvt. Ltd.

Course Code & Title: - CSL202 Discrete Maths & Graph Theory (DC)
(L-T-P-C: 3-0-0-6)

Pre-requisite :

- Set theory, operations on sets – relation and functions, continuity, partial order, equivalence relations, Peano axioms and induction.
- Mathematical logic, propositions, predicate logic, formal mathematical systems, algebra, homomorphism automorphism.
- Elements of Theory of some algebras, semigroups, monoids, groups.
- Rings, fields, lattices, Boolean Algebra
- Graphs, hypergraphs, transitive closure, trees, spanning trees

- Combinatorics , generating functions, recurrences, Counting theorem and applications.
- **Text/References:**
 - Kolman," Discrete Mathematical Structures for Computer Science", Busby
 - Liu C.L" Combinatorial Mathematics", McGraw Hill Book Compan

Course Code & Title: - CSL214 : Data Structures and Program Design – II (DC)
(L-T-P-C: 3-0-2-8)

Pre-requisite: CSL214 : Data Structures & Program Design – I

Lists - Singly-linked lists, doubly linked lists and circular linked lists. List traversal, insertion, deletion at different positions in the linked lists, concatenation, list-reversal etc. Mergesort for linked lists. Applications of lists in polynomial representation, multi-precision arithmetic, hash-tables etc. Multi linked structures and an example application like sparse matrices. Implementation of priority queues.

Trees , binary trees, binary trees- basic algorithms and various traversals. Binary Search Trees (BSTs) and insertion, deletion in BSTs. Height-balanced (AVL) trees, insertion/deletion and rotations. Heaps and heapsort. Splay trees.

Multi-way trees and external sorting - B-trees, Red-black trees. Introduction to B+ trees. Tries. Applications of the above mentioned trees.

Generalisation of trees to graphs – their representation & traversals. Dijkstra's shortest path algorithm, topological sort, all-pairs shortest paths, minimum spanning trees. Huffman coding. Introduction to network flow problem.

Introduction to Skip lists, data structures for disjoint set representation.

Reference Books

1. The C programming language: Brian Kernighan and Dennis Ritchie, PHI-EEE (or Pearson)
2. Data Structures & Program Design in C : Robert Kruse, G. L. Tondo and B. Leung PHI-EEE.
3. Fundamentals of Data Structures in C, E. Horowitz, S. Sahni, and S. Anderson-Freed, University Press

Course Code & Title: - CSL204 Concepts in Programming Languages (DC)
(L-T-P-C: 3-0-0-6)

Pre-requisite:

- Definition of Programming language . Syntax , semantics. High - level languages. Implementation of high-level languages, Compilers and Software interpreters. Data elements, identifiers binding, binding time, binding identifiers to names, binding of attributes, importance of binding time. Concept of r-value and l-value . Effect of environment on a language. Language paradigms.
- Data type, elementary data type, structured data type, elements of specification and implementation of data type. Implementation of elementary data types : integer, real, character, Boolean and pointer. Implementation of structured data types. Vectors & arrays, records and files. Type checking, type conversion and initialization.
- Evolution of data type concept. Abstract data type, encapsulation. Design and implementation of new data types through subprograms. Subprogram definition and activation, their implementation, parameter passing, generic subprograms.

- Sequence control structures used in expressions and their implementation. Sequence control structures used between statements or group of statements and their implementation.
- Sequence control structures used between subprograms, recursive and non recursive subprogram calls. Data control, referring environment dynamic and static scope, static chain implementation and display implementation.
- Type definition as mechanism to create new abstract data types, type equivalence, type definitions with parameters. Defining new abstracts data types Storage management issues, like static and dynamic allocation, stack based allocation and management, Heap based allocation and management
- **Text/References:**
 - Pratt Terence, "Programming Languages, Design and Implementation", PHI
 - Sethi Ravi, "Programming Languages", Addison Wesley

Course Code & Title: - CSL205 Business Information Systems (DE)
(L-T-P-C: 3-0-0-6)

Pre-requisite:

- Introduction to Business Information system : Types of information system, characteristics of system strategies for system development, systems analysis & Design, Tolls for systems development.
- Object Oriented modeling : Object oriented paradigm , object structure, classes, objects instances, Attribute, Operations, constraints, Taxonomy and inheritances, communication abstract classes. Polymorphism, object identity, design patterns.
- Introduction to database management system. Models of database. E-R model. Creating a database, inserting data , updating , deleting, retrieving techniques using SQL.
- Introduction to e-commerce and related issues. Electronics commerce framework, anatomy of e-commerce applications, consumer applications, organization, Electronic commerce and World Wide Web, Network infrastructure for electronics commerce.
- Introduction to Web based computing, three tier architecture, introduction to web page designing, introduction to web servers .Case studies, UML ,CORBA/COM , DCOM, JSP/ASP.
- **Text/References:**
 - Sarda N.L, " Programming in COBOL", TMH India
 - Whiteley David, "e-Commerce", TMH
 - Korth H., Silberschatz, "Database System concepts", Addison Wesley

Course Code & Title: - ECL208 : Analog Circuits (DE)
(L-T-P-C: 3-0-0-6)

Pre-requisite:

Semiconductors, mobility, conductivity, diffusion, continuity equation. Theory of P-N junction, diode characteristics, diode resistances, diode capacitances, switching properties, breakdown of diodes.

Bipolar junction transistor, transistor configuration & characteristics, breakdown of transistors, power transistors, thermal runaway of transistor, biasing of transistor, FETS, FET characteristics, biasing of FETS.

Low frequency small signal equivalent circuits of BJT & FETS, Gain, input/output impedances of equivalent circuits of BJTS & FETS, High frequency small signal equivalent circuits of BJT & FETS, difference amplifiers. Power amplifiers.

Feedback amplifiers, theory of feedback, advantages of negative feedback, feedback configurations, oscillators R-C & L-C, crystal oscillators.

Operational amplifiers- Properties and characteristics study of typical opamp,

Performance limitations, application of opamps- summer, inverter, integrator, differentiator, instrumentation amplifier.

Limiters, log/antilog amplifiers, multipliers, function generators, waveform generators

Text/References:

Millmann, Halkias : "Integrated Electronics", McGraw Hill

Millmann, Halkias : "Electronics Devices Circuits", McGraw Hill

Garud, Jain: , "Electronic Devices & Linear Circuits", Tata McGraw Hill

Tobey, G:" Operational Amplifier "Tata McGraw Hill

Gayakwad Ramkant, : "Op-amps & linear integrated circuits ",PHI.

6th Semester B. Tech. (Computer Science) :

Course Code & Title: - CSL309 Operating Systems (DC) (L-T-P-C: 3-0-0-6)

Pre-requisite: Data Data Structures

- Introduction, basic h/w support necessary for modern operating systems - Services provided by OS, system programs and system calls - brief discussions of evolution of OS - real time and distributed systems : a brief overview of issues.
- File systems, user interface - disk space management and space allocation strategies - examples from UNIX, DOS, Windows etc - directory structures - disk caching - file system consistency and logs - disk arm scheduling strategies.
- Processes and 3 levels of scheduling - process control block and context switch - goals of scheduling and different scheduling algorithms - threads : user-level and kernel level.
- Memory management techniques - contiguous and non-contiguous - paging and segmentation - translation look-aside buffers (TLB) and overheads - virtual memory and demand paging- page faults and instruction restart - problems of large address spaces - page replacement algorithms and working sets - miscellaneous issues.
- Process cooperation and synchronization - mutual exclusion and implementation - semaphores, conditional critical regions and monitors - classical inter - process communication problems - message passing.
- Deadlocks and strategies for handling them - protection and security issues - access lists, capabilities, cryptographic techniques - introduction to distributed systems.

- **Text/References:**
 - Tanenbaum A, "Modern Operating Systems", PHI 2nd Ed
 - Silberchatz & Galvin, "Operating System Concepts", Addison Wesley

Course Code & Title: - CSL307 Theory of Computation (DC) (L-T-P-C: 3-0-0-6)

Pre-requisite:

- Preliminaries - Sets, operations, relations, transitive closure, countability and diagonalisation, induction and proof methods- pigeon-hole principle and simple applications - concept of language - grammars and production rules - Chomsky hierarchy.
- Regular grammars, deterministic finite automata - non determinism, conversion to deterministic automata- e-closures, regular expressions, finite automata, regular sets.
- Pump lemma for regular sets- closure properties of regular sets, decision properties for regular sets, minimization of automata.
- Context - free languages, parse trees and ambiguity, reduction of CFGs, Chomsky and Griebach normal forms, push - down Automata (PDA), non determinism, acceptance by two methods and their equivalence, CFLs and PDAs – Pumping lemma for context free languages, Closure and decision properties of CFLs.
- Turing machines – variants, recursively enumerable (r.e.) sets, recursive sets, TM as computer of function, decidability and solvability, Halting Problem, reductions, Post correspondence Problem (PCP) and unsolvability of ambiguity problem of CFGs.
- Introduction to recursive function theory - primitive recursive and partial recursive functions Church -Turing thesis - convergence of view points of what "computability" is : Semi formal treatment.
- **Text/References:**
 - Martin John, "Introduction to languages and the theory of computation", TMH
 - Motwani Hopcroft, Ullman, "Introduction to Automata Theory, Languages and computation", Pearson Education

Course Code & Title: - CSL306 System Programming (DC) (L-T-P-C: 3-0-2-8)

Pre-requisite:

- Assembler, Macroprocessor - Concept of assembler, design of single pass and two pass assembler, forward reference, design of output file of assembler, concept of macro, macro call within macro, macro definition within macro, recursive macro calls, design of macro processor.
- Linker and Loader - Concept of static and dynamic relocation, external symbols, design of linker, design of object file for different loading schemes.
- Common Object file format - Structure of object file and executable file, section or segment headers, symbol table, concept of storage class, string various, data types line insert, character, arrays structures.
- System utilities - Source code control system, make, link editor, symbolic debugger, pattern matching language like awk.
- Device Drivers - Device programming, system drivers, non system drivers, virtual drivers, Incorporation of driver routines, Basic device driver operation, character and block drivers.
- Lexical Analysis - Role of lexical analyzer, recognition of tokens, tool for study of lex.
- **Laboratory Work : Practicals based on above mentioned syllabus**

- **Text/References:**

- Gorsline , G.W, "Assembly and Assemblers", PHI
- Kerningham and Pike, "Unix programming Environment", PHI
- Easan I., Janet, Thomas J.Teixeria, "Writing Unix device devices", Wiley
- Daniel Norton, "Writing Window device drivers – 1996", Addison Wesley
- Pajari George, "Unix Device Drivers", Pearson Education.
- "Unix system Utilities manual"

Course Code & Title: - CSL313 Computer Networks (DC) (L-T-P-C: 3-0-0-6)

Pre-requisite:

- Fundamentals of computer networking - classification as LAN, WAN etc - topologies and their characteristics - packet switching - virtual circuits and datagrams - unicast, multicast and broadcast - layered architecture, protocols and services - types of services - OSI model, principles, layers and functions - TCP/IP model and comparison.
- Review of signal and system analysis - relation between rise time and bandwidth, analog and digital transmission - transmission line concept, impedance and reflections - optical fibers, sources and detectors - multimode and single mode - point-to-point links - digital radio at VHF/UHF -modulation methods: PCM, DM, ADM etc - leased lines, E1 lines - RZ and NRZ versions of various types of formats - ASK, PSK, FSK, QPSK etc - phone line modems and speeds - introduction to spread spectrum techniques.
- Data link layer design issues - framing, services, error control and flow control - CRC and FEC codes - protocols: stop and wait, go-back, selective repeat - simple analysis of protocols - PPP and HDLC case studies
- Medium access protocols - ALOHA, slotted ALOHA, carrier sense protocols - CSMA-CD - token passing - IEEE 802 standards: 802.2, 802.3 frame formats, protocols, performance and hardware details - introduction to 802.4, 802.5 and 802.11 - FDDI - introduction to network management and SNMP.
- Network layer - routing algorithms - congestion control and internetworking - IP and Ipv6 as case studies.
- Transport layer - design issues - connection establishment and release – timer management - multiplexing - flow control - TCP and UDP as case studies -
- network performance measurement and optimization.

- **Text/References:**

- Tanenbaum A. S, "Computer Networks", PHI 4th Edition
- Peterson, Davie, "Computers Networks", Elsevier 3rd Edition
- William Stallings, "Data and Computer Communications", PHI 6th Edition
- Simon Haykin, "Communication Systems", John Wiley 4th Edititon
- Douglas Comer, "Computer Networks and Internets", Addison Wesley 2nd Editition
- Peterson, Simon, "Computer Networks: A Systems Approach", Pearson Education, Asia

Course Code & Title: - CSP314 : Software Lab. – II

Syllabus as per co-ordinator's instructions.

Course Code & Title: - HUL301 : Technical Communication (DE)
(L-T-P-C: 3-0-0-6)

Pre-requisite:

- Defining technical writing - producing the product - objectives - audience recognition and involvement.
 - Correspondence - memos - letters - job search.
 - Visual appeal - document design - graphics - electronic communication - email, online help and websites.
 - Technical applications - descriptions - instructions and user manuals.
 - Report strategies - research - the summary - reports, proposals and oral presentations.
 - Handbook of grammar, punctuation, mechanics and spelling.
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- **Text / References :**
 - Gersen and Gersen ; Technical Writing: Process and Product ; Pearson Education Asia.
 - Rutherford; Basic Communication Skills for Technology; Pearson Education Asia.
 - Lesikar et al; Lesikar's Basic Business Communication; Tata McGraw Hill.
 - Shirley Taylor ; Communication for Business ; Pearson Education Asia.

Course Code & Title: EEL311 : Control System Theory (Credits : 3-0-0-6)

Pre-requisite:

- Introduction to the need for automation and automatic control, use of feedback, broad spectrum of system application.
 - Concept of transfer function, closed loop transfer function, Block Diagram Reduction technique. Elementary idea of control system Components, Electrical and Electromechanical .
 - Time Response of Systems: First order and second order systems. Concept of gain & time. Constants, Steady state error, type of control system, approximate methods for higher order systems.
 - Stability of control systems: conditions of stability, characteristic Equation, Routh's stability Criterion. Frequency Response method of analysing linear system, polar and Bode plot, Elementary ideas about Nyquist stability Criterion, Gain Margin & Phase Margin Concepts.
 - State variable method of analysis: Formation of state model in Vector-Matrix form, Relation between transfer function & State variable.
 - Sampled Data systems: Introduction, Sample & Hold Circuits, Transforms, Stability of discrete time systems.
-
- **Text/ References:**
 - Nagrath, Gopal ; Control System Analysis
 - D' Azzo J.J.; Houpis C.H.; Linear Control System Analysis
 - Gopal. M; Control Systems: Principle & Design.
 - Kuo B. C.; Automatic Control Systems.

Course Code & Title: - ECL304: Digital Signal Processing (DE)
(L-T-P-C: 3-0-0-6)

Pre-requisite:

- Discrete time signals; Sequences; representation of signals on orthogonal basis; Sampling and reconstruction of signals.
- Discrete time systems; attributes, Z- Transform, Analysis of LSI systems, frequency analysis, Inverse Systems.
- Signal flow graph representation, DF1, DF2, parallel and cascade form. Finite word-length effects in Digital Filters
- Discrete Fourier Transform (DFT), Fast Fourier Transform algorithms.
- Design of FIR Digital Filters: Window method, Park-McClellan's Method.
- Design of IIR Digital Filters: Butterworth, Chebyshev approximations. Lowpass, Bandpass Bandstop and Highpass filters. Bilinear, impulse invariant frequency transformations.
- **Text/ References :**
 - Oppenheim & Schaffer, "Discrete Time Signal Processing", PHI Ltd
 - Proakis John and Manolakis D.G, "Digital Signal Processing: Principles Algorithms and Applications", Prentice Hall 1992.
 - Cavicchi Thomas J, "Digital Signal Processing", Wiley 2002
 - Mitra S.K , "Digital Signal Processing A Computer -Based Approach", Tata McGraw-Hill

8th Semester B. Tech.(Computer Science)

CSD402 : Project Phase – II

Course Code & Title: - CSL406 Network Security (DE) (L-T-P-C: 3-0-0-6)

Pre-requisite :

- **Conventional Encryption and Ciphers**
Conventional Encryption Model, Steganography, Classical Encryption Techniques , Block Cipher Principles , The Data Encryption Standard(DES) , The Strength of DES , Differential and Linear Cryptanalysis , Block Cipher Design Principles , Block Cipher Modes of operation , Stream Ciphers, Finite Fields, Advanced Encryption Standard (AES), Multiple Encryption, Triple DES, Confidentiality Using Symmetric Encryption
- **Public Key Encryption and Hash Functions**
Number Theory, Public Key Cryptography , The RSA Algorithm , Key Management , Diffie-Hellman Key Exchange , Elliptic Curve Cryptography, Message Authentication and Hash Functions, Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions, Security of Hash Functions and MACs
- **Hash and MAC Algorithms**
MD5 Message Digest Algorithm, Secure Hash Algorithm, Whirlpool, RIPEMD, HMAC, Digital Signatures, Authentication Protocols -Digital Signature Standard authentication Applications, Kerberos, PKI Electronic Mail Security, PGP, S/MIME IP Security, Web Security, SSL, TLS and Secure Electronic Transaction
- **Intruders, Viruses and Worms**
Intruders, IDS, Password Management, Viruses and Related Threats Firewalls, Firewall Design Principles, Trusted Systems

- **Text & References :**
 - William Stallings, "Cryptography and Network Security", PHI
 - Schneier, Bruce, "Applied Cryptography", John Wiley and Sons
 - Douglas R. Stinson, "Cryptography: Theory and Practice", CRC Press
 - Behrouz A. Forouzan, "Cryptography and Network Security", Mc-Graw Hill

Course Code & Title: - CSL407 Data Mining & Data Warehousing (DE)
(L-T-P-C: 3-0-0-6)

Pre-requisite:

- Introduction to Data warehousing - Application of Data warehousing and mining, Datawarehouse development life cycle, Data warehouse analysis, CUBE, ROLL UP and STAR queries.
- Data Warehouse Design - Massive denormalisation, STAR schema design ,Data ware house Architecture, OLAP, ROLAP and MOLAP , concepts of Fact and dimension table
- Space Management in Data warehouse - Schemas for storing data in warehouse using different storage structures, B-tree index, hash index, clusters, Bitmap index functional index, domain index, Data partitions.
- Performance and Tuning - Query optimization, memory management, process management. I/o management for Data warehouse.
- Data Mining Tools –Association rules, a priori algorithm, Fp-trees algorithm, constraints and solution.
- Cluster analysis- paradigms, DBSCAN, cluster algorithms.
- Mining tools- decision trees and applications.

- **Text / References :**
 - Jiawei Han, Micheline Kamber, "Data mining- Concepts & Techniques", Morgan Kaufmann
 - Michale Corey, Michale Abbey; Oracle 8i Data Warehousing; Tata McGraw Hill.
 - Navathe and Elmasry ; Fundamentals of Database Systems; Addison Wesley, 2000
 - Arun Pujari; Data Mining; Orient Longman, 2003

CSP430 : Seminar (0-0-0-2)
(Syllabus is as per Co-ordinator's instructions)

Course Code & Title: - CSL409 : Topics in Distributed Systems (DE)
(L-T-P-C: 3-0-0-6)

Pre-requisite Course : Operating Systems

- Motivation and goals, broad overview and advantages of distributed systems main characteristics absence of global clock and state and possibility of large network delays
- Issues in distributed systems such as transparency, scalability, security, resource management etc. theoretical foundation - Lamport's clocks -Chandy-Lamport Global State recording algorithm - termination detection.
- Distributed mutual exclusion - Lamport, Ricart - Agrawal non-token based algorithm - token based algorithms - comparative performance analysis.

- Distributed deadlock detection issues - central and distributed detection algorithm - agreement protocols - model of processor failures - Byzantine agreement and other problems - solutions and applications.
- Distributed file systems - design issues - case studies with emphasis on NFS - distributed shared memory - coherence and coherence protocols - design issues and case studies.
- Distributed scheduling - issues , load distributing algorithms - load sharing policies and case studies - task migration and issues
- Recovery : introduction and basic concepts - backward and forward error recovery,
- Checkpointing : synchronous and asynchronous - atomic actions and commit protocols - voting protocols - reliable communication - cryptography : private and public - implementation issues , RSA algorithm - authentication in distributed systems - Kerberos case study.
- **Text/References:**
 - Singhal and Shivratri, "Advanced concepts in Operating Systems", McGraw Hill
 - Coulouris, "Distributed Systems", AWL Press. Pearson Education
 - Tanenbaum, "Modern Operating Systems", PHI

COURSES OFFERED FOR OTHER DEPARTMENTS

Course Code & Title: - CSL312 Concepts in Operating System (DE) (L-T-P-C: 3-0-0-6)

Pre-requisite:

- Introduction to Operating Systems, simple batch Systems, time sharing systems etc., computer system structures, I/O structure, storage structure, operating system structures, operating system services, system calls
- Process management, Concept of a process, operations on a process, interprocess communication, CPU scheduling, scheduling criteria, scheduling algorithms, process synchronization, critical section problem, synchronization primitives, semaphores, monitors, deadlocks, deadlock prevention, avoidance and detection
- Storage Management, memory management, logical vs. physical address space, paging and segmentation, virtual memory, demand paging, page replacement algorithms, thrashing
- File system interface, file concept, access methods, directory structure, protection, file-system implementation, allocation methods, free-space management
- I/O Systems, I/O hardware, secondary-storage structure, disk structure, disk scheduling, disk management
- Protection and security, goals of protection, domain of protection, access matrix, capability based systems, security issues, authentication, encryption
- **Text/References:**
 - Galvin P.B., Silberchatz A, "Operating System Concepts", Wesley
 - Stallings W, "Operating Systems", PHI, New Delhi
 - Tanenbaum A.S, "Modern Operating Systems", PHI, New Delhi

Course Code & Title: - CSL101 Computer Programming (DC) (L-T-P-C: 3-0-2-8)

Pre-requisite:

- **Introduction:** Flow charts, data types and storage classes, scope of variables, arithmetic operators, assignment, conditional, arithmetic expressions, enumerated data types, decision making, branching, looping, Switch concept, function and parameter passing, recursive functions, macros.
- **Basic programming algorithms:** Programs to illustrate basic language constructs in C like - Factorial, Sine/cosine and other mathematical series, Fibonacci series, calculating square-root of a number, calculating GCD of 2 integers (Euclid's method and otherwise), Calculating LCM of 2 integers and similar such programs.
- **Arrays and applications:** Introduction to one dimensional and 2-D array with examples. Representing a polynomial using 1-D array and polynomial operations, Use of 2-D array to represent a matrix and matrix operations. Character arrays (strings): String related functions (strlen, strcpy, strcat, strcmp, atoi, itoa, reverse, strstr etc) and their function definitions. Searching and Sorting methods: Selection sort, Bubble sort, Insertion sort, Linear and binary search, partitioning an array, merging of 2 sorted arrays. Introduction to "Divide and Conquer" via Mergesort and Quicksort.
- **Structures and Unions:** Basic concept, array of structures and its applications.
- **Pointers:** Introduction (declaration and initialization), pointers and arrays, concept of dynamic memory allocation, use of pointers to represent variable-sized 1-D and 2-D arrays, pointers to structures.
- **File Management in C:** Open, close, read and write operations, Sequential and text files.
- **Text/References:**
 - Kerninghan; Ritchie, "C programming Language", PHI
 - Balguruswamy, "Programming in ANSI C", Tata Mcgraw Hill Publishing
 - Kakde and Deshpande, "C and data Structure", Charles River Media Publisher

R G Dromey, "How to Solve it by Computer", PHI