Computer Science and Engineering (CS)
EN010301 B  Engineering Mathematics II

(CS, IT)

Teaching scheme

2 hours lecture and 2 hour tutorial per week

Credits: 4

Objectives

To know the importance of learning theories and strategies in Mathematics and graphs.

MODULE 1  Mathematical logic  (12 hours)


MODULE 2  Number theory and functions  (12 hours)


Function – types of functions – composite functions – inverse of a function – pigeon hole principles

MODULE 3  Relations  (10 hours)


MODULE 4  Lattice  (14 hours)

Lattice as a poset – some properties of lattice (no proof) – Algebraic system – general properties – lattice as algebraic system – sublattices – complete lattice – Bounded Lattice - complemented Lattice – distributive lattice – homomorphism - direct product

MODULE 5  Graph Theory  (12 hours)

Basic concept of graph – simple graph – multigraph – directed graph- Basic theorems (no proof) . Definition of complete graph, regular graph, Bipartite graph, weighted graph – subgraph – Isomorphic graph –path – cycles – connected graph.- Basic concept of Eulergraph and Hamiltonian circuit – trees – properties of tree (no proof) - length of tree – spanning three – sub tree – Minimal spanning tree (Basic ideas only . Proof not excepted for theorems)
References

2. B.Satyanarayana and K.S. Prasad – Discrete mathematics & graph theory – PHI
8. B.Kolman , R.C.Bushy, S.C.Ross - Discrete mathematical structures- PHI
9. R.Johnsonbough - Discrete mathematics – Pearson Edn Asia
EN010 302 Economics and Communication Skills
(Common to all branches)

Teaching scheme
2 hours lecture and 2 hours tutorial per week
Credt: 4(3+1)

Objectives
• To impart a sound knowledge of the fundamentals of Economics.

Economics

Module I (7 hours)
Reserve Bank of India-functions-credit control-quantitative and qualitative techniques
Commercial banks-functions- Role of Small Industries Development Bank of India and National Bank for Agriculture and Rural Development
The stock market-functions-problems faced by the stock market in India-mutual funds

Module II (6 hours)
Multinational corporations in India-impact of MNC’s in the Indian economy
Globalisation-necessity-consequences
Privatisation-reasons-disinvestment of public sector undertakings
The information technology industry in India-future prospects

Module III (6 hours)
Direct and indirect taxes- impact and incidence- merits of direct and indirect taxes-progressive and regressive taxes-canons of taxation-functions of tax system-tax evasion-reasons for tax evasion in India-consequences-steps to control tax evasion
Deficit financing-role-problems associated with deficit financing

Module IV (5 hours)
National income-concepts-GNP, NNP, NI, PI and DPI-methods of estimating national income-difficulties in estimating national income
Inflation-demand pull and cost push-effects of inflation-government measures to control inflation

Module V (6 hours)
International trade-case for free trade-case for protectionism
Balance of payments-causes of disequilibrium in India’s BOP-General Agreement on Tariffs and Trade-effect of TRIPS and TRIMS in the Indian economy-impact of WTO decisions on Indian industry

Text Books
1. Ruddar Datt, Indian Economy, S.Chand and Company Ltd.
2. K.K.Dewett, Modern Economic Theory, S.Chand and Company Ltd.

References
2. Terence Byres, The Indian Economy, Oxford University Press
3. S.K.Ray, The Indian economy, Prentice Hall of India
Communication Skills

Objectives
- To improve Language Proficiency of the Engineering students
- To enable them to express themselves fluently and appropriately in social and professional contexts
- To equip them with the components of different forms of writing

MODULE – I (15 hours)
INTRODUCTION TO COMMUNICATION
Communication nature and process, Types of communication - Verbal and Non verbal, Communication Flow-Upward, Downward and Horizontal, Importance of communication skills in society, Listening skills, Reading comprehension, Presentation Techniques, Group Discussion, Interview skills, Soft skills

MODULE – II (15 hours)
TECHNICAL COMMUNICATION
Technical writing skills- Vocabulary enhancement-synonyms, Word Formation-suffix, affix, prefix, Business letters, Emails, Job Application, Curriculum Vitae, Report writing- Types of reports

Note: No university examination for communication skills. There will be internal evaluation for 1 credit.

REFERENCES
2. Communication skills for Engineers and Scientists, Sangeeta Sharma and Binod Mishra, PHI Learning private limited, 2010
CS010 303: Problem Solving and Computer Programming  
(Common with IT010 306)

Teaching scheme
2 hours lecture and 2 hour tutorial per week

Credits: 4

Objectives
• To impart the basic concepts of problem solving using a computer.
• To learn about the structure of C programming language.

Module I (10 hours)
Problem solving: Steps in Computer programming – Features of a good program – Problem solving using Algorithms and Flowcharts.
C fundamentals: Character set, Constants, Identifiers, keywords, basic data types, Variables, Operators, Expressions, Statements, Input and Output statements – Structure of a C program – simple programs.

Module II (13 hours)
Single dimensional arrays – defining an array, array initialisation, accessing array elements – Programs for sequential search, bubble sort, binary search.
Multidimensional arrays – defining a two dimensional array, array initialisation, accessing elements – Programs for matrix processing.

Module III (12 hours)
Strings: declaring a string variable, reading and displaying strings, string related library functions – Programs for string matching and sorting.
Functions: Function definition, function call, function prototype, parameter passing, void function – Recursion – Passing array to function.
Macros: Defining and calling macros – Difference between macro & function.

Module IV (13 hours)
Structures: defining a structure variable, accessing members, array of structures, passing structure to function.
Unions: difference with structure, defining union variable, accessing members.
Pointers: declaration, operations on pointers, passing pointer to a function, accessing array elements using pointers, processing strings using pointers, pointer to pointer, array of pointers, pointer to array, pointer to function, pointer to structure, self referential structure.

Module V (12 hours)
Files: Different types of files in C – Opening & Closing a file – Writing to and Reading from a file – Processing files – Library functions related to file – fseek(), ftell(), ungetc(), fread(), fwrite() – Dynamic memory allocation.
Storage Class associated with variables: automatic, static, external and register.
Additional features: Enumerated data type, bitwise operators, typedef.

References
2. Computer Programming in C - Kerningham & Ritchie, PHI.
5. Let us C – Yashwant Kanetkar, BPB.
6. A Book on C – Al Kelley and Ira Pohl, Addison-Wesley.
7. Mastering Turbo C - Stan Kelly Bootle, BPB Publications.
8. Programming and Problem Solving with PASCAL - Micheal Schneider, Wiley Eastern Ltd. (Module 1)
CS010 304: Computer Organization

Teaching scheme
3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives
- To develop a good understanding of a complete computer system through an integrated approach to hardware, software and processor design.
- To emphasise on both background theory and actual design.

Module I (10 hours)
CPU - Arithmetic: Signed addition and subtraction –BCD adder –Multiplication – Array multiplier – Booth’s Algorithm, Division – Restoring and non-restoring division.

Module II (12 hours)
Floating-point arithmetic- addition, subtraction, multiplication, division. Decimal arithmetic- addition subtraction, multiplication, division. ALU - design of arithmetic, logical, arithmetic logical unit

Module III (14 hours)
Control Logic Design – Control Organization – Hardware control, Microprogram control (design for specific problems)– Microprogram sequencer, Horizontal and vertical micro instructions.

Module IV (12 hours)

Module V (12 hours)
Virtual Memory:-Overlay-Need for virtual memory-Address translation-Translation Look Aside Buffer-Relocation techniques-static, dynamic-Paged memory-Page table, Page frame data table-Segmented memory-Paged segments.

Reference Books
CS010 305 SWITCHING THEORY AND LOGIC DESIGN

(Common with IT010 304)

Teaching scheme

3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives:

To introduce the principles of Logic Systems and Circuits, thereby enabling the student to obtain the platform for studying Computer Architecture and Design.

Module 1: (14 Hrs)

Number Systems and Codes:- Decimal, Binary, Octal and Hexadecimal Number systems, Codes- BCD, Gray Code, Excess-3 Code, ASCII, EBCDIC, Conversion between various Codes.

Switching Theory:- Boolean Algebra- Postulates and Theorems, De’ Morgan’s Theorem, Switching Functions- Canonical Forms- Simplification of Switching Functions- Karnaugh Map and Quine McClusky Methods.

Module 2: (12 Hrs)

Combinational Logic Circuits:- Review of Basic Gates- Universal Gates, Adders, Subtractors, Serial Adder, Parallel Adder- Carry Propagate Adder, Carry Lookahead Adder, Carry Save Adder, Comparators, Parity Generators, Decoder and Encoder, Multiplexer and Demultiplexer, PLA and PAL.

Module 3 (12 Hrs)

Sequential Logic Circuits:- Latches and Flip Flops- SR, JK, D, T and MS Flip Flops, Asynchronous Inputs.

Clocked Sequential Circuits:- State Tables State Equations and State Diagrams, State Reduction and State Assignment, Design of Clocked Sequential Circuits using State Equations.

Module 4: (10 Hrs)

Counters and Shift Registers:- Design of Synchronous and Asynchronous Counters:- Binary, BCD, Decade and Up/Down Counters, Shift Registers, Types of Shift Registers, Counters using Shift Registers- Ring Counter and Johnson Counter.

Module 5 (12 Hrs)

Fault Tolerance and Diagnosis: Concepts of Fault and Hazards- Fault Tolerance in Combinational Circuits- Fault Table, Fault Detection methods-Boolean Difference and Path Sensitizing Methods-

Digital ICs- Digital Logic Families- Characteristics- Introduction to RTL, TTL,ECL, MOS and CMOS Logics.
Reference Books
3. Floyd T.L. *Digital Fundamentals*, Universal Bookstall
CS010 306(EC): Electronics Devices and Circuits

Objectives

- To impart the basic concepts of discrete integrated electronics
- To develop understanding about the working and operation of various circuits using discrete and integrated components

Module I (12hours)

Power supplies: Half wave, full wave and bridge rectifiers- L, C, LC and _ filters (working only)- Zener voltage regulator, transistor series and shunt voltage regulator, voltage regulator ICs, 78XX and 79XX series

Module II (12hours)

Transistor Amplifiers: Bipolar transistor models and characteristics, current and voltage characteristics, BJT as a switch, BJT circuits at DC, Need for biasing, Q point selection, Concepts of load line, Bias stability, Biasing in BJT amplifier circuits, Small signal operation and model, transconductance, single stage BJT amplifiers.

Module III (12hours)


Module IV (12hours)

Feedback: Concept of feedback, positive and negative feedback, types of feedback, Effect of feedback on amplifier performance, Stability of feedback circuits.

Oscillators: Condition for oscillators, General form of oscillator circuit, RC phase shift oscillators, Wein bridge oscillator using OP-Amp, Working of Hartley, Colpitt’s and crystal oscillators

Module V (12hours)


Reference Books

1. Integrated Electronics – Milman , Halkias – TMH
3. Fundamentals of microelectronics – B Razavi - Wiley
4. Design with Op-Amp and analog integrated circuits – S Franco – TMH
5. Pulse, digital and switching waveforms – Milman, Taub - TMH
CS010 307(P): Programming Lab

Teaching scheme
3 hours practical per week

Credits: 2

Objectives

- To acquaint the students with the fundamentals of programming.
- To provide the students with good knowledge in C programming and develop problem solving skills.

1. Familiarisation with computer system compliers, editors and operating systems etc.

2. Familiarisation with office packages

3. Programming experiments in C to cover input output statements, control statements, functions, string, arrays, Structures, pointers and files.

4. Programs to find factorial, Fibonacci series, palindrome, matrix operations, sort a set of names, search etc.

Any experiment according to the syllabus of CS010 303 can be substituted.
CS010 308 LOGIC DESIGN LAB

Teaching scheme

Credits: 2

3 hours Practical per week

Objectives:-

To provide an introduction to Logic Systems Design thereby giving a hands on experience on working with digital ICS, which enable the study Computer System Architecture.

1. Familiarization of Logic Gates and Realization of Logic Circuits using basic Gates.

2. Design and implementation of Arithmetic Circuits:- Half Adder, Full Adder, n bit Ripple Carry Adder, Carry Look ahead Adder, BCD Adder

3. Study of Flip Flops:- implementation of RS, JK, D, T and MS Flip Flops

4. Design and implementation of Synchronous and Asynchronous Counters, UP/DOWN Counters

5. Design and Implementation of Shift Registers, Counters using Shift Registers – Ring Counter and Johnson Counter

6. Study of Multiplexers, Demultiplexers, Encoder and Decoder

7. Design of Comparators and Parity Generators.
EN010401  Engineering Mathematics III  
(Common to all branches) 

Teaching scheme  
2 hours lecture and 2 hour tutorial per week  

Credits: 4  

Objectives: Apply standard methods of mathematical & statistical analysis  

MODULE 1 Fourier series  
(12 hours)  
Dirichlet conditions – Fourier series with period 2π and 2l – Half range sine and cosine series – Harmonic Analysis – r.m.s Value  

MODULE 2 Fourier Transform  
(12 hours)  
Statement of Fourier integral theorem – Fourier transforms – derivative of transforms- convolution theorem (no proof) – Parsevals identity  

MODULE 3 Partial differential equations  
(12 hours)  
Formation by eliminating arbitrary constants and arbitrary functions – solution of Lagrange’s equation – Charpits method – solution of Homogeneous partial differential equations with constant coefficients  

MODULE 4 Probability distribution  
(12 hours)  

MODULE 5 Testing of hypothesis  
(12 hours)  
Populations and Samples – Hypothesis – level of significance – type I and type II error – Large samples tests – test of significance for single proportion, difference of proportion, single mean, difference of mean – chi –square test for variance- F test for equality of variances for small samples  

References  
5. Richard A Johnson – Miller Fread’s probability & Statistics for Engineers- Pearson/ PHI
7. G. Haribaskaran – Probability, Queueing theory and reliability Engg. – Laxmi Publications
8. V. Sundarapandian - probability, Statistics and Queueing theory – PHI
CS010 402: Object Oriented Programming

Teaching scheme
3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives

- To impart the basic concepts of object oriented programming in C++.
- To provide sufficient knowledge about developing real world projects with object oriented concepts.

Module I (8 hours)
Introduction to OOP - Evolution of object oriented languages - Need of Objects - Definition of Object-Oriented Language – Classes and Objects – Creating and Using Classes and objects – Member functions and variables – Constructors – multiple and parameterized constructors - copy constructors – constructors with default arguments - Destructors.

Module II (13 hours)

Module III (14 hours)

Module IV (13 hours)
Virtual Destructors – Virtual Base Classes - Template- class templates and function templates- Creating and using templates – Namespaces-Dynamic Objects - Dynamic object allocation - Inline functions. Exception Handling - basics of exception handling-exception handling mechanism- Throwing and Catching Mechanism-Rethrowing and Specifying exceptions.

Module V (12 hours)
Data file operations – opening and closing files-reading and writing from file -Classes and file operations-Other object oriented languages – Java – Object oriented features in Java – Comparison with C++-Object oriented system development-object oriented notations and graphs-object oriented analysis-object oriented design.
Reference Books
CS010 403: Data Structures and Algorithms

Teaching scheme
2 hours lecture and 2 hour tutorial per week

Credits: 4

Objectives
- To impart the basic concepts of data structures and algorithms
- To develop understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures.

Module I (10 hours)

Module II (12hours)

Module III (12hours)
Linked Lists - Linked stacks and queues - Doubly linked lists – Polynomial representation using linked lists, Garbage collection and Compaction.

Module IV (14 hours)

Module V (12 hours)
Sorting methods: Selection sort, Bubble sort, Insertion sort, Merge sort, Quick sort, Heap sort, Radix sort, External sorting methods.
## Reference Books

2. Rajesh K Shukla, *Data Structures Using C & C++*, Wiley India, New Delhi, 2009
CS010 404 SIGNALS AND COMMUNICATION SYSTEMS

Teaching scheme

| Credits: 4 |
| 3 hours lecture and 1 hour tutorial per week |

Objectives:

*To introduce the fundamentals of Analog and Digital Signals, their properties and introduce the relevant transforms used in Communication.*

*To familiarize the core ideas of Communication Engineering which in turn adds to the study of Computer Communication.*

Module 1 (15 hrs):

Introduction to Signals:- Continuous Time Signals- Discrete Time Signals- Signal Operations- Properties of Signals(Periodicity and Symmetry), Frequency Domain Representation of Continuous Time Signals-Continuous Time Fourier Series(CTFS)- Definition- properties- Examples, Continuous Time Fourier Transform(CTFT)- Definition- Properties – Examples- Concept of Frequency Spectrum, Sampling- The Sampling Theorem(proof not required)- Quantisation

Module 2 (12 hrs):


Communication Channels:- Twisted Pairs- Coaxial Cables- Fiber Optic Cables- Capacity of a Noisy Channel- Shannon Hartley Theorem

Module 3: (15 Hrs)

Modulation- Need for Modulation

Analog Modulation- Types of analog modulation- Amplitude Modulation, Frequency modulation, Phase modulation, Pulse Modulation Schemes- Pulse Amplitude modulation(PAM), Pulse Width Modulation(PWM), Pulse Position Modulation(PPM), Pulse Code Modulation(PCM), Delta modulation, Sample problems based on different modulation methods.

Digital modulation:- Amplitude Shift Keying(ASK), Frequency Shift keying(FSK), Phase Shift Keying(PSK), Quadrature Amplitude modulation (QAM), Differential Phase Shift Keying(DPSK)

Module 4: (8 Hrs)
Multiplexing:- Time Division Multiplexing (TDM), Frequency Division Multiplexing (FDM), Wavelength Division Multiplexing (WDM)

Switching:- Circuit, Packet and Message Switching Schemes, Case Study:- SONET (Basic ideas only)- Datagrams and virtual Circuits

Digital Transmission:- Analog to Digital Converter (ADC), Serial and parallel Transmission- Simplex, Half Duplex and Full Duplex Transmissions.

Module 5: (10 Hrs)

Error Correction and Detection:- Line Coding Schemes- Block Coding- Convolution Coding- Hamming Codes

Transmission Codes:- Different Character Codes- ASCII, EBCDIC, Baudot Code, Bar Coding, Parity Coding

Reference Books

5. William Stallings- *Data and Computer Communications* - Prentice Hall of India
6. Fred Halsall- Digital Communication, *Computer Networks and Open Systems* - Pearson Education
CS010405: Microprocessor Systems

Teaching scheme
3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives
- To impart the basic concepts of microprocessors and interfacing concepts.
- To develop an understanding about the assembly level programming.

Module I (10 hours)

Module II (12 hours)
Subroutines - Stack Operations - Call Return sequence- Programming Examples. Timing and control unit – The fetch operation – Machine cycle and T- State instruction and data flow. Address space partitioning - Memory mapped I/O - I/O mapped I/O.

Module III (14 hours)

Module IV (12 hours)
Data transfer schemes - Programmed data transfer - synchronous and asynchronous transfer - interrupt driven data transfer – DMA data transfer. Study of Interfacing ICs – 8257,8255 programmable peripheral interface (compare it with 8155).

Module V (12 hours)
Programmable interval timer 8253, 8251 ,Interfacing Keyboard and display devices, Hardware and Software approach – USART 8251. (interfacing chips functions and internal block diagram only).

Reference Books
1. Gaonkar -Microprocessor Architecture, Programming and Applications with the 8085 - New Age International
3. N K Srinath -8085 Microprocessors programming and interfacing - PHI
4. Adithya P. Mathur -Introduction to Microprocessors Systems - PHI
5. KK Tripathi, Rajesh K Gangwar -Microprocessor and its Applications -Acme learning
6. R.Theagarajan,S.Dhanasekaran,S.Dhanapal –Microprocessor and ITS Applications - New Age International
7. N Senthil Kumar,M saravanan,s.jeevananthan-Microprocessor and microcontrollers -Oxford higher education

CS 010 406: Theory of Computation
(Common with IT010 404)

Teaching scheme
3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives
- To impart the basic concepts of theory of automata, languages and computation.
- To develop understanding about machines for sequential computation, formal languages and grammars, and classification of feasible and intractable problems.

Module I (10 hours)
Proving techniques - Mathematical induction - Diagonalization principle - Pigeonhole principle - Functions - Primitive recursive and partial recursive functions - Computable and non computable functions - Formal representation of languages - Chomsky Classification.

Module II (13 hours)
Introduction to Automata theory - Definition of Automation - Finite Automata - Language acceptability by Finite Automata - Deterministic and Nondeterministic finite automation - Regular Expressions - Finite Automation with ε-Transitions - Conversion of NFA to DFA - Minimisation of DFA - DFA to Regular Expressions conversion - Pumping lemma for regular languages - Applications of finite automata - NFA with o/p (moore/mealy)

Module III (12 hours)
Context Free Grammar - Simplification of CFG - Normal forms - Chomsky Normal form and Greibach Normal form - Pumping lemma for Context free languages - Applications of PDA - Pushdown Automata - Formal definition - Language acceptability by PDA through empty stack and final state - Deterministic and nondeterministic PDA - designing of PDA

Module IV (13 hours)

Module V (12 hours)

### Reference Books

3. Harry R Lewis, Christos H Papadimitriou, *Elements of the theory of computation*, Pearson Education Asia,
CS010 407: Data Structures Lab

Teaching scheme
3 hours practical per week

Credits: 2

Objectives

- To provide experience on design, testing, and analysis of Algorithms and Data Structures.
- To acquaint the students with the Data Structures used in the Computer Science field.

1) Representation of Polynomials using Arrays and Linked List and the different operations that can be performed on Polynomials
2) Representation of Sparse Matrix using Arrays and Linked List and the different operations that can be performed on Sparse Matrices
3) Representation of Stacks using Arrays and Linked List and the different operations that can be performed on Stacks
4) Representation of Queues using Arrays and Linked List and the different operations that can be performed on Queues
5) Representation of Double Ended Queue using Arrays and Linked List and the different operations that can be performed on Double Ended Queue
6) Representation of Priority Queues using Arrays and Linked List and the different operations that can be performed on Priority Queues
7) Representation of Binary Trees using Arrays and Linked List and the different operations that can be performed on Binary Trees
8) Representation of Graphs using Arrays and Linked List and the different operations that can be performed on Graphs
9) Infix, Postfix and Prefix conversions.
10) Different Sorting and Searching methods.
11) String representation using Arrays and Linked List and different pattern matching algorithms
12) Implementation and operations on B-Tree and B+Tree

Any experiment according to the syllabus of CS010 403 can be substituted.
CS010 408(EC) ELECTRONIC CIRCUITS AND COMMUNICATION LAB

Teaching scheme

3 hours Practical per week

Objectives:

To provide an introduction to Electronic Circuits Design thereby giving a hands on experience on working with various Electronic Components, and Devices

PART 1 (Electronic Circuits):

1. Design of Two Stage RC Coupled Amplifiers
2. Design of FET Amplifiers
3. Design of Bootstrap Sweep Generators
4. Design of Astable, Monostable, and Bistable Multivibrators (3 experiments)
5. Design of Oscillators (RC Phase Shift Oscillator, Hartley Oscillator, Colpitt’s Oscillator – 3 experiments)

PART 2 (Communication Engineering):

1. Amplitude Modulation
2. Frequency Modulation
3. Delta Modulation
4. Pulse Amplitude Modulation (PAM)
5. Pulse Width Modulation (PWM)
6. Amplitude Shift Keying (ASK)
7. Phase Shift Keying (PSK)

Note: - A minimum of 5 experiments from each part must be done.

Reference Books:

1. Boylestead and Nashelky- Electronic Devices and Circuits- Prentice Hall of India
2. George Kennedy - Electronic Communication Systems - TMH
EN010501 B  Engineering Mathematics IV
(CS, IT)

Teaching scheme

2 hours lecture and 2 hour tutorial per week

Credits: 4

Objectives: To use basic numerical techniques for solving problems and to know the importance of learning theories in mathematics and in queueing system.

MODULE 1  Finite differences (12 hours)

Finite difference operators \( \Delta, \nabla, E, \mu \) - interpolation using Newton’s forward and backward formula – Newton’s divided difference formula - Numerical differentiation using Newton’s forward and backward formula – Numerical integration – Trapezoidal rule – Simpsons 1/3rd and 3/8th rule

MODULE 2  Z transforms (12 hours)

Definition of Z transforms – transform of polynomial function and trigonometric functions – shifting property, convolution property - inverse transformation – solution of 1st and 2nd order difference equations with constant coefficients using Z transforms.

MODULE 3  Discrete numeric functions (12 hours)


MODULE 4  Complex integration (12 hours)


MODULE 5  Queueing Theory (12 hours)

General concepts – Arrival pattern – service pattern – Queue disciplines – The Markovian model M/M/1/∞, M/M/1/N – steady state solutions – Little’s formula.

References

5. K Venkataraman- Numerical methods in science and Engg -National publishing co
6. V. Sundarapandian - probability, Statistics and Queueing theory - PHI
EN010 502(ME): Principles of Management
(Common with EN010 402(ME))

Teaching scheme
3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives
- To develop an understanding of different functional areas of management.
- To understand the functions and duties an individual should perform in an organisation.

Module I (12 hours)

Module II (12 hours)

Module III (12 hours)
Production management: Objectives and scope of production management- Functions of production department- production management frame work- product life cycle-Types of production- Production procedure- Project planning with CPM and PERT- Basic concepts in network.

Module IV (12 hours)
Cost Management: Elements of cost- Components of cost- Selling Price of a product.

Module V (12 hours)
Sales and Marketing Management: Sales management- Concept- Functions of sales department- Duties of sales engineer- Selling concept and Marketing concept- Marketing- Definition and principles of marketing- Marketing management and its functions- Sales forecasting- Pricing- Advertising- Sales promotion- Channels of distribution- Market research.

Text Books

Reference Books
1. Martand Telsang, Industrial Engineering and Production Management.

Syllabus - B.Tech. Mechanical Engineering
CS010 503: Database Management Systems  
(Common with IT010 506)

Teaching scheme
2 hours lecture and 2 hours tutorial per week

Credits: 4

Objectives
- To impart an introduction to the theory and practice of database systems.
- To develop basic knowledge on data modelling and design of efficient relations.
- To provide exposure to oracle database programming.

Module I (10 hours)
Basic Concepts - Purpose of Database Systems- 3 Schema Architecture and Data Independence- Components of DBMS –Data Models, Schemas and Instances-Data Modeling using the Entity Relationship Model-Entity types, Relationship Types, Weak Entity Types .

Module II (14 hours)
Relational Model Concepts –Constraints – Entity Integrity and Referential Integrity, Relational Algebra -Select, Project, Operations from Set Theory, Join, OuterJoin and Division - Tuple Relational Calculus. SQL- Data Definition with SQL - Insert, Delete and Update Statements in SQL, Defining Domains, Schemas and Constraints, Constraint Violations - Basic Queries in SQL - Select Statement, Use of Aggregate functions and Group Retrieval, Nested Queries, Correlated Queries – Views.

Module III (12 hours)

Module IV (11 hours)

Module V (13 hours)
Introduction to Transaction Processing- Transactions- ACID Properties of Transactions-Schedules- Serializability of Schedules- Precedence Graph- Concurrency Control – Locks and Timestamps-Database Recovery
Query processing and Optimization- Translating SQL Queries into a Relational Algebra Computing Select, Project and Join
Object Relational Databases-Distributed Databases-Different Types-Fragmentation and Replication Techniques-Functions of DDBMS.
Reference Books


Mahatma Gandhi University

CS010 504(EC) DIGITAL SIGNAL PROCESSING

Teaching scheme

3 hours lecture and 1 hour tutorial per week

Objectives:- To introduce the principles and core areas of Signal Processing, in a programmatic approach and explore the basic ideas on the applications of DSP in various fields of Science and Technology.

Module 1: (12 Hrs)


Module 2: (12 Hrs)


Module 3(13Hrs)


Module 4: (13 Hrs)


Module 5(10 Hrs)

Introduction to DSP Chips: - Basic Architecture of a DSP chip, Case Study: TMS 320, TigerSHARC Processors (Overview of Architecture and Features)

Applications of DSP:- Audio Signal Processing and Compression, Image Processing- JPEG Compression, Video Compression, Speech Processing and Recognition, Weather Forecasting, RADAR, (Brief idea only)

Text Books


Reference Books

CS010 505: Operating Systems
(Common with IT010 504)

Teaching scheme
3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives
- To understand the fundamental concepts and techniques of Operating Systems.
- To study the basic structure of Linux system.

Module I (8 hours)
Introduction: Operating System – Batch, Multiprogrammed, Time-sharing and Real time systems – Operating system structure – Operating system operations

Module II (12 hours)
Process Scheduling: Basic concepts – Preemptive scheduling, Dispatcher – Scheduling criteria – Scheduling algorithms – Multiple-processor scheduling.

Module III (16 hours)

Module IV (14 hours)
Memory Management: Resident Monitor – Dynamic loading – Swapping – Contiguous memory allocation – Paging – Basic, Multi-level Paging – Segmentation

Module V (10 hours)
Case study: Linux system.
### Reference Books

CS010 506: Advanced Microprocessors & Peripherals

Teaching scheme
3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives
- To understand the concepts related to advanced microprocessors.
- To study the basic technology of various peripherals.
- To have an overview of different types of communication buses and ports.

Module I (15 hours)

Module II (9 hours)
Additional features of 80286 – protected mode memory addressing – Additional features of 80386 – Paging mechanism (Flat memory model) – Additional features of Pentium Processors – Brief study of latest processors of Intel & AMD – Dual core processor(Brief idea only).
Note: Architecture not required for the processors discussed in this module.

Module III: Peripherals (11 hours)

Module IV: Storage Devices (15 hours)

Module V (10 hours)
### Reference Books

5. K.K Tripathi, Rajesh K Gangwar, “Microprocessor and Its Application”, Acme Learning, 2010
CS010 507 Database Lab

Teaching scheme
3 hours practical per week

Credits: 2

Objectives

- To acquaint the students with the implementation and fundamental algorithms of database systems.
- To provide experience on design, querying, and processing of data in a relational database.

I. Experiments to implement the following

1. Relational algebra operations select, project and join.
2. Determination of Attribute Closure, Candidate Key, Functional Dependency.
3. Checking Serializability of a Schedule.
4. Dynamic Hashing.

II. Experiments in any relational database for the following

2. Simple Queries, Nested Queries, Use of Arithmetic and String Functions.
4. Report Generation
5. ODBC/JDBC Interface.

Any experiment according to the syllabus of CS010 503 can be substituted.

Resources:
1 SQL, PL/SQL ”Ivan Bayross”, BPB Publication 3rd Ed.
CS010 508: Hardware and Microprocessors Lab

Teaching scheme
3 hours practical per week

Credits: 2

Objectives

- To acquaint the students with the implementation and fundamental algorithms of database systems.
- To provide experience on design, querying, and processing of data in a relational database.
- To familiarise the students with 8085, 8086, masm programming and various PC hardware components
- To provide experience on design, querying, and processing of data in a relational database.

Phase I

1. Familiarization of 8085 training Kit.
2. Simple programs using 8085 Kit.

Phase II

4. Simple programs in 8086 using MASM.

Phase III.

5. Familiarisation with PC Components.
6. Experiments based on various hardware components.
7. Experiments for communication with peripheral devices using C and MASM

NB: Students should do the experiments in all the phases. External examiner can conduct University Examinations on any of these phases.
CS010 601: Design And Analysis Of Algorithms
(Common with IT010 605)

Teaching scheme
2 hours lecture and 2 hours tutorial per week

Credits: 4

Objectives
• To develop an understanding about basic algorithms and different problem solving strategies.
• To improve creativeness and the confidence to solve non-conventional problems and expertise for analysing existing solutions.

Module I (13 hours)
Introduction and Complexity

Module II (11 hours)

Module III (14 hours)
Greedy Strategy - Control Abstraction, General Knapsack Problem, Minimum Cost Spanning Trees – PRIM’s Algorithm, Kruskal’s Algorithm, Job sequencing with deadlines.
Dynamic Programming - Principle of Optimality, Multistage Graph Problem, Forward Approach, Backward Approach, All-Pairs Shortest Paths, Traveling Salesman Problem.

Module IV (11 hours)
Backtracking – State Space Tree - Fixed Tuple and Variable Tuple Formulation - Control Abstraction – Generating Function and Bounding Function - Efficiency of the method - Monte Carlo Method – N-Queens Problem, Sum of Subsets.
Branch and Bound Techniques – FIFO, LIFO, and LC Control Abstractions, 15-puzzle.

Module V (11 hours)
Lower Bound Theory - Comparison Trees for Searching and Sorting, lower bound on comparison based algorithms, Sorting, Selection & Merging; Oracles and Adversary Arguments –Merging,Basic concepts of randomized algorithm-Las Vagas algorithm for search.

## Reference Books


CS010 602: Internet Computing

Teaching scheme
2 hours lecture and 2 hours tutorial per week

Credits: 4

Objectives
- To impart the basic concepts of Internet Computing and Java Programming
- To develop understanding about Internet Computing with the help of Java Platform and establishing network connections using Socket Programming

Module I (10 hours)

Module II (12 hours)

Module III (14 hours)

Module IV (13 hours)

Module V (11 hours)

Reference Books
8) Debasish Jana, *Java and Object Oriented Programming Paradigm*, Prentice Hall of India, New Delhi, 2005
CS010 603 SYSTEM SOFTWARE

Teaching scheme

3 hours lecture and 1 hour tutorial per week

Objectives:-

To introduce the techniques adopted in the design and implementation of System Software.

Module I (12 Hrs)

Introduction:-


Macro Preprocessor

Macro Instruction Definition and Invocation. Types of Macros – Parameterised macros, Nested macros, Recursive macros. Basic functions of Macro Preprocessor – Macro expansion, Generation of unique labels. Macro preprocessor design and Algorithm - Handling conditional Macro calls, Nested Macro calls and Recursive Macro calls.[Reference (1)] Case Study : The C Preprocessor [Web- Reference (1) ]

Module - II (15 Hrs)

Assembler


Module - III (12 Hrs)

Linker and Loader

Need for Linking and Loading : The absolute loader, Program Relocation, Relocating Loader, Linking external symbols. Algorithms for the two passes of a Linking Loader.[References (2),(3)] Variants of the basic model – Automatic Library Search, Linkage Editor, Dynamic Linking. [Reference(1)] Case study : UNIX ELF and Microsoft DLL (basic structure only).

Module - IV (11 Hrs)

Text Editors : Overview of Editing, User Interface, Editor Structure. [Reference (1)]

Case Study : VI Editor (Basic ideas only)[ Reference (1) ]

Debuggers : Debugging Functions and Capabilities, Relationship with other parts of the system, Debugging Methods- By Induction, Deduction and Backtracking,. [Reference (1) , (8)] Case Study : gdb (Basic ideas only)
Module - V (10 Hrs)

Device Driver: Device Characteristics, Design and anatomy, Types of device driver, General Design – Character Devices and character device drivers, Block Devices and Block device drivers. Case Study: Device Driver for the PC Speaker [References(4), (6),(7)]

REFERENCES:


5. IBM PC Assembly Language and Programming - Peter Abel Third Edition – Prentice Hall of India


WEB REFERENCE:


Note: separate subjects are provided in the syllabus in the Seventh and Fifth Semesters for the detailed discussion of the subjects marked [1] and [2] respectively.
CS010 604: Computer Networks

Teaching scheme
3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives
To develop basic knowledge on the mode of operation of different types of computer networks that are used to interconnect a distributed community of computers and various interfacing standards and protocols.

Module I (8 hours)
Network requirements, Network Architecture –layering and protocol, OSI Architecture, Internet Architecture, Performance-bandwidth and latency, Delay x bandwidth product, high speed networks.

Module II (10 hours)
Direct Link Network, Hardware Building Block, Framing-Byte Oriented Protocol, Bit Oriented Protocol, Clock Based Framing, Reliable Transmission-Stop and Wait, Sliding Window, Ethernet(802.3)-Physical properties, Access protocol, Wireless-Bluetooth, WiFi, Wimax

Module III (12 hours)
Packet Switching-Switching and Forwarding- Datagram, virtual circuit switching, Source routing Bridges and LAN Switches-Learning Bridges, Spanning tree Algorithms, Broadcast and Multicast, Limitations of bridges, Simple Internetworking-Service Model, Global Address, Datagram Forwarding in IP, address translation, Routing-network as graph, distance vector, link state, matrix

Module IV (16 hours)
End to End Protocol, Simple de-multiplexer, Reliable Byte stream, TCP-Issues, segment format, connection establishment and termination sliding window revisited, triggering transmission, adaptive retransmission, RPC-fundamentals, TCP Congestion control –additive increase, slow start, fast retransmit and fast recovery, congestion avoidance mechanism, DEC bit, Random Early Detection bit, Source Based Congestion avoidance

Module V (14 hours)
Applications -WWW, E-mail, Name Service, Network Management, Web Services Custom Application protocol, Generic Application Protocol, Overlay Networks-Peer to Peer Networks.

Reference Books
2. Introduction to data communication and networking Behrouz Forozan TMH.
3. Computer networks, Andrew S Tanenbaum, PHI
4. Data communication, computer networks and open systems, Halsall F, Addison Wesley.

CS010 605 SOFTWARE ENGINEERING

Teaching scheme

3 hours lecture and 1 hour tutorial per week

Objectives:

To familiarize the steps in designing a Computer Software System following the conventions in Engineering Design.

To introduce the fundamentals of Structured and Object Oriented Designs and Design Tools.

Module I (12 Hrs)


Module - II (12 Hrs)

Management: Functions - Project planning - Software productivity - Productivity metrics - Cost estimation - COCOMO & COCOMO II - Project control - Work breakdown structures, Gantt charts, PERT charts - Dealing with deviations - Team organization - centralized, de-centralized, mixed - An assessment of organizations - Risk management – Configuration Management. Introduction to project management and planning CASE tools.

Module - III (12 Hrs)


Module - IV (12 Hrs)

Design activity & its objectives – Function Oriented and Object Oriented Design-Modularization techniques - module structure and its representation, interface and information hiding, categories, specific techniques to accommodate change, stepwise refinement, top-down and bottom-up design - Handling anomalies. Case Study with UML and CASE Tool support.

Module - V (12 Hrs)

References

CS010 606L01: DISTRIBUTED SYSTEMS

Teaching scheme
2 hours lecture and 2 hours tutorial per week

Credits: 4

Objectives
- To impart an introduction to distributed systems and distributed computing.
- To develop basic knowledge on distribution of data and file systems in distributed environment.
- To provide exposure to distributed database concepts.

Module I (10 hours)
Introduction to Distributed Systems, evolution, characteristics, design issues, user requirements, Distributed computing models-workstation model, workstation-server model, processor–pool model. Protocols for distributed systems - VMTP and FLIP.

Module II (12 hours)

Module III (14 hours)

Module IV (12 hours)

Module V (12 hours)
Distributed Databases: Distributed DBMS architecture, distributed query processing, transactions, concurrency control, deadlock management and Distributed Database Recovery protocols-2PC, Network Partitioning.

Reference Books
4. Andrew S Tenenbaum, Distributed Operating Systems, Pearson Education Asia
CS010 606L02  Micro controller Based Systems
(Common with EE010 503 and EC010 502)

Teaching scheme
2 hours lecture and 2 hours tutorial per week

Credits: 4

Objectives
- To impart the basic concepts of microcontrollers and their programming in assembly language and in C.
- It also focused on the 8051 microcontroller which is a widely used microcontroller.

Pre-requisites: Microprocessor systems, Advanced microprocessor and peripherals

Module I (10 hours)

Module II (12 hours)
8051 programming in C-data types and time delay – I/O programming – logical operation – data conversation program – basics of serial communication connection to RS232- serial port programming in assembly and C.

Module III (14 hours)
Basics of interrupts,-interrupt sources- interrupt enable register-interrupt priority-interrupt control system-interrupt handling-single step operation- port bit latches and buffers-port structures and operation- accessing external memory.

Module IV (12 hours) Timer 0& -Timer1- T MOD SFR-mode0,mode 1,mode2,mode3- TCON SFR-serial interface-SCON SFR-mode0,mode 1,mode 2,mode3-block schematics-baud rates-power on reset circuit-ONCE mode-on chip oscillator-external program & data memory timing diagrams.

Module V (12 hours)
PIC microcontrollers: Overview and features-PIC16C6X/7X FSR-Reset action-PIC memory organization-instructions-addressing modes.
Reference Books

2. V Udayashankara, M S Mallikarjunaswamy , *8051 Microcontroller hardware & software application*, TMH
5. Satish Shah, *8051 microcontrollers MCS 51 family and its variants*, Oxford higher education
CS010 606L03: User Interface Design

Teaching scheme
2 hours lecture and 2 hours tutorial per week

Credits: 4

Objectives
- To impart the basic concepts of User Interface Design.
- To develop understanding about human computer interaction methods that utilize more general, widespread and easier-to-learn capabilities.

Module I (8 hours)
Introduction: Importance of user interface – definition, importance of good design, brief history – Graphical User Interface – Web User Interface – Theories, Principles and Guidelines of User interface design

Module II (10 hours)
Design Process: Obstacles in development path designing for people-Understanding Human Interaction with computers, Importance of Human Characteristics, Human consideration, Human Interaction speeds – Understanding Business function

Module III (15 hours)

Module IV (15 hours)

Module V (12 hours)

Reference Books
2. Ben Shneiderman, *Designing the User Interface*, 3rd Edn., Pearson Education Asia, Delhi, 2002
5. Alan Cooper, *The Essentials of User Interface Design*, Wiley Dreamtech, Delhi, 2002
CS010 606L04 : UNIX Shell Programming
(Common with IT010 606L03)

Teaching scheme

Credits: 4

2 hours lecture and 2 hour tutorial per week

Objectives

- To provide a fair knowledge of Unix concepts and gain sharp skills in Unix Shell programming

Module 1. (8 hours)
Introduction to Unix:- Architecture of Unix, Features of Unix, Basic Unix Commands - Unix Utilities:- Introduction to unix file system, vi editor, file handling utilities, security by file permissions, process utilities, disk utilities, networking commands - Text processing utilities and backup

Module 2. (13 hours)

Module 3. (12 hours)
grep:- Operation, grep Family, Searching for File Content.

sed:- Scripts, Operation, Addresses, commands, Applications, grep and sed.

awk:- Execution, Fields and Records, Scripts, Operations, Patterns, Actions, Associative Arrays, String Functions, Mathematical Functions, User Defined Functions, Using System commands in awk, Applications of awk, grep and sed

Module 4. (15 hours)

Shell Programming - Korn Shell, C Shell and BASH -
Basic Script concepts, Expressions, Decisions: Making Selections, Repetition, special Parameters and Variables, changing Positional Parameters, Argument Validation, Debugging Scripts, Script Examples.

Module 5. (12 hours)
Process management:- Creation, Hierarchies, Sending signals to processes, exec, termination, Zombie, waitpid etc - Network management:- tools, Client server mechanism, address resolution, ping, telnet, ftp, dn and squid – X Window System:- Overview, Architecture, starting and stopping X, X clients and display

Syllabus - B.Tech. Information Technology
Reference Books
3. Kernighan and Pike, “Unix programming environment”, PHI. / Pearson Education
4. Graham Glass, King Ables,” Unix for programmers and users”, 3rd edition, Pearson Education
CS010 606L05: Embedded Systems

Teaching scheme
2 hours lecture and 2 hours tutorial per week

Credits: 4

Objectives
- To impart the basic concepts of Embedded System and its applications
- To develop understanding about micro controllers and programming the micro controller for the development of Embedded systems.

Module I (-12 hours)

Module II (13 hours)
Application Specific Embedded System – Domain Specific Embedded System, Designing Embedded Systems with 8bit Microcontrollers- Factors to be considered in selecting a Controller- Designing with 8051 microcontroller- 8052 microcontroller, Programming the 8051 microcontroller – Addressing modes of 8051 – the 8051 Instruction set

Module III (13 hours)

Module IV (12 hours)

Module V (10 hours)
### Reference Books

CS010 606L06: Advanced Software Environments

Teaching scheme
2 hours lecture and 2 hours tutorial per week

Credits: 4

Objectives
- To impart the basic concepts of Windows programming.
- To develop understanding about the new software environment and develop of software to meet the growing demand of the industry.

Pre-requisites: Knowledge required to study this subject (OOP concepts)

Module I (10 hours)

Module II (10 hours)

Module III (13 hours)

Module IV (13 hours)

Module V (14 hours)

Reference Books
CS010 607: Operating Systems Lab

Teaching scheme
3 hours practical per week

Credits: 2

Objectives
- To provide a practical exposure of all algorithms and behaviour of processes in the system with respect to all its timings.
- This lab also explains the allocation of process in the memory with some memory management techniques.

(Implement the following on LINUX platform. Use C for high level language implementation)

1. Basic UNIX commands

2. Shell programming
   - Command syntax
   - Write simple functions with basic tests, loops, patterns

3. Write programs using the following system calls of UNIX operating system:
   - fork, exec, getpid, exit, wait, close, stat, opendir, readdir

4. Write programs using the I/O system calls of UNIX operating system (open, read, write, etc

5. Write C programs to simulate UNIX commands like ls, grep, etc.

6. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for FCFS and SJF. For each of the scheduling policies, compute and print the average waiting time and average turnaround time

7. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for Priority and Round robin. For each of the scheduling policies, compute and print the average waiting time and average turnaround time

8. Implement the Producer – Consumer problem using semaphores.

9. Implement inter-process communication using shared memory.

10. Implement some memory management schemes

Example for expt 10:

Free space is maintained as a linked list of nodes with each node having the starting byte address and the ending byte address of a free block. Each memory request consists of the process-id and the amount of storage space required in bytes. Allocated memory space is again maintained as a linked list of nodes with each node having the process-id, starting byte address and the ending byte address of the allocated space.

When a process finishes (taken as input) the appropriate node from the allocated list should be deleted and this free disk space should be added to the free space list. [Care should be taken to merge contiguous free blocks into one single block. This results in deleting more than one node from the free space list and changing the start and end address in the appropriate node]. For allocation use first fit, worst fit and best fit.
CS010 608 Mini Project

Teaching scheme
3 hours practical per week

Credits: 2

Objectives

- To estimate the ability of the student in transforming the theoretical knowledge studied so far into application software.
- For enabling the students to gain experience in organisation and implementation of a small project and thus acquire the necessary confidence to carry out main project in the final year.
- To understand and gain the knowledge of software engineering practices, so as to participate and manage large software engineering projects in future.

In this practical course, each group consisting of two/three members (four in special cases) is expected to design and develop practical solutions to real life problems related to industry, institutions and computer science research. Software life cycle should be followed during the development. The theoretical knowledge, principles and practices gained from various subjects should be applied to develop effective solutions to various computing problems. The knowledge gained during various practical subjects to work with various software tools, Designing tools, programming languages, operating systems, etc. should be utilized in various stages of development. Structured/Object Oriented design techniques may be used for the project. Software Requirements Specification (SRS), Modeling Techniques, Design and Testing strategies should be documented properly.

A committee consisting of minimum three faculty members will perform the internal assessment of the mini project. A report on mini project should be submitted for evaluation and project work should be presented and demonstrated before the panel of examiners.

<table>
<thead>
<tr>
<th>Internal Continuous Assessment (50 marks)</th>
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<tbody>
<tr>
<td>40% - Design and development (30% by guide and 10% by committee)</td>
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<tr>
<td>30% - Final result and Demonstration (15% by guide and 15% by committee)</td>
</tr>
<tr>
<td>20% - Report (10% by guide and 10% by committee)</td>
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<tr>
<td>10% - Regularity in the class (by guide)</td>
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<table>
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<tr>
<th>End Semester Examination (Maximum Marks-100)</th>
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<tbody>
<tr>
<td>20% - Demonstration of mini project</td>
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<tr>
<td>50% - Practical test connected with mini project</td>
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<tr>
<td>20% - Viva voce</td>
</tr>
<tr>
<td>10% - Project report</td>
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CS010 701: Web Technologies

Objectives
- To impart the new concepts in Web Technologies
- To develop understanding about the different technologies used in the World Wide Web including XML, Perl,

Module I (15hours)

XHTML

Cascading Style Sheets
Introduction to CSS – Levels of Style Sheets- Style Specification Formats- Selector Forms- Property Value Forms – Font Properties- List Properties – Color- Alignment of Text – Background Images- Span and Div Tags.

Module II (12 hours)

XML

Module III (12hours)

Perl

Module IV (12 hours)

PHP
Origin and Use of PHP- Overview of PHP- General Syntactic Characteristics-Operations and Expressions- Control Statements- Arrays- Functions-Pattern Matching- Form Handling- Files-Cookies-Session Tracking - Simple programs in PHP.

Module V (9 hours)

Rails
Overview of Rails- Document Requests- Processing Forms- Rails Application with Databases – Layouts.

Credits: 4
2 hours lecture and 2 hours tutorial per week
Ajax
Overview of Ajax – Basics of Ajax – Rails with Ajax.

Reference Books

CS010 702: COMPILER CONSTRUCTION

Teaching scheme
2 hours lecture and 2 hours tutorial per week

Credits: 4

1.) • To introduce the various techniques involved in the translation of source programs into object programs by a compiler.
2.) • To understand the inner working of a compiler using the various data structures used in the translation process.

Module 1 (12Hrs)


Module 2 (12 Hrs)

Syntax analyzer - Role of syntax analyzer - Review of context free grammar - derivation and parse trees - Basic parsing approaches - Top down parsing - Recursive Descent parsing - LL(1) parsing - Bottom up parsing - Shift reduce parsing - Operator precedence parsing - LR parsing - Simple LR, Canonical LR and LALR parsers - Design of syntax analyzer using YACC

Module 3 (12 Hrs)

Semantic analysis - Need for semantic analysis - Syntax directed definitions - S attributed definitions - L attributed definitions - Translation schemes - Type system and Type checking - Design of a simple type checker

Storage Management - Memory allocation strategies (static, stack and heap allocations) - Memory allocation in block structured languages - Accessing local and non local data - Array allocation and access - Procedure calls - Parameter passing methods - Runtime stack and storage management

Module 4 (12 Hrs)

Synthesis phase - Intermediate Code Generation (ICG) - Need for ICG - IC Formats - 3 Address code - Triples and quadruples

Code optimization - Need for code optimizer - Basic blocks and program flow graph - Machine dependent and machine independent optimizations - Optimization transformations - Local and global optimizations

Module 5 (12 Hrs)

Code Generation - Basic issues in code generation - Data descriptors - Expression trees - Generating target code from expression trees - Symbol table handling - Symbol table requirements and organization - Error handling - Types of errors - Compile time errors and recovery - Runtime errors - Runtime Error Handling - Cross Compilers and Incremental Compilers (Brief idea only)
Reference Books

1.) Aho A Ravi Sethi and J D Ullman, Compilers Principles Techniques and Tools, Addison Wesley
3.) D M Dhamdhare, System programming and operating system, Tata McGraw Hill & Company
4.) Tremblay and Sorenson, The Theory and Practice of Compiler Writing - Tata McGraw Hill & Company
CS010 703: COMPUTER GRAPHICS

Objectives:-

To understand the basic concepts of Computer Graphics & display techniques.

Module I (3 Hrs)


Module II (10 Hrs)


Module III (12 Hrs)

3D Graphics: 3D Transformations, 3D display methods, 3D Object Representation – Polygon Surfaces – Curved lines and surfaces-Quadric surfaces – Spline Representations – Cubic Spline Interpolation Methods-Bezier Curves and Surfaces – B-Spline Curves and Surfaces, Sweep representation,Octrees.[1]

Module IV (10 Hrs)

3D Rendering: Three-Dimensional Viewing – Projections [3], Visible Surface Detection – Classification of Visible surface detection algorithms – Back-face Detection, Depth- Buffer Method, Scan-line Method. [1,3]

Module V (10 Hrs)

Rendering: Surface Rendering Methods- Basic illumination Models – Polygon–rendering Methods,Interpolative shading methods-Constant shading, Gouraud shading,Phong shading, Texture Mapping.[3]

Fractal Geometry Methods – Classification of Fractals – Self-Squaring Fractals, Ray Tracing and Ray Casting.[1]
REFERENCES:

1. Computer Graphics (C version) - Donald Hearn & Pauline Baker (Pearson Education Asia)
**CS010 704 : Object Oriented Modeling and Design**

**Teaching scheme**

2 hours lecture and 1 hour tutorial per week

**Credits:** 3

**Objective**

- To impart ideas on building systems through the object oriented modelling approach using the Unified Modelling Language.

**Module 1** (10 hours)


**Module 2** (10 hours)

**Dynamic modeling:** Events and states – Operations – Nested state diagrams – Concurrency – Advanced dynamic modeling concepts – A sample dynamic model – Relationship of Object and Dynamic models.


**Module 3** (10 hours)

**Analysis:** Analysis in object modeling, dynamic modeling and functional modeling, Adding operations- Iterating the analysis

**System Design:** Breaking system into subsystems - Identifying concurrency-allocating subsystems to processors and tasks, managing of data stores. Handling of global resources- handling boundary conditions-Common Architectural Frameworks

**Module 4** (8 hours)

**Object Design:** Overview of Object design – Combining the three models – Designing algorithms – Design optimization – Implementation of control – Adjustment of inheritance - Design of association – Object representation – Physical packaging – Documenting design decisions-Comparison of methodologies

**Module 5** (7 hours)

**Unified Modeling language:** Introduction, UML Diagrams – Class diagrams, Sequence diagrams, Object diagrams, Deployment diagrams, Use case diagrams, State diagrams, Activity diagram, Component diagrams – Case Study.
**Reference Book**

1. Object Oriented Modeling and Design - James Rumbaugh, Prentice Hall India
2. UML Distilled – Martin Fowler, Addison Wesley
4. Object Oriented Analysis and Design with Applications - Grady Booch, Pearson Education Asia
CS010 705: PRINCIPLES OF PROGRAMMING LANGUAGES

Teaching scheme

2 hours lecture and 1 hour tutorial per week.

Objectives

- **To provide an overview of the key paradigms used in developing modern programming languages.**
- **To explore the implementation details of languages to provide an understanding of the source program and its execution behavior.**

Module I (9 Hours)

**Introduction** – Role of programming languages - Programming domains - Language evaluation criteria - Influence on language design - Implementation methods - Virtual computers - Bindings - Concept of binding.

Module II (9 Hours)

**Data types** - Implementation of data types - Primitive, User defined – Names – Variables - Type checking - Strong Typing - Type compatibility - Scope – Lifetime - Referencing environments - Named constants – Virtualization - Heap management.

Module III (8 Hours)

**Expressions , Assignments and Control Structures** – Arithmetic expressions – Assignment statements-Compound statements - Selection statements - Iterative statements – Unconditional branching – Guarded commands.

Module IV (10 Hours)


Module V (9 Hours)

**Implementation of Subprograms** – General semantics of calls & returns- Activation Records – Blocks – Recursion

References


CS010 706L01 : Real Time Systems
(Common to IT010 706L04 Real Time Systems)

Teaching scheme
2 hours lecture and 2 hour tutorial per week

Credits: 4

Objectives
• to learn, real-time operating systems, task scheduling, communication, fault tolerant techniques and, programming languages

Module 1 (12 hours)
Introduction to Real Time Systems: Structure of real time systems, real time computer, task classes – Periodic, Aperiodic, critical, Non-critical, definition of real time systems – real time systems, embedded systems - Hard real time systems, soft real time systems, real time design issues.

Module 2 (12 hours)

Module 3 (12 hours)
Communication – Communication Media and message sending topologies, network architecture issues, protocols – contention – based, token - based, stop and go multi loop, polled bus, hierarchal round robin, fault tolerant routing – clocks and synchronization– fault tolerant synchronization in hardware, synchronization in software.

Module 4 (12 hours)
Fault tolerance – definition, cause of failure, fault types, fault detection and containment, redundancy – hardware, software, time, information, integrated failure handling. Reliability Evaluation techniques- Obtaining parameter values, Reliability models for Hardware redundancy, software error models.

Module 5 (12 hours)
Programming Languages and Real Time databases – Desired language characteristics, Data Typing, Control Structures. Real time databases, characteristics, main memory databases, Transaction, Disk schedule algorithms, Databases for hard real time systems, maintaining serialization constituency.

Syllabus- B.Tech. Computer Science & Engg
References

2. Real Time Systems- Jane W.S. Liu (Pearson)
CS010 706L02: DATA MINING AND DATA WAREHOUSING

Teaching scheme  
2 hours lecture and 2 hours tutorial per week

Credits: 4

Objectives
- To impart an introduction to Data Mining.
- To develop basic knowledge of how data is transformed to Data Warehouses.

Module I (12 hours)

Data Mining- Data Mining Functionalities-Classification of Data Mining Systems-Data Mining Task Primitives- Major Issues in Data Mining
Data Preprocessing- Descriptive Data Summarization- Data Cleaning- Data Integration and Transformation- Data Reduction- Data Discretization and Concept Hierarchy Generation

Module II (14 hours)

Data Warehouse- A Multidimensional Data Model- Data Warehouse Architecture- Data Warehouse Implementation
Data Cube Computation and Data Generalization- Efficient methods for Data Cube Computation- Data Cube and OLAP Technology- Attribute Oriented Induction

Module III (10 hours)

Mining Frequent Patterns- Associations- Correlations-Basic Concepts-Efficient and Scalable Frequent Itemset Mining methods- Mining various kinds of Association Rules- From Association Mining to Correlation Analysis- Constraint Based Association Mining.

Module IV (12 hours)

Classification and Prediction- Issues regarding Classification and Prediction- Classification by Decision Tree Induction- Bayesian Classification – Rule Based Classification- Classification by Backpropagation- Support Vector Machines- Classification by Association Rule Analysis- Learning from Neighbors- Prediction- Accuracy and Error measures- Evaluating the accuracy of a Predictor- Ensemble methods- Model Selection.

Module V (12 hours)

Cluster Analysis- Types of Data in Cluster Analysis- Catagorization of Major Clustering methods- Partitioning methods- Hierarchical methods- Density based methods- Grid based methods- Model based Clustering methods- Clustering High Dimensional Data- Constraint based Cluster Analysis- Outlier analysis

Reference Books
1) Jiawei Han, Micheline Kamber, Data Mining Concepts and Techniques, 2nd edn., Elsevier New Delhi 2010
3) Pieter Adriaans, Dolf Zantinge, Data Mining, Pearson Education Ltd., New Delhi, 2008
4) Thomas W Miller, Data and Text Mining, A Business Applications Approach, Pearson Education Ltd., New Delhi, 2008
5) Galit Shmueli, Nitin R. Patel, Peter C. Bruce, Data Mining for Business Intelligence, Wiley India Pvt. Ltd., New Delhi 2009.
CS010 706L03: Operating System Kernel Design
(common to IT010 706L05 Operating System Kernel Design)

Teaching scheme
2 hours lecture and 2 hours tutorial per week

Credits: 4

Objectives
• To provide knowledge about the operating system working principles.
• To discuss most of the significant data structures and algorithms used in the kernel.

Module I (13 hours)

Module II (13 hours)

Module III (10 hours)

Module IV (14 hours)
Overview of the Unix File System - The Virtual File System - role of the VFS - VFS Data Structures – File system Mounting. The Ext2 File system - Disk Data Structures - Creating the File system - Data Blocks Addressing - Allocating a Data Block.

Module V (10 hours)

Reference Books
1) Daniel P. Bovet, Marco Cesati, Understanding the Linux Kernel, First ed., O'Reilly, 2000
CS010 706L04 : Digital image processing

Teaching scheme
2 hours lecture and 2 hour tutorial per week

Credits: 4

Objectives

• To learn the image fundamentals and mathematical transforms necessary for image processing.
• To learn the image enhancement techniques and image restoration procedures.
• To learn the image segmentation and representation techniques.

Module I (14 hours)

Digital image representation: Elements of digital image processing systems - Image digitizers & scanners - Elements of visual perception - Brightness & contrast - colour perception & processing - pixel based transformation – geometric transformation – image file formats

Image sampling & Quantization: Two dimensional Sampling theorem - Reconstruction of image from its samples – Aliasing

Module II (14 hours)

Image Transforms: Two dimensional DFT & its properties - Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar, Slant, and Karhunen – Loeve transforms

Module III (10 hours)


Module IV (12 hours)

Image Restoration: Degradation model – Diagonalization of circulant matrices - Inverse filtering - Wiener filter methods – Constrained least mean square filtering

Image Coding & Compression: basic principles Image compression: Run length coding , predictive coding ,Basics of Image compression standards:

Module V (10 hours)

References

2. Dutta Majumdar - *Digital Image Processing and Applications*, PHI
CS010 706L05: DATA PROCESSING AND FILE STRUCTURES

Teaching scheme

Credits: 4

2 hours lecture and 2 hour tutorial per week

Objectives

- To develop an understanding about basic concepts of data processing in mainframe system.
- To enable the students to learn the detailed features of COBOL, database concepts.

Module I (10 hours)

Introduction to mainframe system

Introduction—Evolution of Mainframe Systems, Introduction to COBOL & JCL, COBOL/JCL Relation ,Compiling and Linking Programs in Mainframes, VSAM—VSAM Data Sets—Mainframes Operating Systems(overview), z/OS , OS/2 , MVS --Features

Module II (14 hours)

Programming Concept

Mainframe Programming—Introduction to COBOL, Structure of COBOL Programs, COBOL words, Identification and Environment Division, Configuration Section, Input-output Section, Data Division, Level Structure— File section, Assign to clause, Working Storage section-Editing, Special-names paragraph, Usage clause—Synchronized, Justified, Redefines, Renames clauses

Module III (11 hours)

Data Processing Concept

Procedure division—Data movement, Arithmetic, Sequence control, Input/Output Conditional verbs, Group moves, Compute verb, Conditions, Table handling, Occur clause—Perform verb, Set verb, Writing simple COBOL programs

Module IV (14 hours)

File Handling in Mainframes

File types — Sequential, Direct, Indexed files, Using Files in COBOL Programs, File Manipulation Verbs, JCL Basics—Writing to disk, DSN, DISP, Unit, Space, DCB Parameters, Job statement and Parameters –Positional and keyword Parameters, EXEC statement, EXEC Parameters, Concept of Compile and Run JCL s.

Module V (11 hours)

DataBase Concepts

Introduction to DB2—Relational DBMS Concept, Writing DB2/COBOL programs, Compilation and Binding of DB2 Programs, Concepts of DBRM, Bind JCL, Introduction
to CICS – Case study (library information system in COBOL/JCL/DB2—to be taken along with all modules as example )

Reference Books

CS010 706L06 CLIENT SERVER ARCHITECTURE AND APPLICATIONS

Teaching scheme
2 hours lecture and 2 hour tutorial per week

Credits: 4

Objectives
- To impart an introduction Client-Server system.
- To develop basic knowledge on securing Client-Server system.
- To have exposure to applications of Client-Server system.

Pre-requisites: Computer Networks and Operating Systems

Module I (10 hours)

Module II (12 hours)
Design: Fundamentals of client server design - Managing the interaction of client and server - Communications Techniques protocols & Client server interaction protocols - Preparing applications for client server - Optimizing applications for client server - Example client server implementations - Request acceptance dispatching - Execution of requests - Client server interaction using message.

Module III (14 hours)
Multitasking: Multi programming vs multitasking - Processor - Advantages and draw backs of multiple processor - Child and parent processor - Case study Novell Netware and Windows NT - Developing server applications - Threads - Server communication model.

Module IV (12 hours)
Synchronization: Scheduling implementations - processing queues - context switching pre-emptive systems - critical sections - mutual exclusion - semaphores – semaphore implementations in NT & Netware

Module V (12 hours)
Communications: Network communication - Inter process communication - Building portable client server applications - Introduction to Client/server security concepts- Secure client/server communications – password security at system level and application level

Reference Books
4. W.H.Inman,”Developing Client Server Applications”, BPB
CS010 707: Systems Programming Lab

Teaching scheme
3 hours practical per week

Credits: 2

Objectives

- To familiarize the design of all phases of compilers up to a stage of intermediate code generation.
- To enable the students to design and implement modern compilers for any environment.

Section 1 (Compiler Design)
1. Design of a Lexical Analyzer using Finite Automation (including Symbol table)
   (The program should be designed for a specific number of keywords, identifiers, numbers, operators, punctuators etc. Finite automata should be designed for each type of token)
2. Design of lexical analyzer using LEX
3. Design of recursive descent and LL (1) parsers (including syntax tree)
   (The programme should be designed for a subset of PL features (For example Arithmetic expressions with operators +, -, *, /, ↑ etc)
4. Implementation of Operator precedence Parsing (including syntax tree)
5. Design of parser for arithmetic expressions using YACC
6. Design of a simple type checker (For eg for the primitive types of C)
7. Generation of IC for arithmetic expressions
8. Simple code optimization strategies (For example Constant folding, Loop invariant elimination, common sub expression elimination etc)
9. Design of a code generator for arithmetic expressions using Expression tree
   (The program should take a set of IC as the input and produce the target code for some machine such as Intel 8086 Microprocessor)
10. Writing a simple Compiler for a subset of Language features

Section 2:-
1. Design of 2-Pass Assembler (The Program should be designed for the generation for machine code of any simple processor such as Intel 8005)
2. Design of Absolute Loader
3. Design of Macro Pre-processor (The program should be designed for a simple preprocessor such as the # define in C)
4 Design of Device Drivers (Implementation of Simple Device Drivers such as one for the PC Speaker.)

Remark:

At Least 8 experiments from Section 1 and 2 experiments from section
CS010 708: Networking Lab

Teaching scheme
3 hours practical per week

Credits: 2

Objectives

- To provide experience on design, testing, and analysis of Java Programs.
- To acquaint the students with the Networking Protocols and Communication using ports and sockets.

1) Basic Java Programming
2) Programs to create Applets
3) Programs to create Graphic User Interfaces
4) Programs to implement Client and Server Sockets
5) Programs for Chatting using TCP and UDP
6) Programs for Remote Procedure Call
7) Programs for Remote Method Invocation
8) Programs to interface with XML
9) Programs to implement Sliding Window Protocols
10) Programs for Multicasting
11) Programs to interface with Databases
12) Programs for Image Processing
13) Programs in Perl and PHP
14) Programs to create Dynamic Web Pages

Any experiment according to the syllabus of CS010 602 Internet Computing, CS010604 Computer Networks, CS010701 Web Technologies may be substituted subjected to permission from competent authority.
CS 010 709 Seminar

Teaching scheme

2 hours practical per week

The seminar power point presentation shall be fundamentals oriented and advanced topics in the appropriate branch of engineering with references of minimum seven latest international journal papers having high impact factor.

Each presentation is to be planned for duration of 25 minutes including a question answer session of five to ten minutes.

The student’s internal marks for seminar will be out of 50. The marks will be awarded based on the presentation of the seminar by the students before an evaluation committee consists of a minimum of 4 faculty members. Apportioning of the marks towards various aspects of seminar (extent of literature survey, presentation skill, communication skill, etc.) may be decided by the seminar evaluation committee.

A bona fide report on seminar shall be submitted at the end of the semester. This report shall include, in addition to the presentation materials, all relevant supplementary materials along with detailed answers to all the questions asked/clarifications sought during presentation. All references must be given toward the end of the report. The seminar report should also be submitted for the viva-voce examination at the end of eighth semester.

For Seminar, the minimum for a pass shall be 50% of the total marks assigned to the seminar.
Project work, in general, means design and development of a system with clearly specified objectives. The project is intended to be a challenge to intellectual and innovative abilities and to give students the opportunity to synthesize and apply the knowledge and analytical skills learned in the different disciplines.

The project shall be a prototype; backed by analysis and simulation etc. No project can be deemed to be complete without having an assessment of the extent to which the objectives are met. This is to be done through proper test and evaluation, in the case of developmental work, or through proper reviews in the case of experimental investigations.

- The project work has to be started in the seventh semester and to be continued on to eighth semester.
- Project work is to be done by student groups. Maximum of four students only are permitted in any one group.
- Projects are expected to be proposed by the students. They may also be proposed by faculty member (Guide) or jointly by student and faculty member.
- Students are expected to finalise project themes/titles with the assistance of an identified faculty member as project guide during the first week of the seventh semester.

The progress from concept to final implementation and testing, through problem definition and the selection of alternative solutions is monitored. Students build self confidence, demonstrate independence, and develop professionalism by successfully completing the project.

Each student shall maintain a project work book. At the beginning of the project, students are required to submit a project plan in the project book. The plan should not exceed 600 words but should cover the following matters.

- Relevance of the project proposed
- Literature survey
- Objectives
- Statement of how the objectives are to be tackled
Time schedule
Cost estimate

These proposals are to be screened by the evaluation committee (EC- minimum of 3 faculty members including the guide) constituted by the head of department, which will include a Chairman and the EC will evaluates the suitability and feasibility of the project proposal. The EC can accept, accept with modification, request a resubmission, or reject a project proposal.

Every activity done as part of project work is to be recorded in the project book, as and when it is done. Project guide shall go through these records periodically, and give suggestions/comments in writing in the same book.

The students have to submit an interim report, along with project work book showing details of the work carried out by him/her and a power point presentation at the end of the 7th semester to EC. The EC can accept, accept with modification, request a resubmission, or extension of the project.

The student’s internal marks for project will be out of 50, in which 30 marks will be based on day to day performance assessed by the guide. Balance 20 marks will be awarded based on the presentation of the project by the students before an evaluation committee consists of a minimum of 3 faculty members including the guide.

For Project, the minimum for a pass shall be 50% of the total marks assigned to the Project work.
CS010 801 : HIGH PERFORMANCE COMPUTING

Teaching scheme
3 hours lecture and 2 hour tutorial per week

Credits: 4

Objectives
- To design a powerful and cost-effective computer system.
- To provide the basic concepts of parallel processing on high performance computers.

Module I (15 hours)
Introduction to parallel processing - Trends towards parallel processing - Parallelism in uniprocessor - Parallel computer structures - Architecture classification schemes, Amdahl’s law, Indian contribution to parallel processing

Module II (15 hours)
Principles of pipelining and vector processing - Linear pipelining - Classification of pipeline processors - General pipelines - Instruction and Arithmetic pipelines - Design of Pipelined instruction unit - Principles of Designing Pipeline Processors - Instruction prefetch and branch handling - Data Buffering and Busing Structure - Internal forwarding and register tagging - Hazard detection and Resolution, Dynamic pipelines and Reconfigurability

Module III (15 hours)
Array processors - SIMD array processors - Interconnection networks - Static vs dynamic networks - mesh connected networks - Cube interconnection networks - Parallel algorithms for array processors - SIMD matrix multiplication - Parallel sorting on array processors - Associative array processing - Memory organization.

Module IV (15 hours)
Multiprocessor architectures and Programming - Loosely coupled and Tightly coupled multiprocessors - Interconnection networks - Language features to exploit parallelism - Inter process communication mechanism - Process synchronisation mechanisms, synchronization with semaphores.

Module V (15 hours)
Dataflow computers - Data driven computing and Languages, Data flow computers architectures - Static data flow computer, Dynamic data flow computer, Data flow design alternatives.
References:

3. Elements of Parallel computing - V. Rajaraman - PHI
CS010 802: ARTIFICIAL INTELLIGENCE

Teaching scheme
2 hours lecture and 2 hour tutorial per week

Credits: 4

Objectives

- To provide introduction to the basic knowledge representation, problem solving, and learning methods of Artificial Intelligence.
- To familiarize with Fuzzy Logic and knowledge processing in expert systems
- To give exposure to problem solving in AI using Python

Module 1 (14 hours)


Python- Introduction to Python- Lists Dictionaries & Tuples in Python- Python implementation of Hill Climbing

Module 2 (12 hours)


Module 3 (12 hours)

Knowledge representation - Using Predicate logic- representing facts in logic, functions and predicates, Conversion to clause form, Resolution in propositional logic, Resolution in predicate logic, Unification, Question Answering, forward and backward chaining.

Module 4 (12 hours)


Module 5 (10 hours)


**References**

1. Elaine Rich, Kevin Knight, Shivashankar B Nair  
3. George F Luger - Artificial Intelligence, Pearson Education Asia

**Web Reference**

CS010 803: Security in Computing

Teaching scheme Credits: 4
2 hours lecture and 2 hours tutorial per week

Objectives
• To impart an essential study of computer security issues
• To develop basic knowledge on cryptography
• To impart an essential study of various security mechanisms

Module 1 (12 hours)

Module 2 (12 hours)
Modern Block Ciphers - Fiestel Networks, DES Algorithm – Avalanche Effect.
Introduction to Number Theory - Prime Factorisation, Fermat's Theorem, Euler's Theorem, Primitive Roots, Discrete Logarithms.

Module 3 (12 hours)

Module 4 (12 hours)

Module 5 (12 hours)
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CS010 804L01: E-COMMERCE

**Teaching scheme**

2 hours lecture and 2 hours tutorial per week

**Objectives**

- To impart an introduction to Electronic Commerce.
- To develop basic knowledge of Business in Internet and Electronic Payment.

**Module I (12 hours)**


**Module II (14 hours)**


*Consumer Oriented Electronic Commerce:* Consumer Oriented Applications, Mercantile Process Models, Mercantile Models from the Consumer’s Perspective, Mercantile Models from the Merchant’s Perspective

**Module III (10 hours)**

*Electronic Payment Systems:* Types of Electronic Payment Systems, Digital Token Based Electronic Payment System, Smart Cards, Credit Cards, Risk in Electronic Payment Systems, Designing Electronic Payment Systems.

**Module IV (12 hours)**


**Module V (12 hours)**


**Reference Books**


3) P. T. Joseph, E-Commerce An Indian Perspective, PHI Learning Private Limited, New Delhi, 2009
CS010 804L02: GRID COMPUTING
( Common to IT010 804L06: Grid Computing )

Teaching scheme

Credits: 4

2 hours lecture and 2 hours tutorial per week

Objectives

- To impart an introduction to Grid Computing.
- To develop basic knowledge about the Open Grid Service Architecture.

Module I (12 hours)


Module II (12 hours)


Module III (12 hours)

Merging the Grid Services Architecture- Service Oriented Architecture- Web Service Architecture- XML relevance to Web Services- Service Message Description Mechanisms- Relationship between Web Service and Grid Service.

Module IV (12 hours)


Module V (12 hours)


Reference Books

CS010 804L03: Bioinformatics

Teaching scheme                  Credits: 4
2 hours lecture and 2 hour tutorial per week

Objectives

- To understand the science of storing, extracting, organizing, analysing and interpreting biological data.

Module 1 (12 hours)
Basic Concepts of Molecular Biology: Cells - Chromosomes, DNA, RNA, Proteins, Central dogma of molecular biology, RNA classification – coding and non coding RNA- 
mRNA, tRNA, miRNA and sRNA, Genomes and Genes - Genetic code, ORFs, Slice variants, Transcription, Translation and Protein synthesis.

Module 2 (12 hours)
Sequence alignments – local/global, pairwise/multiple Sequence alignment - Smith-Waterman algorithm, Needleman-Wunch algorithm, Multiple sequence alignment – Sum-of-Pairs measure - Star and tree alignments, Scoring matrices: basic concept of a scoring matrix, Matrices for nucleic acid and proteins sequences, PAM and BLOSUM, Phylogenetic Trees

Module 3 (12 hours)

Module 4 (12 hours)
Evolution of Protein Structures, Classification of Protein Structures- primary, secondary, ternary and quaternary, Protein Structure prediction and modeling, Assignment of protein structures to genomes, Prediction of protein function, Protein folding problem, Protein Threading, Drug discovery and development

Module 5 (12 hours)
Biological data bases: Pubmed, Swissport, EMBL, DDBJ, Genbank, Software Tools: Use of Tools for basic and specialized sequence processing such as: BLAST, FASTA, RasMol, Phylip, ClustalW

Syllabus- B.Tech. Computer Science & Engg
References

5. Zoe Lacroix, Terence Critchlow “Bioinformatics managing scientific Data”, Morgan Koufmann Publishers
CS010 804L04 : Optimization Techniques

Teaching Schemes
2 hours lecture and 2 hour tutorial per week.

Credits: 4

Objectives:

- To understand the need and origin of the optimization methods.
- To get a broad picture of various applications of optimization methods used in engineering.
- To define an optimization problem and its various components.

Module I (12 Hrs)
One Dimensional Unconstrained Minimization techniques, single variable minimization, unimodality, bracketing the minimum, necessary and sufficient conditions for optimality, convexity, steepest descent method.

Module II (12 Hrs)
Linear programming, introduction, linear programming problem, linear programming problems involving LE (?) constraints, simplex method, optimality conditions, artificial starting solutions, the M method.

Module III (12 hrs)
Transportation models, definition, non traditional models, transportation algorithm, East West corner method, Vogel approximation method. Assignment model, Introduction, Hungarian method.

Module IV (12Hrs)
Forecasting Models, moving average technique, regression method, exponential smoothing. Game Theory, two persons zero sum games, mixed strategy games-graphical method.

Module V (12Hrs)
Queuing models, elements of queuing model, pure birth and death model, specialized Poisson queues, single server models. Multiple server models, self service model.

References:

1. Ashok D Belegundu, Tirupathi R Chandrupatla, optimization concepts and Application in Engineering, pearson Education.
CS010 804L05: MOBILE COMPUTING

Objectives

• To study the relevance and underlining infrastructure of multimedia system.
• To enable the students to apply contemporary theories of multimedia learning to the development of multimedia products.

Module I (10 hours)
Cellular concepts - channel assignment strategy - hand off strategy - interface and system capacity - trunking - improving coverage and capacity in cellular system.

Module II (12 hours)
Wireless Communication Systems:- Telecommunication Systems-GSM-GSM services & features, architecture, channel type, frame structure, signal processing in GSM & DECT-features & characteristics, architecture, functional concepts & radio link, personal access communication system (PACS)-system architecture-radio interface, Protocols. Satellite Systems-GEO, LEO, MEO.

Module III (11 hours)
Location Management, Addressing, Access Point Control Protocol (APCP).

Module IV (14 hours)
Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Transmission.

Module V (13 hours)
Wireless Application Protocol & World Wide Web
WWW- HTTP, Usage of HTML, WWW system architecture.

Teaching scheme

2 hours lecture and 2 hours tutorial per week

Credits: 4

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<th>References</th>
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<tbody>
<tr>
<td>1. Jochen Schiller “Mobile Communications “ , Preason Education Asia</td>
</tr>
<tr>
<td>3. Computer Networks – Andrew S. Tanenbaum, PHI</td>
</tr>
</tbody>
</table>
CS010 804L06 : Advanced Networking Trends

Teaching scheme

2 hours lecture and 2 hours tutorial per week

Credits: 4

Objectives

- To acquaint the students with the application of networking.
- To understand the various TCP/IP protocols and the working of ATM and its performance, Network security and authentication, and various algorithms related to it has been dealt, to get a practical approach, advanced topics in the design of computer networks and network protocols

Module 1 (12 hours)


ISDN - Definition - Protocol architecture - System architecture - Transmission channels - ISDN interface, B-ISDN.

Module 2 (12 hours)


Module 3 (12 hours)


Bluetooth – Physical Layer – MAC layer – Networking - Security

Module 4 (12 hours)


Module 5 (12 hours)


References

3. Mobile Communication - Jochen Schiller, Pearson Education Asia
CS010 805G01: MULTIMEDIA TECHNIQUES

Teaching scheme
2 hours lecture and 2 hours tutorial per week

Credits: 4

Objectives
- To study the relevance and underlining infrastructure of multimedia system.
- To enable the students to apply contemporary theories of multimedia learning to the development of multimedia products.

Module I (10 hours)
Multimedia Basics: Multimedia and Hypermedia, Multimedia Software, Editing and Authoring Tools, VRML.

Graphics and Image Data Representation— Graphics/Image Data Types, Popular File Formats.


Module II (12 hours)

Module III (11 hours)
Image, Video and Audio Compression — Image Compression -JPEG , JPEG-LS.

Basic Video Compression Techniques - Introduction to Video Compression, Video Compression Based on Motion Compensation, MPEG

Video Coding— Audio Compression Techniques—MPEG, ADPCM in Speech Coding, Vocoders, Psychoacoustics, Audio Codecs.

Module IV (14 hours)
Storage and Retrieval of Images — Content-Based Retrieval in Digital Libraries: Image retrieval, CBIRD. A Case Study, Image Search Systems, Quantifying Results, Querying on Videos, Querying on Other Formats, Outlook for Content-Based Retrieval.


Module V (13 hours)
Multimedia Databases


Multimedia Databases—Design and Architecture of a Multimedia Database, Organizing Multimedia Data based on the Principle of Uniformity, Media Abstractions, Query Languages for Retrieving Multimedia Data, Indexing SMDSs with Enhanced Inverted Indices, Query Relaxation/Expansion.
References

CS010 805G02 : Neural networks
(Common to IT010 805G05 Neural Networks)

Teaching scheme
2 hours lecture and 2 hours tutorial per week

Credits: 4

Objectives
To understand the fundamental building blocks of Neural networks

Module 1 (14 hours)

Module 2 (12 hours)

Module 3 (10 hours)

Module 4 (12 hours)

Module 5 (12 hours)
References
1. B. Yegnanarayana, "Artificial Neural Networks", PHI.
2. Simon Haykin, Neural Networks, 2/e, Prentice Hall
3. Neural Computing & Practice – Philip D. Wasserman
4. Neural Networks in Computer Intelligence-Limin Fu, Tata Mc.Hill Edition
CS010 805G03 : Advanced Mathematics

( common to IT010 805G02  Advanced Mathematics )

Teaching Schedule:                    Credits: 4
2 hour Lecturer and 2 hour Tutorial per week

Objectives

- To provide an understanding of Green’s Function, Integral Equations, Gamma, Beta functions, Power Series solution of differential equation, Numerical solution of partial differential equations

Module 1 (12 Hours)
Green’s Function

Module 2 (12 Hours)
Integral Equations

Module 3 (12 Hours)
Gamma, Beta functions

Module 4 (12 Hours)
Power Series solution of differential equation
The power series method – Legendre’s Equation – Legendre’s polynomial – Rodrigues formula – generating function – Bessel’s equation – Bessel’s function of the first kind – Orthogonality of Legendre’s Polynomials and Bessel’s functions.

Module 5 (12 Hours)
Numerical solution of partial differential equations
Classification of second order equations - Finite difference approximations to partial derivatives – solution of Laplace and Poisson’s equations by finite difference method – solution of one dimensional heat equation by Crank – Nicolson method – solution one dimensional wave equation.
<table>
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<th>References</th>
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<tr>
<td>10. P. Kandasamy, K. Thilagavathy, K. Gunavathy Numerical methods, S. Chand &amp; co</td>
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Objectives

- To understand the role of a software architecture in the development of an enterprise application system.
- To develop the ability to understand the models that are used to document a software architecture.

Module I (13 hours)


Module II (11 hours)

**Architectural Design**—Guidelines for User Interface Architectures, Design Space and Rules, Applying Design Space with an Example, A Validation Experiment.

**The Quantified Design Space**—Background, Quantified Design Space.

Module III (11 hours)


Module IV (14 hours)

**Architectural Description Languages**—Requirements for Architectural Description Languages, The Linguistic Character of Architectural Description, Desiderata for Architecture Description Languages, Problems.

**First-Class Connectors**—Current practice, Software System Composition. Adding Implicit Invocation to Traditional Programming Languages.

Module V (11 hours)

**Architectural Design Tools**—UniCon A Universal Connecting Language, Components, Abstraction and Encapsulation, Types and Type checking.

**Architectural Design** - Exploiting Styles, Architectural Interconnection

References

CS010 805G05: Natural Language Processing

Teaching scheme

2 hours lecture and 2 hours tutorial per week

Credits: 4

Objectives

- To acquire a general introduction including the use of state automata for language processing
- To understand the fundamentals of syntax including a basic parse
- To explain advanced feature like feature structures and realistic parsing methodologies
- To explain basic concepts of remotes processing
- To give details about a typical natural language processing applications

Module I (12 hours)


Module II (12 hours)


Module III (12 hours)

Module IV (12 hours)


Module V (12 hours)


References:
CS010 805G06: Pattern Recognition

Teaching Schemes
2 hours lecture and 2 hours tutorial per week

Credits: 4

Objectives:
- To impart a basic knowledge on pattern recognition and to give a sound idea on the topics of parameter estimation and supervised learning, linear discriminant functions and syntactic approach to PR.
- To provide a strong foundation to students to understand and design pattern recognition systems.

Module I (12 hours)
Introduction: introduction to statistical, syntactic and descriptive approaches, features and feature extraction, learning and adaptation. Bayes Decision theory, introduction, continuous case, 2-category classification, minimum error rate classification, classifiers. Discriminant functions and decision surfaces.

Module 2(12 hours)
Introduction- Maximum likelihood estimation - General principle, Gaussian case; bias, Bayesian estimation – class conditioned density, parameter distribution, Bayesian Parameter estimation – General Theory, Gibb’s Algorithm – Comparison of Bayes Method with Maximum likelihood.

Module 3(12 hours)

Module 4(12 hours)

Module 5(12 hours)
Syntactic approach to PR: Introduction to pattern grammars and languages, higher dimensional grammars, tree, graph, web, plex, and shape grammars, stochastic grammars, attribute grammars, Parsing techniques, grammatical inference.

Syllabus- B.Tech. Computer Science & Engg
## References

1. R.O Duda, Hart P.E, “Pattern Classification And Scene Analysis”, John Wiley
4. Fu K.S., “Syntactic Pattern Recognition And Applications”, Prentice Hall,
CS010 806: Computer Graphics Lab

Teaching scheme
3 hours practical per week

Credits: 2

Objectives

- To acquaint the students with the implementation of fundamental algorithms in Computer Graphics.

I. Experiments to implement the following: (first 3 weeks)

1. DDA Algorithm
2. Bresenham's Line drawing Algorithm for any slope.
3. Mid-point Circle Algorithm.
4. 2D Transformations

II. Experiments to implement the following:

1. 3D Rotations on a cube (about any axis, any general line) controlled by keyboard navigation keys.
2. 3D Rotations on a cube with hidden surface elimination.(keyboard controlled)
3. Composite transformations
4. Bezier cubic splines like screen saver
5. Any Fractal Construction (Koch curve)
6. Animations using the above experiments.(eg.moving along curved path)

Any experiment according to the syllabus of CS010 702 Computer Graphics can be substituted subjected to permission from competent authority.
CS010 807  Project Work

Teaching scheme  
credits: 4

6 hours practical per week

The progress in the project work is to be presented by the middle of eighth semester before the evaluation committee. By this time, the students will be in a position to publish a paper in international/ national journals/conferences. The EC can accept, accept with modification, and request a resubmission.

The progress of project work is found unsatisfactory by the EC during the middle of the eighth semester presentation, such students has to present again to the EC at the end of the semester and if it is also found unsatisfactory an extension of the project work can be given to the students.

**Project report:** To be prepared in proper format decided by the concerned department. The report shall record all aspects of the work, highlighting all the problems faced and the approach/method employed to solve such problems. Members of a project group shall prepare and submit separate reports. Report of each member shall give details of the work carried out by him/her, and only summarise other members’ work.

The student’s sessional marks for project will be out of 100, in which 60 marks will be based on day to day performance assessed by the guide. Balance 40 marks will be awarded based on the presentation of the project by the students before an evaluation committee.

**For Project, the minimum for a pass shall be 50% of the total marks assigned to the Project work.**
A comprehensive oral Viva-voce examination will be conducted to assess the student's intellectual achievement, depth of understanding in the specified field of engineering and papers published / accepted for publication etc. At the time of viva-voce, certified bound reports of seminar and project work are to be presented for evaluation. The certified bound report(s) of educational tour/industrial training/ industrial visit shall also be brought during the final Viva-Voce.

An internal and external examiner is appointed by the University for the Conduct of viva voce University examination.

For Viva-voce, the minimum for a pass shall be 50% of the total marks assigned to the Viva-voce.

Note: If a candidate has passed all examinations of B.Tech. course (at the time of publication of results of eighth semester) except Viva-Voce in the eighth semester, a re-examination for the Viva-Voce should be conducted within one month after the publication of results. Each candidate should apply for this ‘Save a Semester examination’ within one week after the publication of eighth semester results.