INFORMATION TECHNOLOGY

3RD SEMESTER

Course Code	Course No.	SUBJECT	Teaching Periods			Duration Uty Exams (Hrs)	Marks		
			L	T	P/D		Sessional	Univ. Exam	Total
A	RT 301	Engg. Mathematics II	3	1	0	3	50	100	150
B	T302	Electrical Circuits and Systems	3	1	0	3	50	100	150
C	RT303	Solid State Electronics	2	1	0	3	50	100	150
D	RT304	Problem Solving & Computer Programming	3	1	0	3	50	100	150
E	RT305	Humanities	2	1	0	3	50	100	150
F	T306	Digital Electronics	3	1	0	3	50	100	150
G	T307	C Programming Lab	0	0	4	3	50	100	150
H	T308	Electronic Circuits Lab	0	0	4	3	50	100	150
		TOTAL	16	6	8		400	800	1200

4TH SEMESTER

Course Code	Course No.	SUBJECT	Teaching Periods			Duration Uty Exams (Hrs)	Marks		
			L	T	P/D		Sessional	Univ. Exam	Total
A	CMELR PTA401	Engg. Mathematics III	3	1	0	3	50	100	150
B	T402	Data Structures & Algorithms	3	1	0	3	50	100	150
C	T403	Linear Integrated Circuits & Applications	2	1	0	3	50	100	150
D	T404	Computer System Architecture	3	1	0	3	50	100	150
E	LTA405	Signals & Systems	2	1	0	3	50	100	150
F	T406	Object Oriented Programming in C++	3	1	0	3	50	100	150
G	T407	C++ & DS Lab	0	0	4	3	50	100	150
H	T408	Integrated Circuits Lab	0	0	4	3	50	100	150
		TOTAL	16	6	8		400	800	1200

5TH SEMESTER

Course Code	Course No.	SUBJECT	Teaching Periods			Duration Uty Exams (Hrs)	Marks		
			L	T	P/D		Sessional	Univ. Exam	Total
A	RT501	Engg. Mathematics IV	3	1	0	3	50	100	150
B	T502	Operating System Concepts	4	1	0	3	50	100	150
C	RT503	Database Management Systems	3	1	0	3	50	100	150
D	T504	Microprocessors	3	1	0	3	50	100	150
E	RT505	Language Processors	3	1	0	3	50	100	150
F	RT 506	Data Communication	2	1	0	3	50	100	150
G	T 507	DBMS Lab	0	0	3	3	50	100	150
H	T 508	Microprocessor Lab	0	0	3	3	50	100	150
		TOTAL	18	6	6		400	800	1200

6TH SEMESTER

Course Code	Course No.	SUBJECT	Teaching Periods			Duration Uty Exams (Hrs)	Marks		
			L	T	Prac./ Proj.		Sessional	Univ. Exam	Total
A	T 601	Project Management	3	1	0	3	50	100	150
B	RT602	Software Engineering	2	1	0	3	50	100	150
C	LTA603	Digital Signal Processing	3	1	0	3	50	100	150
D	RT 604	Computer Networks	3	1	0	3	50	100	150
E	RT605	Network Computing	3	1	0	3	50	100	150
F	T606	Personal Computer Hardware	4	1	0	3	50	100	150
G	T 607	Systems Programming Lab	0	0	3	3	50	100	150
H	T608	Mini Project	0	0	3	3	50	100	150
		TOTAL	18	6	6		400	800	1200

7TH SEMESTER

Course Code	Course No.	SUBJECT	Teaching Periods			Duration Uty Exams (Hrs)	Marks		
			L	T	Prac./ Proj		Sessional	Univ. Exam	Total
A	RT 701	Object Oriented Modelling and Design	2	1	0	3	50	100	150
B	RT 702	Computer Graphics	3	1	0	3	50	100	150
C	T 703	Modern Communication Systems	3	1	0	3	50	100	150
D	T 704	Mutimedia Techniques	2	1	0	3	50	100	150
E	RT 705	Web Technologies	2	1	0	3	50	100	150
F	T706	Elective I	3	1	0	3	50	100	150
G	T 707	Multimedia Lab	0	0	3	3	50	100	150
H	T708	Communication Systems Lab	0	0	3	3	50	100	150
I	T 709	Project & Seminar	0	0	3	_	_	_	_
		TOTAL	15	6	9		400	800	1200

8TH SEMESTER

Course Code	Course No.	SUBJECT	Teaching Periods			Duration Uty Exams (Hrs)	Marks		
			L	T	Prac./ Proj		Sessional	Univ. Exam	Total
A	RT 801	Security in Computing	2	1	0	3	50	100	150
B	T 802	Information Systems and Management	3	1	0	3	50	100	150
C	T 803	E-Commerce	2	1	0	3	50	100	150
D	RT 804	Artificial Intelligence	3	1	0	3	50	100	150
E	T 805	Elective II	3	1	0	3	50	100	150
F	T 806	Elective III	3	1	0	3	50	100	150
G	T 807	Internet Lab	0	0	4	3	50	100	150
H	T 808	Project & Seminar	0	0	4	_	100	_	100
I	T 809	Viva Voce	0	0	0	_	0	50	50
		TOTAL	16	6	8		450	750	1200

THIRD SEMESTER

ENGINEERING MATHEMATICS - II

RT301 **3+1+0**

Module 1

Mathematical Logic – Statements, connectives – Well formed formulas – Tautologies. Equivalence of formulas - Duality law Tautological implications – Normal forms – the theory of inference for the statement. Calculus – validity . Consistency, Theorem proving – the predicate calculus – Inference Theory of the predicate calculus.

Module 2

Number Theory: Prime and relatively prime numbers – modular arithmetic – Fermat's and Euler's theorems – testing for primability – Euclids algorithm – discrete logarithms.

Relations & Functions – Properties of binary relations – Equivalence relations and partitions – Functions and pigeon hole principle.

Module 3

Algebraic systems – general properties – Lattices as a partially ordered set – some properties of lattices – lattices as algebraic systems – sub lattices – direct product – homomorphism – some special lattices.

Module 4

Discrete Numeric Functions & generating Functions, Recurrence relations – Manipulations of Numeric functions – generating functions – Recurrence – relations – Linear recurrence relations with constant coefficients – Homogenious solutions – Particular solutions – Total solutions – solutions by the method of generating functions.

Module 5

Graph Theory: Basic concept of graphs, subgraphs, connected graphs, Paths, Cycles, Multigraph and Weighted graph – Trees – spanning trees.

References

1. Elements of Discrete Mathematics - C.L.Lieu. McGraw Hill.
2. Discrete Mathematical Structures with Applications to Computer Science - J.P. Trembly, R. Manohar. McGraw Hill.
3. Discrete Mathematics - Richard Johnsoubaugh (Pearson Education Asia)
4. Discrete Mathematical Structures - Bernard Kolman, Robert C. Bushy, Sharon Cutler Ross, Pearson Education Asia.
5. A first look at Graph Theory - John Clark & Derek Allan Holton, Allied Publishers.
6. Cryptography and network security principles and practice - William Stallings.

ELECTRICAL CIRCUITS AND SYSTEMS

T 302 **3+1+0**

Module 1

Introduction: - The resistance, capacitance and inductance parameters. Active element conventions, Dot convention for coupled circuits. Topological description of networks. The network equations- Kirchoff's laws – source transformations. Loop variable analysis. Duality State variable analysis. Examples.

Module 2

First order differential equations – solutions. Time constants. The integrity factor – examples – Initial conditions in elements Geometrical Interpretation of derivation. Evaluating initial conditions. Initial State of a network.

Module 3

Second order equations – internal excitation. The Laplace Transformation – Basic theorems – examples. Transform of signal waveforms – Shifted unit sep function – Ramp and Impulse function. Waveform Synthesis – Initial and final value – Convolution as a summation

Module 4

Impedance function – Concept of Computer frequency. Transform Impedance and transform circuits, series and parallel combinations of elements.

Theorem – Super position, reciprocity, Thevenins and Norton's theorems – proof and examples.

Module 5

Network functions – Terminal pairs – one port and two port networks – Ladder networks – General networks.

Poles and zeros. Pole – zero locations for transfer functions. Pole – zero plot – domain behavior, stability. Two port parameters – two port variable – short circuit admittance parameters – open circuit impedance parameters – transmission parameters – hybrid parameters – parallel connection of two port networks.

Text Book

1. Network Analysis – M. E. Van Valkenburg – PHI

References

1. Introductory Circuit Theory – Errist A. Guillemin – John Wiley & Sons
2. Network Analysis and synthesis – Franklin F Kuo – John Wiley & Sons
3. Basic Network Theory – Paul M. Chirlian – Mc Graw Hill
4. Electric Circuit Analysis, 2nd Edition – S.N.Sivanadam, Vikas Publications

SOLID STATE ELECTRONICS

RT 303 **2+1+0**

Module 1

Transistor – Biasing – Stability – Thermal runaway. Transistor As an amplifier – RC coupled amplifier, Frequency Response, Gain Bandwidth relation – Cascading of transistors – cascade Darlington pair – emitter follower.

Module 2

FET, FET amplifier – MOSFET, depletion and enhancement type – source drain characteristics and transfer characteristics.

Module 3

Oscillators – Concept of feed back – Transistorised phase shift oscillator – wein bridge Oscillator – Hartley Oscillator – Colpits Oscillator (Operation and Expression for frequency)

Module 4

Clipping, Clamping, Integration, Differentiation – Astable, Bistable and Monostable Multivibrators – Sweep generators, Simple Bootstrap sweep generators.

Module 5

Power supplies & Special semi conductor devices – Regulator power supplies – IC regulated Power supplies, 7805, 7905, LM317 – LED, LCD, Photodiode, Photo transistor, opto coupler. Seven segment display, SCR, UJT (basic concepts only), DIAC, TRIAC.

References

1. Integrated Electronics - Millman and Halkias, McGraw Hill.
2. Pulse Digital and Switching wave forms - Millman and Taub.
3. Electronics Devices & Circuits - Boylsted & Neshelsky, Pearson Education.

PROBLEM SOLVING AND COMPUTER PROGRAMMING

RT 304 **3+1+0**

Module 1

Problem solving with digital Computer - Steps in Computer programming - Features of a good program - Modular Programming - Structured - Object Oriented - Top down and bottom up approaches - Algorithms - Flowchart - Pseudocode, examples

Module2

C fundamentals: - Identifiers, keywords, data types, operators, expressions, data Input and Output statements, simple programming in C.

Module 3

Control statements & Functions: If - else, for, while, do - while, switch, break & continue statements, nested loops. Functions - parameter passing - void functions Recursion – Macros.

Module4

Structured data types: Single dimensional arrays - multidimensional arrays, strings, structures & unions - Program for bubble sort.

Module 5

Pointers & files - Declaration, passing pointers to a functions- Accessing array elements using pointers - Operations on pointers - Opening & Closing a file - Creating & Processing a file, Command line arguments.

Text

1. Programming with C - Byron S. Gottfried, Tata McGraw Hill

References

1. Computer Programming in C - Kerninghan & Ritchie, PHI
2. Programming with ANSI and Turbo C - Ashok N. Kamthan, Pearson Eduacation
3. Let us C - Yeaswanth Khanetkar, BPB
4. Programming in C - Stephen C. Kochan, CBS publishers
5. Using C in Program Design - Ronald Leach, Prism Books Pvt. Ltd, Bangalore
6. Mastering Turbo C - Bootle, BPB Publications
7. Programming and Problem Solving with PASCAL - Micheal Schneider, Wiley Eastern Ltd.
8. Pointers in C - Yeaswanth Khanetkar, PBP
9. C Programming - A Modern Approach - K.N. Iling W.W. Norton & Company
10. Newyork Structured and Object Oriented Problem Solving using C++ - Andrew C Staugaard Jr., PHI

HUMANITIES

RT 305 **2+1+0**

PART A: PRINCIPLES OF MANAGEMENT

Module 1

Scientific Management, Evolution of management theory, Contributions of Taylor, Gilbreth, Gantt, Emerson, Definition and functions of management Authority, Responsibility, Delegation and Span of control, Types of structures of Organisation – Types of Business firms, Job evaluation and merit rating, Wages – Types of incentives.

Module 2

Procedure for ISO and ISI certification – Design, Development and implementation of re-engineering - Inspection – SQC control charts – quality assurance – TQM – ZERO defects.

PART B: ENGINEERING ECONOMICS

Module 3

The Indian financial system – Reserve bank of India, functions – commercial banking system, profitability of public sector banks, development financial institutions – IDBI, ICICI, SIDBI, IRBI – Investment institutions – UTI, Insurance companies – The stock market – functions – Recent trends.

Module 4

Indian Industries - Industrial pattern - structural transformation – industrial growth – inadequacies of the programme of industrialization – large and small scale industries – industrial sickness and Government policy – industrial labour – influence of trade unions.

Module 5

The tax frame work – Direct and indirect taxes – impact and incidence – progressive and regressive – functions of the tax system – Black money – magnitude and consequences – Public debt – Debt position of the Central and State Governments – Deficit financing – revenue deficit and fiscal deficit – Problems associated with deficit financing.

References

1. Management - Stoner, Freeman and Gilbert.
2. Engineering Managemt - Mazda, Pearson Education.
3. Indian Economy - Ruddar Datt, S. Chand and Company Ltd.
4. A.N. Agarwal - Indian Economy Problems of Development and Planning, Wishwa Prakashan.

DIGITAL ELECTRONICS

T 306 **3+1+0**

Module 1

Review of number Systems – Binary, Octal, Hexadecimal – Conversion,

Binary codes – BCD, Self complementing, Excess – 3 and Gray code, Alphanumeric codes

Boolean Algebra – Postulates, Switching function, Sum of Product, Product of Sum, switching circuits, simplification – rules, laws and theorems, Karnaugh map, Completely and incompletely specified functions, Quine – Mc Clauskey method.

Logic gates, Realization using logic gates, Design with NAND and NOR gates.

Module 2

Combinational logic circuits – adder – half and full, subtractor – half and full, Serial & Parallel adders, Carry save adder, Look ahead carry adder, BCD adder, Multiplexers, Encoders, Demultiplexers, Decoders, Comparators, Implementation of logic functions using multiplexers and decoders.

Module 3

Logic families – positive and negative logic, TTL NAND – analysis – characteristics, open collector gate, tri-state gates, ECL & IIL logic (Brief explanation only), CMOS – Inverter, NAND, NOR, Characteristics, properties, Comparison of logic families, Typical IC's.

Module 4

Sequential logic Circuits – classification, flip flops – SR, JK, Master slave, D, T. applications, Truth table and Excitation table, Conversion of one type of flip flop to another.

Memories – ROM- organization of a ROM, Programmable ROMs, EPROM, EEPROM, PLD – PLA and PAL, RAM – basic structure, static and dynamic RAM.

Module 5

Shift registers – SISO, SIPO, PISO, PIPO, universal shift register, applications, Ring counter, Johnson Counter.

Binary counters – Asynchronous and Synchronous – Design, decade, Up-Down counters, Typical counter IC's.

Text Book

1. Digital Electronics and Logic Design - B. Somanathan Nair - PHI 2002
2. Digital Fundamentals, 8th Edition - Floyd, Pearson Education.

References

1. Logic and Computer Design Fundamentals, 2nd Edn. - Morris Mano & Charles R. Kime, Pearson Education.
2. Digital Integrated Electronics - Taub and Shilling, McGraw Hill.
3. Digital Logic – Applications and Design - John.M.Yarbrough- Vikas Thomson Learning

C PROGRAMMING LAB

T 307 **0+0+4**

1. Familiarization with computer system, Processor, Peripherals, Memory etc.
2. Familiarization of operating system-DOS, Windows etc. (use of files directories, internal commands, external commands, compilers, file manager, program manager, control panel etc.)
3. Familiarization with word processing packages like MS Excel, MS Access, MS PowerPoint and MS Word.
4. Programming experiments in C to cover control structures-functions-arrays-Structures-pointers and files.

   (Any experiment according to the syllabus of RT304 can be included.)

ELECTRONIC CIRCUITS LAB

T308 **0+0+4**

1. Characteristics – Diode, Zener Diode, Transistor, FET, UJT, Determination of parameters.
2. Rectifiers with filters- Half Wave, Full wave& Bridge
3. Simple regulator circuits- series regulator.
4. Design of a single stage RC coupled amplifier. Determination of Bandwidth, Input & Output Impedances.
5. Wave shaping. Design of clipping, clamping, RC differentiator and Integrator.
6. Design of Astable multivibrator for specified time period sharpening edges.
7. Simple sweep circuits.
8. RC Phase shift oscillator. Wein bridge oscillator.

FOURTH SEMESTER

ENGINEERING MATHEMATICS - III

CMELRPTA 401 **3+1+0**

Module 1

Ordinary Differential Equations: Linear Differential equations with constant coefficients - Finding P.I. by the method of variation of parameters –Cauchy's equations- Linear Simultaneous eqns- simple applications in engineering problems.

Module 2

Partial Differential Equations - formation by eliminating arbitary constants and arbitary Functions - solution of Lagrange Linear Equations –Charpits Method – solution of homogeneous linear partial differential equation with constant coefficients – solution of one dimensional wave equation and heat equation using method of separation of variables – Fourier solution of one dimensional wave equation.

Module 3

Fourier Transforms: - Statement of Fourier Integral Theorems – Fourier Transforms – Fourier Sine & Cosine transforms - inverse transforms - transforms of derivatives – Convolution Theorem (no proof) – Parsevals Identity - simple problems.

Module 4

Probability and statistics: Binomial law of probability - The binomial distribution, its mean and variance - poisson distribution as a limiting case of binomial distribution - its mean and variance - fitting of binomial & poisson distributions - normal distribution - properties of normal curve - standard normal curve - simple problems in binomial, poisson and normal distributions.

Module 5

Population & Samples: Sampling distribution of mean (σ known) –Sampling distribution of variance, F and Chi square test – Level of significance - Type 1 and Type 2 errors – Test of hypothesis – Test of significance for large samples – Test of significance for single proportion, difference proportion, single mean and difference of mean (proof of theorems not expected)

References

1. Higher Engineering Mathematics - B.S. Grewal, Khanna Publishers
2. Engineering Mathematics Vol.II -3rd year Part A & B - M.K. Venkataraman, National Publishing Company
3. Elements of Partial Differential Equations - Ian N.Sneddon.,McGrawhill International Edn.

4. Miller and Fread's Probability and statistics for engineers – Richard A Johnson, Pearson Education Asia / PHI
5. A text book of Engineering Mathematics (Volume II) – Bali and Iyengar, Laxmi Publications Ltd.
6. Advanced Engg. Mathematics Erwin Kreyszig, Wiley Eastern Ltd. Probability and statistical inferences – Hogg and Tanis, Pearson Education Asia

DATA STRUCTURES & ALGORITHMS

T402 **3+1+0**

Module 1

Introduction, Data structures, Algorithms-Analysis of algorithms, Time & Space Complexity, Big O notation, Complexity calculation of simple algorithms.

Basic data structures-Arrays, Records, Sparse matrix representation & addition using arrays, Polynomial representation & addition using arrays, Stacks & Queues-Sequential Implementation, Circular queue, Priority queue & D queue.

Module 2

Linked lists- Linked stacks and queues, Doubly linked list, applications, Circular linked list, Polynomial representation using linked list

Module 3

Trees-basic terminology-binary tree-binary search tree-insertion, search, traversal, deletion, need for balancing, Balanced trees-AVL Trees & B Trees (basic idea only)

Module 4

Graphs –representation, traversal, applications

Hashing- Hashing functions, Collision resolution

Dynamic memory management, Storage allocation and compaction.

Module 5

Selection sort, insertion sort, bubble sort, radix sort, tree sort, heap sort, quick sort & merge sort

Sequential search, binary search, Interpolation search

References

1. Introduction to Data Structures with Applications - Tremblay & Sorenson, TMH
2. Data Structures in C & C++ - Tanenbaum, et., al., Pearson Education
3. Classic Data Structures – Samanta, PHI
4. Data Structures and Algorithms – O.G.Kakde and U.A.Deshpande-ISTE Learning material
5. Data Structures and Algorithms in C++- Adam Drozdek, Vikas Thomson Learning.
6. Data Structures and Program design in C - Robert L Kruse, et.al., Pearson Education

7. Introduction to Algorithms – Thomas.H.Coreman-PHI
8. Fundementals of Data Structures in C++ - Horrowits and Sahni- Galgotia
9. Algorithms + Datastructures = Program- NiklausWirth, PHI

LINEAR INTEGRATED CIRCUITS & APPLICATIONS

T 403 **2+1+0**

Module 1

Operational Amplifiers – Block diagram, Equivalent circuit, Ideal Op Amp-characteristics, Non-ideal Op Amp - finite open loop gain, offset voltage, bias current, drift, frequency response, band width, CMRR, circuit stability and slew rate.

Inverting, Non Inverting Amplifier, Integrator. Differential Amplifiers, Instrumentation Amplifiers, V to I and I to V converters, Precision rectifiers.

Module 2

Active Filters: Butterworth and Chebyshev filters- I & II order filters – low pass, high pass, band pass, band reject, filter design.

Comparators, Oscillators, Multivibrators, Waveform generators.

Module 3

D/A converters- Weighted resistor, R-2R networks, Hybrid converters .

A/D converters- Successive approximation, Integrating ADC, Dual slope, Flash converters (parallel), Analog multipliers.

Module 4

Voltage regulators- voltage references, block diagram of linear voltage regulators, voltage regulator ICs and their design, three terminal voltage regulators, negative voltage regulators, dual tracking and switching regulators.

Module 5

PLL: Operating principle, lock range and capture range, applications of PLL, building blocks of PLL, LM 565 and its applications. Signal generators-monolithic waveform generators. IC power amplifiers.

References

1. OP-AMPS and Linear Integrated Circuits, 4rd Edn. - Ramakant A.Gayakwad, Pearson Education

2. OP-AMPS and Linear Integrated Circuits, 6th Edn. - Coughlin and Driscoll, Pearson Education.
3. Microelectronics Circuits - Sedra & Smith, Oxford University Press
4. Integrated Circuits - K.R.Botkar, Khanna Publishers.
5. Microelectronics - Jacob Millman & Arvin Grabel, McGraw Hill.
6. Electronics Circuits - Donald L.Schlling and Charles Belove

COMPUTER SYSTEM ARCHITECTURE

T 404 **3+1+0**

Module 1 Introduction

Organization & Architecture, Functional Units of a computer, CPU-Memory connection, Review of basic operational concepts like CPU registers, Instruction formats, Addressing modes, Instruction cycle, Interrupt, Operating system, Interconnection structures, Layered view of a computer system.

Internal architecture of a typical 8-bit Microprocessor (Intel 8085), Signals, Registers, Machine cycles

Module 2 Instruction set

Instruction set of 8085, Addressing modes-Register, Direct, Immediate, Indirect and Implicit addressing, examples

Instruction types – Arithmetic, Logic, Data transfer, Branch, Stack, I/O and Machine control Instructions, examples (Assembly language programming not intended)

Module 3 CPU organization.

Processor Organization-Single bus and 2 bus organization, execution of a complete instruction, Hardwired and micro programmed control units, Sequencing, Horizonal & vertical microprogramming.

Arithmetic-Review of addition & subtraction techniques, Carry look ahead & Carry save addition, Multiplication-array multiplier, Booth's algorithm, Division-Restoring & non- Restoring division

Module 4 Memory Organization.

Memory Hierarchy, characteristics, Memory system considerations, High speed techniques-Cache memory, Associative memory, Memory interleaving, Virtual memory-paging.

Module 5 I/O Organization.

I/O Module- Functions & Structure, I/O Processor, I/O techniques-Programmed I/O, Interrupt driven I/O, DMA

Standard I/O interfaces: RS 232 C, GPIB, SCSI

References

1. Microprocessor Architecture, Programming & Applications – Ramesh S Gaonkar, Penram International
2. Computer Organization & Architecture -William Stallings, Pearson Education.
3. Computer Organization-Hamacher, Vranesic & Zaky, Mc Graw Hill
4. Computer System Architecture-Morris Mano, Pearson Education.
5. Computer Organization & Design-Pal Chaudhari, PHI

SIGNALS AND SYSTEMS

LTA 405 **2+1+0**

Module 1

Dynamic Representation of Systems - Systems Attributes- Causality linearity- Stability- time-invariance. Special Signals- Complex exponentials- Singularity functions (impulse and step functions).. Linear Time-Invariant Systems: Differential equation representation- convolution Integral. Discrete form of special functions. Discrete convolution and its properties. Realization of LTI system (differential and difference equations).

Module 2

Fourier Analysis of Continuous Time Signals and Systems - Fourier Series- Fourier Transform and properties- Parseval's theorem- Frequency response of LTI systems. Sampling Theorem.

Module 3

Fourier Analysis of Discrete Time Signals & Systems - Discrete-Time Fourier series- Discrete-Time Fourier Transform (including DFT) and properties. Frequency response of discrete time LTI systems.

Module 4

Laplace Transform - Laplace Transform and its inverse: Definition- existence conditions- Region of Convergence and properties- Application of Laplace transform for the analysis of continuous time LTI system (stability etc.) Significance of poles & zeros- Z-Transform - Z-Transform and its inverse: Definition- existence- Region of convergence and properties- Application of Z-Transform for the analysis of Discrete time LTI systems- Significance of poles and zeros.

Module 5

Random Signals - Introduction to probability. Bayes Theorem- concept of random variable- probability density and distribution functions- function of a random

variable. Moments- Independence of a random variable. Introduction to random process. Auto and cross correlation. wide-sense stationarity- power spectral density White noise- Random processes through LTI systems.

References

1. Signals and Systems: Oppenheim Alan- V- Willsky Alan. S- Pearson Edn.
2. Communication Systems: Haykin Simon- John Wiley.
3. Signals and Systems: I J Nagrarth- Tata Mc Graw Hill.
4. Signals and Systems: Farooq Husain- Umesh pub.
5. Adaptive signal processing: W Bernad- Pearson Edn.

OBJECT ORIENTED PROGRAMMING IN C++

T 406 **3+1+0**

Module 1

Need for OOP- Characteristics of Object Oriented Language- Basic concepts and terminology-C++ and object oriented programming
C++ Programming basics, loops and decisions

Module 2

Structures- Structure specifier, accessing, nested structures, structures and classes.
Functions- Declarations, definition, argument passing.
Variables and storage classes

Module 3

Objects and classes –creation and usage, member functions, constructors and destructors Arrays- Definition, accessing, Arrays as class members, arrays of objects

Module 4

Operator overloading, Function overloading, Inheritance, Classification of inheritance, virtual functions, Polymorphism-Run time and compile time polymorphism.

Module 5

Advanced OO concepts- iterations and sequences, Virtual destructors, Virtual base classes, Templates, exceptions and exceptions handling, standard library design.

References

1. Object Oriented Programming in C++: Robert Lafore, Galgotia Publications
2. C++ Programming language: Bjarne Stroustrup, Pearson Education
3. Object Oriented Programming in C++: Nabajyoti Barkakati, PHI
4. C++ Primer: Lippman and Zajoie, Pearson Education
5. C++ for You++: Maria Litwin & Garry Litwin, Vikas Publishing
6. Object Oriented Programming Using C++: Ira Pohl, Pearson Education.
7. Standard C++ with Object Oriented Programming: Paul.S.Wang, Vikas Publishing.

C++ & DATA STRUCTURES LAB

T 407 **0+0+4**

Using C++ Modern Compiler

1. Desk Calculator example.
2. Name spaces and Exceptions
3. Programming with Multiple files
4. Using classes, derived classes
5. Templates
6. Standard Library, standard containers, algorithms, Strings, Streams
7. Using a Debugger

(Any experiment based on the syllabus of T 402 can be substituted.)

Simple experiments based on the syllabus of T 402 - Arrays, Stack, Queues, Trees, Simple sorting and searching techniques.

INTEGRATED CIRCUITS LAB

T 408 **0+0+4**

1. Characteristics of TTL and CMOS gates.
2. Realization of logic circuits using TTL and CMOS NAND/NOR gates.
3. Arithmetic Circuits- Half adder, Full adder, 4-bit adder/subtractor.
4. Realization of RS, T, D, JK and Master-Slave Flip-flops using gates and study of flip-flop ICs.
5. Shift Registers, Ring Counter and Johnson Counter.
6. Counters- synchronous and asynchronous, using flip-flops.
7. Operational amplifiers- Measurement of parameters.
8. Inverting and non-inverting amplifiers, Summing amplifiers.
9. Weinbridge Oscillator.

10. Triangular and square wave generators using OP-AMPs.
11. IC Voltage regulator, fold back protection.
12. IC power amplifier
13. VCO, PLL
14. Filters- LP, HP and BP, Notch Filter.

FIFTH SEMESTER

ENGINEERING MATHEMATICS - IV

RT 501 **3+1+0**

Module 1 QUEUEING THEORY

General Concepts - Arrival pattern - service pattern - Queue disciplines - The Markovian model M/M/1/$, M/M/1/N - steady state solutions – Little's formula.

Module 2 NUMERICAL METHODS

Introduction - solution of algebraic and transcendental equations - Bisection method - Method of false position - Newton's method - Approximate solution of equations – Horner's method solutions of linear simultaneous equations - Iterative methods of solution-Jacobi's method - Gauss Seidal method.

Module 3 FINITE DIFFERENCES

Meaning of operators – Δ, ∇, μ ,δ ,E - interpolation using Newton's forward and backward formula - Langrange's and Newton's divided difference interpolation formula - numerical differenciation - first and second order derivatives using forward and backward formula - numerical integration - trapizoidal rule - Simpson's 1/3 and 3/8 rules.

Module 4 LINEAR PROGRAMMING PROBLEM

Graphical solution of LPP- general problem - solution of LPP using simplex method - Big M method – duality in LPP.

Module 5 TRANSPORTATION AND ASSIGNMENT PROBLEM

Balanced transportation problem - initial basic feasible solution -Vogel's approximation method - optimum solution by Modi method - Assignment problem - Hungerian techniques

References

1. Operations Research - P.K. Gupta & D.S. Hira, S.Chand & Co. Ltd
2. Advanced Engg Mathematics - Ervin Kreyszig, Wiley Eastern Ltd.
3. Higher Engg. Mathematics - Dr. B.S. Grewal, Khanna Publishers.
4. Operations research Schaum's Outline Series - Richard Bronson,
5. Operations research - Panneer Selvam, PHI
6. Numerical Methods in Science & Engg. National Publishing Co.- M.K. Venkataraman,

OPERATING SYSTEM CONCEPTS

T 502 **4+1+0**

Module 1 Introduction

O.S. Objectives and functions, evolution of O.S, Basic concepts and terminology, O.S. hierarchy, Different types of O.S – multiprogramming, time sharing, real time, microkernel, multithreading, multiprocessing, distributed O.S etc. (basic idea only), Windows – 2000 overview, UNIX overview.

Module 2 Process Management

Process – states, model, description, process hierarchy, scheduling, scheduler organization, scheduling strategies, Process synchronization – interacting processes, co-ordinating processes, critical section, deadlock, semaphores.

Processes and Threads, Multithreading, Multiprocessing, Brief study of process management in UNIX and Win 2000.

Module 3 Memory Management

Memory management requirements, Techniques, Partitioning, Paging, Segmentation, Virtual memory – hardware and software support, Brief study of memory management in UNIX, Linux, Win 2000 and Solaris.

Module 4 I/O and File Management

Design issues, Model of I/O organization, Disk scheduling policies and algorithms – RSS, FIFO, PRI, LIFO, SSTF, SCAN, C-SCAN, FSCAN etc. , Disk cache, File management systems, file system architecture, file organization and access, Directory structure, File allocation, sharing and security, Brief study of file management in Unix and Win 2000.

Module5 Distributed Systems

Advantages, Disadvantages, comparison of Network and distributed O.S, Client-Server architecture, Distributed message passing – RPC, Distributed Process management, Distributed memory management. Clustering – cluster computer architecture, win 2000 cluster server.

Text Books

1. Operating systems, 4th Edition - William Stallings, Pearson Edn.
2. Operating system Concepts - Silber Schatz, John Wiley.

References

1. Operating Systems - Nutt, Pearson Edn.

2. Modern Operating System - Tannenbaum, PHI
3. Understanding Operating System - Flynn, McHoes, Thomson Publications.
4. System Programming and Operating System - Dhamdhere, TMH.
5. Guide to Operating Systems- Michel Parmer & Michel Walters, Vikas Thomson Learning

DATA BASE MANAGEMENT SYSTEMS

RT503 **3+1+0**

Module 1

Basic Concepts - Purpose of database systems-Components of DBMS – DBMS Architecture and Data Independence- Data modeling - Entity Relationship Model, Relational – Network- Hierarchical and object oriented models-Data Modeling using the Entity Relationship Model.

Module2

Structure of relational databases – relational databases – relational algebra- tuple relational calculus. Data definition with SQL, insert, delete and update statements in SQL – views – data manipulation with SQL

Module 3

Introduction to Transaction Processing- Transaction and System Concepts- Desirable properties of Transactions- Schedules and Recoverability- Serializability of Schedules-Query processing and Optimization- Concurrency Control- -assertions – triggers.

Oracle case study: The basic structure of the oracle system – database structure and its manipulation in oracle- storage organization in oracle.- Programming in PL/SQL- Cursor in PL/SQL

Module 4

Database Design– Design guidelines– Relational database design – Integrity Constraints – Domain Constraints- Referential integrity – Functional Dependency- Normalization using Functional Dependencies, Normal forms based on primary keys- general definitions of Second and Third Normal Forms. Boyce Codd Normal Form– Multivalued Dependencies and Forth Normal Form – Join Dependencies and Fifth Normal Form – Pitfalls in Relational Database Design.

Module 5

Distributed databases: Distributed Database Concepts- Data Fragmentation, Replication and Allocation Techniques- Different Types- Query Processing – semijoin -Concurrency Control and Recovery.

Text Book

1. Fundamentals of Database System - Elmasri and Navathe (3rd Edition),Pearson Education Asia

References

1. Database System Concepts - Henry F Korth, Abraham Silbershatz , Mc Graw Hill 2nd edition.
2. An Introduction to Database Systems - C.J.Date (7th Edition) Pearson Education Asia
3. Database Principles, Programming and Performance – Patrick O'Neil, Elizabeth O'Neil
4. An Introduction to Database Systems - Bibin C. Desai

MICROPROCESSORS

T 504 **3+1+0**

Module 1

Evolution of 8086 family of microprocessors – 8088 to Itanium, Internal architecture of 8086, block diagram, Registers, flags, Programming model, 8086 and 8088, 8086 memory organization, segmented memory, Physical address calculation, Memory Addressing, Addressing modes.

Module 2

Instruction set, Classification of instructions – Data transfer, Arithmetic and Logic instructions, Program control instructions, Simple programs in 8086 Assembly language.

IBM PC Assembly Language Programming, Program Development Tools – DEBUG, MASM, TASM etc.

Module 3

8086 hardware design – bus buffering and latching, bus timing – read and write, timing diagram, ready and wait states, Minimum mode and Maximum mode, 8086 Memory interface, address decoding.

Module 4

Comparative study of the features of the 8086, 80286, 80386, 80486, Pentium, Pentium Pro, Pentium II, Pentium III and Pentium IV Processors.

Introduction to Micro controllers – architecture, applications.

Module 5

Study of Peripheral chips

8255 – Programmable peripheral interface

8251 - USART

8259 – Programmable interrupt controller.

8279 – Programmable keyboard and display interface.

8237 – DMA controller.

8254 – Programmable Interval Timer

Brief study of interfacing of Stepper motor, keyboard, 7-segment display and ADC with the Microprocessors.

References

1. The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium II, Pentium III and Pentium IV processors. Architecture, Programming and Interfacing, 6th Edn – Barry B Bray, Pearson Education Asia
2. The 80X86 family, 3rd Edn - John Uffenbeck, Pearson Education.
3. Micro computer Systems - The 8086/8088 Family, Architecture, Programming & Design- Liu & Gibson – PHI.
4. IBM PC Assembly Language Programming- Peter Abel, PHI
5. Microprocessors and Interfacing - Douglas V. Hall, TMH
6. Advanced Microprocessors & Peripherals- Roy & Bhurchandi, TMH

LANGUAGE PROCESSORS

RT 505 **3+1+0**

Module 1 Assembler

Overview of the assembly process- Design of two pass assembler- Single pass assembler- Macros – Macro definition and usage- schematics for Macro expansion – Design of a Macro pre-processor - Macro Assembler.

Module 2 Introduction to Compilers

Compilers and Translators – Structure of a compiler – lexical analysis – syntax analysis – context free grammars – basic parsing techniques- top down and bottom up parsing (brief idea only)- Recursive Decent parser – Shift reduce parser.

Module 3 Storage allocation

Data descriptors- Static and Dynamic storage allocation – Storage allocation and access in block structured programming languages – Array allocation and access- Compilation of expressions – Handling operator priorities – Intermediate code forms for expressions –code generator.

Module 4 Compilation of Control Structures

Control transfer- Conditional and Iterative constructs- Procedure calls – Code optimization – Optimization transformations – Local optimization and global optimization – Compiler writing tools – Incremental Compilers

Module 5 Loaders and Linkers

Loading – Program relocatability – linking – various loading schemes – linkage editing – Design of linkage editor – dynamic loading – overlays – dynamic linking.

Text Books

1. System Programming and Operating Systems – Dhamdhere Mc Graw Hill
2. Principles of Compiler Design - Aho A.V., Ullman Narosa Publications.

References

1. Systems programming - Donovan, Mc. Graw Hill.
2. System Software – An Introduction to Systems Programming - Leland L. Beck, Addison Wesley.
3. Compilers – Principles Techniques And Tools – Aho, Sethi, Ullman, Pearson Education Asia

DATA COMMUNICATION

RT 506 **2+1+0**

Module 1

Communication concepts – Analog modulation – Various schemes – AM, PM, FM –Sampling theorem - Analog pulse modulation – PAM, PWM, PPM – Generation of various modulated waves (Block diagram only) –Digital Pulse modulation (PCM).

Module 2

Multiplexing - Frequency Division Multiplexing (FDM) – Time Division Multiplexing (TDM), Synchronous Time Division Multiplexing –Statistical time Division multiplexing – Key Techniques - ASK, FSK, PSK, DPSK - Channel capacity - Shannon`s Theorem.

Module 3

Digital data transmission – Serial, Parallel, Synchronous, Asynchronous and Isochronous transmission. Transmission mode- Simplex - Half duplex – Full duplex, Noise- different types of noise – Basic Principles of Switching (circuit, packet, message switching)

Module 4

Error detection and Correcting codes: Hamming code – Block codes and convolution codes – ARQ techniques – Transmission codes – Baudot – EBCDIC and ASCII codes – Barcodes.

Module 5

Terminal handling – Point to point, Multidrop lines. Components of computer communication – Concentrators - Front end Processor – Transmission media – Guided media – Twisted pair cable, coaxial cable, fibre optic cable. GSM service and GSM system architecture.

References

1. Electronic communication system - Kennedy, Mc Graw Hill.
2. Principles of Communication System - Taub & Schilling Mc Graw Hill.
3. Introduction to Data Communications & Networking – Behurouz & Forozan Mc Graw Hill.
4. Data Communication, Computer Networks & Open Systems - Fred Halsall Pearson Education Asia
5. Principles & Application of GSM - Vijay K. Garg Pearson Education Asia
6. Modern Digital & Analog Communication Systems – B.P Lathi Prism Books Pvt. Ltd.
7. Computer Networks - A.S. Tanenbaum, PHI
8. Data and Computer Communication - William Stallings, Pearson Education Asia
9. Communication Engineering - A. Kumar, Umesh Publications

DBMS LAB

T 507 **0+0+3**

Experiments for performing the following:

1. Creation, Updating, Deletion of tables, indexes, views, reports, Queries, Relational Operations, Trigger
2. Importing and Exporting Data.
3. Use of Link Libraries.
4. Natural Language Support
5. Administration.
6. ODBC Interface
7. Exposure to Data Base management packages (Preferably on 4 GLs like ORACLE/INTEGRA/SYBASE, Foxpro or the latest packages)
8. Exercise in Pay Roll, Inventory Management, Library Management using the packages.

(Any experiment according to the syllabus of RT 503 can be substituted)

MICROPROCESSOR LAB

T 508 **0+0+3**

1. Study of 8 bit /16 bit microprocessor kit.
2. Assembly language programming with 8 bit /16 bit Microprocessor kit.
3. Interfacing experiments such as: -
    a. Stepper motor control.
    b. DAC/ADC interface.
    c. Data Acquisition Board.
    d. Keyboard interfacing.
    e. Video display board.
    f. LED moving graphic display board.
    g. Serial communication.
4. IBM PC Assembly language programming using MASM/TASM.

SIXTH SEMESTER

PROJECT MANAGEMENT

T601 **3+1+0**

Module 1 PROJECT PLANNING

Overview – Capital expenditure - Phases of capital budgeting – Project development cycle – 7-s of project management – Requirements of a project manager – Forms of project organization.

Module 2 PROJECT ANALYSIS

Market Analysis – Technical Analysis - Financial Analysis – Risk Analysis – Social cost Benefit Analysis.

Module 3 CONTROL OF PROJECT

Control Systems – Control of major constraints – Project management software & information systems.

REVIEW: Performance of Evaluation – Abaudonment Analysis – Behavioral issues in Project Management

Module 4 TOTAL QUALITY MANAGEMENT

Quality systems – ISO 9000 series – ISI – Benchmarking – Quality Function development (QFD) – Total Productive Maintenance (TPM) – ISO 14000.

Module 5 CONCEPTS IN SAMPLING

Sampling designs and schemes – Errors in sampling – Simple random sample – stratified random sample – Cluster sample.

Sample size destination – Estimating population mean – Estimating population proportion.

References

1. Projects preparation, Apprisal, Budgeting & Implementation – Prasanna Chandra – Tata McGraw Hill
2. PROJECTS – Planning, Analysis, Selection, Implementation & Review - Prasanna Chandra – Tata McGraw Hill
3. Project Management - Harvey Maylor - Pearson Education
4. Total Quality Management – Dale H. Besterfield – Pearson Education
5. Quality control and Improvement – Amitava Mitra – Pearson Education
6. Quality assurance and TQM – Jain & Chitale – Khanna Publishers

SOFTWARE ENGINEERING

RT 602 **2+1+ 0**

Module 1 Introduction to Software engineering

Introduction – Software and software Engg.- Phases in software development- Software development process models-Role of Management in software development –Role of Matrics and measurement –Software requirement specification(SRS) - Problem Analysis - validation .

Module 2 Project Planning

Cost Estimation – Uncertainties – models – COCOMO model – Project scheduling – average duration estimation – Project scheduling and milestones – staffing and personal plan – Rayleigh curve – personnel plan – team structure – software configuration – management plans – quality assurance plans – verification and validation – inspections and reviews - project monitoring plans - time sheets – reviews – cost schedule – milestone graph – risk management.

Module 3 System Design

Design Principles – Problem partitioning and hierarchy – abstraction – modularity – top down and bottom_up – strategies – module level concepts - coupling - cohesion – structured design methodology - verification - matrics.

Module 4 Coding

Top-down and Bottom-up - Structured Programming - Information Hiding - Programming style - Internal Documentation – Verification - Code Reading - Static Analysis - Symbolic execution - Proving Correctness - Code inspections – Unit testing.

Module 5 Testing

Testing fundamentals - Functional and Structured Testing - Testing Process - Comparison of Verification and Validation Techniques - Reliability assessment - Programmer Productivity - Error removal efficiency.

Text Book

1. An integrated approach to Software Engineering - Pankaj Jalote, Narosa Publication

References

1. Software Engineering - Roger S. Pressman, Tata McGraw Hill
2. Software Engineering - Ian Sommervilla, Pearson Education
3. Software Engineering Theory and Practice- Shari Lawrence, Pearson Education Asia
4. Fundamentals of Software Engineering –Rajib Mall, PHI
5. Fundamentals of Software Engineering – Carlo Ghezzi, Mehdi Jazayeri, PHI

DIGITAL SIGNAL PROCESSING

LTA 603 **3+1+0**

Module1

Review of signals and systems. Introduction - advantages and limitations of Digital Signal Processing. Infinite Impulse Response (IIR) Filters - Signal Flowgraph- Basic Network structure for IIR filter- Direct- Cascade- Parallel Forms. Design of IIR Digital filters from analog filters- Butterworth design- Chebyshev design- design based on numerical solutions of differential equations- Impulse Invariant Transformation.

Module 2

Finite Impulse Response (FIR) Filters: Linear phase FIR filters- Frequency response of linear phase FIR filters - Location of the zeros of linear phase FIR filters. Realization of FIR- cascade - lattice design-Fourier Series method- using windows-rectangular- triangular or barlett windows- hanning- hamming- Blackman- Kaiser windows.

Module 3

Discrete fourier Transform: Properties-Circular convolution- Linear Convolution using DFT- relation between Z- Transform and DFT- Fast Fourier Transform; decimation – in time and Frequency - FFT algorithms – General Computation using Radix 2 algorithm.

Module 4

Finite word length effects in digital filters: Introduction- Number Representation - Fixed Point- Sign-Magnitude - One's-complement- Two's - complement forms - Addition of two fixed point numbers- Multiplication in Fixed Point arithmetic - Floating point numbers- Block floating point numbers- quantization - truncation- rounding - effects due to truncation and rounding- Input quantization error - Product quantization error - Co-efficient quantization error- zero-input limit cycle Oscillations - Overflow limit cycle Oscillations - Scaling- Quantization in Floating Point realization IIR digital filters - Finite Word Length Effects in FIR Digital Filters- Quantization effects in the Computation of the DFT- quantization errors in FFT algorithms.

Module 5

Applications of digital signal processing: Speech Processing- speech analysis- speech coding- sub band coding- channel vecoder- homomorphic vecoder- digital processing of audio signals- Radar signal processing- DSP based measurements systems. Equi ripple FIR design- PCM DSP chips- a general study.

References

1. Digital signal processing: Ifechor- Pearson edn.
2. Desecrate time signal processing Oppenhiem- Pearson edn.
3. Digital signal processing: Oppenhiem and Sheffer- PHI
4. Introduction to Digital signal processing: Johny R Johnson
5. Digital signal processing: Proakis and Manolakis.
6. Digital signal processing: P Ramesh Babu- Scitech Pub.

COMPUTER NETWORKS

RT 604 **3+1+0**

Module 1

Introduction: - ISO-OSI Reference Model – TCP/IP Reference Model – Comparison Network hardware-Repeaters, Routers, Bridges, Gateways, Hub, Cable Modem.

Physical Layer: - Transmission Media– ISDN system Architecture – Communication Satellites – geostationary satellites - Medium Earth Orbit Satellites- Low earth orbit satellites– Satellite v/s Fiber

Module 2

Data Link Layer: - Design issues-Error Detection and correction – Elementary Data link protocols- Sliding window protocols. .

LAN Protocols: - Static & Dynamic channel allocation in LAN's and WAN's, Multiple access protocols – ALOHA – Pure ALOHA – Slotted ALOHA – Carrier Sense Multiple Access protocols – persistent and non-persistent CSMA – CSMA with collision detection – IEEE 802.3 standards for LAN

Module 3

Network layer: -Virtual Circuits, Datagrams, Routing Algorithm – Optimality principle - Flooding - Flow Based Routing - Link state routing – Distance vector routing – Multicasting – Link state multicasting – Distance vector multicasting - Congestion Control Algorithms – General principles – Packet discarding – Choke packets - Congestion prevention policies – Traffic shaping – Leaky bucket algorithm – Flow specifications – jitter control

Module 4

Transport Layer: - Transport Service - Elements of transport protocols – Internet Transfer Protocols UDP and TCP – ATM – Principle characteristics.

Module 5

Application Layer: -Domain name system – DNS name space – Resource records – Name servers – operation of DNS - Electronic Mail – MIME

Mobile networks: - Mobile telephone systems, Bluetooth - Components – Error correction – Network topology – Piconet and scatternet – L2CAP layers – Communication in Bluetooth networks

References

1. Computer Networks (Fourth Edition): Andrew S.Tanenbaum, Pearson Education Asia/ PHI
2. An Introduction to computer networking: Kenneth C. Mansfield Jr., James L. Antonakos, Prentice-Hall India
3. Communication Networks: Leon, Garcia, Widjaja Tata McGraw Hill.
4. Computer Networks (Second Edition): Larry L Peterson & Bruce S Davie, (Harcourt India)
5. Computer Networking: James F Kurose & Keith W Ross, Pearson Education
6. Introduction to Data Communications and Networking: Behrouz, Forouzan, McGraw Hill

NETWORK COMPUTING

RT 605 **3+1+0**

Module 1

HTML Documents

Basic Tags for Font & Paragraph Formatting Lists, Tables, Frames, image Maps

Cascading Style Sheets

Style Element, Inline style sheets, Embedded style sheets, External Style sheets, CLASS Attribute, Absolute and relative positioning of elements, DIV & SPAN Tags.

Module 2

Dynamic HTML Pages

Client side scripting - Java Script – variables, Arithmetic operations – message boxes, Arrays, control statements, functions, event handling, document object model.

Dynamic updating of pages with JAVA Script.

Embedding ActiveX controls - using the structured graphics – ActiveX Control.

Module 3

Java programming – Features of Java, Creating & using classes in Java – Static classes – Inheritance – Final methods, variables and classes – Interfaces - Nested classes – Inner classes – Anonymous Inner classes – Exception handling – Creating & using exceptions, Multithreaded programs and thread synchronization, creating and using packages. Creating GUI with AWT and Swing – -JDK1.1 event model

Module 4

Network Programming with Java - Features of Java – Applets & Application – Life cycle of applets - Security features for applets - Inter applet communication – Threads & Thread synchronization – TCP/IP Programming with Java – Iterative & Concurrent servers. Datagrams, IP multicasting, RMI (Structure and Working of a simple RMI Program only)

Module 5

HTTP Protocol working – HTTP methods, GET, PUT, DELETE, POST, HEAD
Server side scripting – HTML Forms & CGI – GET & POST, Basic working of a CGI supported web server – Simple CGI program in C to validate user name & Password.
Email: Working of SMTP and POP protocols (Overview only).

Text Books

Module 1,2,5

1. Internet and World Wide Web – How to program - Deitel, Deitel & Nieto, Pearson Education Asia
2. HTML, DHTML, Java Script, Perl, CGI - Evan Bayross, BPB

Module 3,4,5

1. Java 2 Complete reference - Herbert, Schildt, Tata McGraw Hill
2. The Java Programming Language 3rd Edition - Arnold, Gosling, Holmes, Pearson Education Asia
3. Using Java 2 Platform - Joseph Weber, PHI
4. Computer Networks - Tenanbaum, PHI/ Pearson Education Asia

References

1. Unix Network Programming - Stevens W Richard, PHI
2. TCP/IP Protocol suite, 2/e - Behrouz A. Forouzan, TMH

PERSONAL COMPUTER HARDWARE

T 606 **4+1+0**

Module 1 Introduction to PC

Hardware components – study of motherboards –Different types of ports, slots and connectors-Add-on cards-Power supply– SMPS- function & operations.

Module 2 Storage Devices

Floppy – Floppy Disk Controller - Disk Physical specification & operations – Disk magnetic properties – Cylinders – Clusters – Hard disks – Hard disk drive operation – Magnetic data storage - Sectors – Disk formatting – partitioning -

Hard disk features – Hard disk data transfer modes –Programmed I/O – Direct memory access – Ultra DMA – Data addressing – Standard CHS addressing – Extended CHS addressing – Logical Block Addressing.

Module 3 Optical Storage

CD ROM, CD Technology, Sector layout, CD-R, CD-RW, CDROM, drive specifications- data transfer rate – Access time – Constant linear velocity – constant angular velocity - Buffers – Interface – Magneto optical drives – WORM devices –DVD- RAID – Holographic storage.

Module 4 Memory Management in PC

Parity – ECC – Static & Dynamic RAM – Memory Addressing – Segmented addressing - 64 KB Limits – 640 KB barrier – Logical, segmented, virtual, linear and physical memory addresses – Extended and Expanded memory – Cache memory – Video memory – HMA - Flat memory model – Advanced memory technologies.

Module 5 Bus Structures

ISA, PCI, PCMCIA, AGP, USB, Hard Disk Interfaces – IDE, EIDE, ATA – Communication ports – Serial – Parallel port – Keyboard / Mouse Interface connectors.

References

1. PC Hardware Complete Reference - Craig Zacker & John Rourke, Tata McGraw Hill
2. Inside the PC (8^{th} Edition) - Peter Norton, Techmedia Publications
3. The Indispensable PC Hardware Book - Messmer, Pearson Education
4. Troubleshooting and Repairing Your PC - Corey Candler, Wiley
5. Upgrading and repairing PC's (4^{th} edition) - Scott Mueller, Pearson Education
6. IBM PC Assembly Language Programming - Abel, PHI
7. PC Upgrading Maintenance & Trouble shooting guide - Dr. S. K. Chauhan, Kataria

SYSTEMS PROGRAMMING LAB

T607 **0+0+3**

1. Symbol table construction
2. Single pass and two pass assembler.
3. Macro processor module binder (with limited Instruction set)
4. Lexical analyzer.
5. Bottom Up and Top Down Parser.
6. Code generation.
7. Generation of code for linkers & loaders.

8. Study on UNIX: UNIX Shell Programming, Basic exercises in Processor Management – concurrent processing – memory management – implementation of shared memory and semaphores for process synchronization – device management – dead lock handling, implementation of simple protocols

(Any experiment according to the syllabus of T 502 and RT 505 can be substituted.)

MINI PROJECT

T608 **0+0+3**

The aim of the mini project is to prepare the students for the final year project. The topic for the mini project should be simple as compared to the main project, but should cover all the aspects of a complete project.

SEVENTH SEMESTER

OBJECT ORIENTED MODELING AND DESIGN

RT 701 **2+1+0**

Module 1

Introduction: object oriented development-modeling concepts – object oriented methodology – models – object oriented themes-Object Modeling– links and associations – advanced links and association concepts – generalization and inheritance - grouping constructs – a sample object model- Advanced Object Modeling: aggregation – abstract classes – generalization as extension and restriction – multiple inheritance – metadata – candidate keys – constraints

Module 2

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

Functional modeling: Functional models – Data Flow Diagrams - Specifying operations – Constraints – A sample functional model – Relation of functional to Object and Dynamic models.

Module 3

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

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

Other Models: Booch's Methodology- Notations, models, concepts. Jacobson Methodology- architecture, actors and use-cases, requirement model, Analysis Model, Design model, Implementation model and Test Model-Unified Modeling Language (UML).

Text Books

1. Object Oriented Modeling and Design -JamesRumbaugh, Prentice Hall India
2. Object Oriented Analysis and Design with Applications - Grady Booch, Pearson Education Asia

References

1. Object Oriented Software Engineering - Ivan Jacobson, Pearson Education Asia
2. Object Oriented Software Engineering - Berno Bruegge, Allen H. Dutoit, Pearson Education Asia
3. Object Oriented Analysis and Design using UML - H. Srimathi, H. Sriram, A. Krishnamoorthy
4. Succeeding with the Booch OMT Methods -A practical approach - Lockheed Martin, Addison Wesley
5. UML and C++ practical guide to Object Oriented development - Richard C.Lee & William, Prentice Hall India.

COMPUTER GRAPHICS

RT 702 **3+1+0**

Module1

Introduction to Computer Graphics: Basic concepts in Computer Graphics – Applications of Computer Graphics, Interactive Graphics system – Raster scan and Random scan systems – Generating a raster image, Application of raster scan graphics. Video Display Devices, Display processors – Display files – graphical input & output devices.

Module 2

2D Graphics: Line drawing algorithms – DDA, Bresenham's – Bresenham's Circle drawing algorithm - 2D Transformations, Clipping – Line clipping – Polygon Clipping, Windowing.

Module 3

3D Graphics: 3D display methods, 3D Object Representation – Polygon Surfaces – Quadratic surfaces – Spline Representations – Bezier Curves and Surfaces – B-Spline Curves and Surfaces, 3D Transformations.

Module 4

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

Surface Rendering Methods-Basic illumination Models – Polygon–rendering Methods, Gouraud Shading, Ray-Tracing Methods.

Module 5

Advanced Technologies: Fractals – Classification of Fractals – Self-Squaring Fractals, Animation- Raster Animation, Morphing.

Text Book

1. Computer Graphics (C version) - Donald Hearn & Pauline Baker (Pearson Education Asia)

References

1. Computer Graphics- Donald Hearn & Pauline Baker (Prentice Hall of India)
2. Principles of Interactive Computer Graphics – William .N. Newman, Robert .F. Sproull (second edition), McGraw Hill edition
3. Computer Graphics Principles & Practice - Foley, VanDam, Feiner, Hughes (second edition in C), Addison Wesley
4. Fundamentals of Computer graphics & - D. P. Mukherjee, Prentice Hall of India multimedia
5. Java 2 complete reference - Herbert, Schildt, Tata McGraw Hill
6. Computer Graphics - Roy A Plastack & Gordon Kally (Schanmi Series McGraw Hill edition)

MODERN COMMUNICATION SYSTEMS

T 703 **3+1+0**

Module 1 Optical Fibre communication

Advantages, Disadvantages, System block diagram, Fibre types, Cable configurations, Light propagation through optical fibre, Fibre configurations, Acceptance angle and acceptance cone, Cable losses, Light sources, Light detectors.

Module 2 Microwave communication

Advantages, Analog Vs Digital Microwave, Frequency modulated microwave radio system – Transmitter, Repeater, Receiver (block diagram only) Microwave terminal station – transmitter and receiver, path characteristics – fading.

Module 3 Satellite Communication

Satellite orbits, Geostationary satellites, Satellite classifications, Spacing, Frequency allocation, Satellite uplink and down link models (block diagram only), Earth station, Multiple accessing – FDMA, TDMA, CDMA, Satellite Radio Navigation, GPS (Basic idea only)

Module 4 Mobile Communication

Mobile communication services, Cellular telephone, Concepts – Cells, Frequency reuse, Interference, Cell splitting, Segmentation and Dualisation, Call system layout, Call processing, Analog and Digital Cellular Telephones, Block diagram of a typical transceiver, PCSS Mobile telephone system.

Module 5 Advanced Concepts

Concepts of Wireless LAN, ISDN-Protocol, Architecture, B-ISDN, ATM
Blue tooth Technology

WAP and WWW- Architecture, Protocols and Applications.

Text Book

1. Electronic Communication Systems, Fundamentals Through Advanced, 4th Edn - Wayne Tomasi, Pearson Education.

References

1. Electronic Communication Systems, TMH, 4th Edition. - Kennedy
2. Electronic Communications, PHI, 4th Edition. - Roddy & Coolen
3. Mobile Communications - Jochen Schiller, Pearson Education.
4. Electronic Communication systems, 3rd Edition - Frank R Dungan, VikasThomson Learning

MULTIMEDIA TECHNIQUES

T 704 **2+1+0**

Module 1 INTRODUCTION

Definition of multimedia, multimedia, hardware, software applications and software environments, - Media Types - Analog and digital video, digital audio, music and animation - Analog & Digital video - Memory storage - Basic tools - Authoring tools.

Module 2 BUILDING BLOCKS

Text - Hyper text - Sound - Sound cards - Standards - Image - Image types - Image compression, RLE, JPEG, MPEG - Fractal and Wavelet Compressions - Image file types - Animation - Capture and Playback techniques. (basic ideas only)

Module 3 MULTIMEDIA ENVIRONMENTS

The Compact Disc family, CD-interactive, Digital Video Interactive, QuickTime, Multimedia PC and Microsoft Multimedia Extensions.

Module 4 MULTIMEDIA PROGRAMMING

Framework: Overview, Media classes, Transform classes, Format classes and Component classes - Problems related to programming - Composition, Synchronisation, Interaction, Database integration.

Module 5 ADVANCED MULTIMEDIA

Moving pictures - Techniques realistic image synthesis, Virtual Reality - Full motion digital video - Video capture techniques - multimedia networks - Desktop video conferencing - Future multimedia.

References

1. Multimedia Programming Objects, Environments & Framework.- Simon J. Gibbs, Dionysios C. Tsischritziz (Addison-Wesley Publishing Co.)
2. Multimedia: Computing, Communications andApplications- Ralf Steinmentz and Klara Nahrstedt, Pearson Education.
3. Multimedia making it work - Tay Van Ghan – Osborne Tata Mcgraw Hill
4. Authoring Interactive multimedia - Arch C Luther
5. Optimizing your Multimedia PC - L.J. Skibbe, Susan Lafe Meister - Comdex
6. Multimedia Bible - Winn L. Rosch, Sams
7. Multimedia in Action - James E. Shuman, Vikas Publication
8. Multimedia Power Tools - Peter Jellam, Random house Electronic Pub.
9. Multimedia Computing - Mathew E. Hodger & Russel M. Sasnett, Addison wesley
10. Integrated Multimedia Systems - Palikom, The communication Wall Overview

WEB TECHNOLOGIES

RT 705 **2+1+0**

Module 1

Introduction to SGML – features - XML, XML as a subset of SGML – XML Vs HTML – Views of an XML document – simple XML documents – Starting & Ending of Tags – Attributes of Tags – Entity References – Comments - CDATA section

Module 2

Document Type declarations – Creating XML DTDs – Element type declaration – Attribute List Declaration – Attribute types – Attribute defaults – Displaying XML Data in HTML browser as HTML tables – Storing XML data in HTML document – Converting XML to HTML with XSL minimalist XSL style sheets – XML applications

Module 3

Java Beans: Features – Designing Java Beans – Creating and using properties – Induced - bound and constrained properties - using and creating events – Introspection – creating & using Beanlnfo clauses – customization – providing custom property editors and GUI interfaces.

Module 4

JSPs - Creating simple JSP Pages – templating – Request time expression – Request & Response objects – Reading parameter values – Using Javabeans in JSPs - Reading & setting Properties of JavaBeans – Connecting forms & bean properties – Serialized beans – declaring variables & methods in pages – scriptlets – conditionals, loops & execution handling in JSPs with scriptlets – Accessing beans via scriptlets.

Module 5

EJB – Basics of EJB – Types of Beans – Development of Session Beans – Steps – Creating & Implementing Interfaces – Writing Deployment descriptors – Packaging and deploying bean - using the bean from a client – Development of stateful session bean. Entity beans – Features (Basics of developing and using entity beans)

References

Module1, 2

1. XML by Example: Building Ecommerce applications - Sean McGrath, Pearson Education Asia

Module 3

1. Using JAVA 2 Platform Special Edition - Joseph L. Weber, Prentice Hall of India
2. Java 2, AWT, Swing, XML and JavaBeans Programming Black Book - Steven Holzner, Wiley Dreamtech

Module 4

1. Java Server pages - Larne Pekowsky – Pearson Education Asia
2. JSP: Java server pages - Barry Burd, IDG Books India

Module 5

1. Mastering Enterprise Java Beans and the Java 2 Platforms, Enterprise Edition - EdRoman (WILEY computer publishing)
2. EJB Design Patterns - Floyd Marinescu

Additional Reference

1. Internet & Web Technologies - Raj Kamal, TMH

ELECTIVE -I

T 706 **3+1+0**

LIST OF ELECTIVE SUBJECTS

1.	CMELRPTA 706-01	Optimization Techniques
2.	T 706-02	Digital Image Processing
3.	RT 706-03	Principles of real time systems
4.	RT 706-04	Windows Programming
5.	RT 706-05	Mobile Computing
6.	RT 706-06	Software Architecture
7.	T 706-07	Optical Communication

Note

New Elective subjects related to the recent trends in Information Technology can be added to this list. Institutions offering such courses should submit the detailed syllabus and get it approved from the University before offering the course.

OPTIMIZATION TECHNIQUES (ELECTIVE - I)

CMELRPTA 706-1 **3+1+0**

Module1 Classical optimization techniques

Single variable optimization – Multivariable optimization with no constraints – Hessian matrix – Multivariable saddle point – Optimization with equality constraints – Lagrange multiplier method – Multivariable optimization with inequality constrains – Kuhn- Tucker conditions.

Module 2 Constrained multivariable optimization

Elimination methods – unrestricted search method – Fibonacci method – Interpolation methods – Quadratic interpolation and cubic interpolation methods.

Module 3 One-dimensional unconstrained minimization

Gradient of a function – Steepest descent method – Newton's method – Powells method – Hook and Jeeve's method.

Module 4 Integer – Linear programming problem

Gomory's cutting plane method – Gomory's method for all integer programming problems, mixed integer programming problems.

Module 5 Network Technique

Shortest path model – Dijkstra's Algorithm – Floyd's Algorithm – minimum spanning tree problem – PRIM algorithm – Maximal Flow Problem algorithm.

References

1. Optimization theory and application - S.S. Rao, New Age International P. Ltd.
2. Optimization Concepts and applications in Engineering - A. D. Belegundu, T.R. Chandrupatla, Pearson Education Asia.
3. Principles of Operations Research for Management - F. S. Budnick, D. McLeavey, R. Mojena, Richard D. Irwin, INC.
4. Operation Research an introduction - H. A. Taha, Eastern Economy Edition.
5. Operation Research – R. Pannerselvam, PHI

DIGITAL IMAGE PROCESSING

T 706-2 **3+1+0**

Module 1

Introduction to Digital Image Processing, The Fourier and Z-Transform of Multi dimensional Sequences, Digital image processing in practice, Digitalizing images, Characteristics of an image digitiser, Types of Image Digitisers. Image processing software, Software organization, processing sequence the gray level histogram, Introduction to histograms, Uses of histograms, Relations between histogram and image.

Module 2

Point operations, Uses, Linear point operations, Point operations and the histogram, Applications of point operations. Introduction to algebraic operations, Applications, Geometric operations, Grey level interpolation, Spatial transformation, applications, geometric operations, linear filtering theory – Harmonic signals and complex signal analysis.

Module 3

Convolution operation, Applications of digital filtering some useful functions, Convolution filtering – Dimension sampling, Reconstruction of images from its samples, Nyquist rate, Aliasing and foldover frequencies. Non rectangular grid sampling, Practical limitation in sampling and construction. Display aperture and interpolation, Moire effect and flat field response.

Module 4

Processing sampled data, Computing data, Truncation, Optics and System analysis, Diffraction limited optical systems, Abbreviation in an imaging system. Applications of Digital image processing – Image restoration, Approaches and models, Super resolution, System identification, DTF from degraded image spectrum, noise modeling.

Module 5

Image Segmentation by Thresholding, Optimal threshold selection, Gradient optical threshold selection, Gradient based methods, Region growing techniques – Segmented image structure. Measurement and classification size, shape, Measurements, Feature selection, Classification 3 dimensional image processing optical sectioning, CAT Stereo – Metric ranging, Stereoscopic image display – shaded surface display.

References

1. Digital Image Processing- Kenneth R. Castleman, Prentice Hall.
2. Digital Image Processing – Rafael C Gonzalez & Richard E Woods, Pearson Education
3. Discrete Time Signal Processing- Oppenheim and Schafer, Prentice Hall of India.
4. Fundamentals of Digital Image Processing- Anil K. Jain, Prentice Hall of India.
5. Introducing Digital Image Processing- Jensen J.R, Prentice Hall.

6. Image Processing, Analysis & Machine Vision –Sonka, Hlavac & Boyle, Thomson Learning

PRINCIPLES OF REAL TIME SYSTEMS (ELECTIVE - I)

RT706-3 **3+1+0**

Module 1

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

Real time kernel – polled loop systems, co-routines, interrupt driven systems – sporadic, fixed rate systems, hybrid systems, task control block - task status, scheduling – uniprocessor scheduling – traditional rate monotonic, rate monotonic deferred server, EDF, IRIS tasks – multiprocessor scheduling – utilization balancing algorithm, next-fit, bin- packing algorithm, myopic offline, buddy strategy (no need of proofs) fault tolerant scheduling.

Module 3

Communication – Communication Media and message sending topologies, network architecture issues, protocols – contention – based, token - based, stop and go multiloop, polled bus, hierarchal, round robin, fault tolerant routing – clocks and synchronization – fault tolerant synchronization in hardware, synchronization in software.

Module 4

Fault tolerance – definition, cause of failure, fault types, fault detection and containment, redundancy – hardware, software, time, information, integrated failure handling – reliability – parameter values – series – parallel systems, NMR clusters, combinational model, master chain model, fault latency, transient faults, software error models.

Module 5

Programming Languages – Desired language characteristics, Real time databases, characteristics, main memory databases, Transaction, Disk schedule algorithms, Databases for hard real time systems, maintaining serialization constituency.

Text Book

1. Real Time Systems - C.M Krishna, Kang G. Shini (M?C Graw Hill)

Reference

1. Real Time Systems, Design & Analysis - Philip Laplante (IEEE)

WINDOWS PROGRAMMING (ELECTIVE - I)

R706-4 **3+1+0**

Module 1

Introduction -Concepts of Windows Programming- Event Driven Programming – Languages that support Windows Programming – Visual Basic – Java – Visual C++

Visual Basic Programming: Basic Language features – Variables, data types, constants, control statements – Forms – Creating and Using basic Controls – text boxes, labels, buttons - Event handling procedures – Properties Window – Common properties for Controls. Message boxes

Module 2

Visual Basic Programming (Contd) Standard Controls – List boxes, Comboboxes, Image box, picture box, Shape controls, Timer, Scrollbars, Frames, Checkboxes, Option Boxes – Frames - File, Drive and Directory List boxes - MDI and SDI interfaces – Menus

Module 3

ActiveX controls - RichTextBox, Tree View Control, List view Control, Progessbar, Flexgrid Control, Common dialog Controls – Font, File, Print Dialogs – Creating Custom activex controls – Creating Events and properties for ActiveX controls.

Module 4

Graphics and Multimedia – Drawing Graphics in Windows - setting colors - Drawing text, lines, ellipses, arcs, circles – plotting points –Filling figures with colors and patterns – Using clipboards to transfer images between applications Printing graphics and text – Creating animations with Picture clip control - applying image effects – stretching, flipping, embossing, egraving, blurring, sweeping – Using the Multimedia Control – Handling multimedia Errors

Module 5

Database Access – Using DAO, RDO and ADO for accessing databases – Creating tables, inserting, deleting and updating records – Using the Data Control – Using the ADO Data Control

Using Windows API: Using DLL Procedures in Visual Basic – Declare statement – Handling C++ and Windows Data types – Playing sound with API funtions – Capturing Images from the screen – Handling mouse outside Applications window – Making an ‘always on top’ window.

References

1. Visual Basic 6 Programming Black Book - Steven Holzner (Dreamtech Press)
2. Programming Windows fifth Edition - Charles Petzlod (Microsoft Press)
3. Visual Basic - Ivan Petrosaus (BPB)
4. Visual Basic - Garry Cornell (BPB)
5. Using Visual Basic - Resselman (PHI)

MOBILE COMPUTING (ELECTIVE - I)

R706-5 **3+1+0**

Module 1

Introduction - Short History, Mobile telephone systemsSimplified Reference model. Multi carrier modulation. Cellular systems.

Module 2

Wireless Communication Systems -Telecommunication Systems-GSM & DECT-Architecture and Protocols.Satellite Systems-GEO, LEO, MEO.

Broadcast Systems-Broadcast transmission, Digital Audio Broadcasting-Multimedia Object Transfer Protocol. Digital Video Broadcasting.

Module 3

Wireless LAN and ATM - Infra red and Radio Transmission, Infrastructure and ad hoc networks, 802.11- Bluetooth- Architecture, Applications and Protocol, Layers, Frame structure. Comparison between 802.11 and 802.16.

Wireless ATM- Services, Reference Model, Functions, Radio Access Layer. Handover- Reference Model, Requirements, Types, handover scenarios.

Location Management, Addressing, Access Point Control Protocol (APCP).

Module 4

Mobile Network and Transport Layers - Mobile IP- Goals, Requirements, IP packet delivery, Advertisement and discovery. Registration, Tunneling and Encapsulation, Optimization, Reverse Tunneling, IPv6, Dynamic Host configuring protocol, Ad hoc networks – Routing, DSDV, Dynamic source routing. Hierarchical Algorithms.

Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Transmission.

Module 5

Wireless Application Protocol & World Wide Web

WAP- Architecture, Protocols-Datagram, Transaction, Session.-Wireless Application Environment-WML- Features, Script- Wireless Telephony Application.

WWW- HTTP, Usage of HTML, WWW system architecture.

Text Book

1. Mobile Communications – Jochen Schiller, Preason Education Asia

References

1. Computer Networks – Andrew S. Tanenbaum, PHI
2. Communication Networks -Fundamental Concepts and Key Architectures Leon-Garcia & Indra Widjaja, Tata McGraw Hill

SOFTWARE ARCHITECTURE (ELECTIVE - I)

R706-6 **3+1+0**

Module 1

Introduction to Software architecture – Architectural styles – pipes and filters – data abstract and object oriented organization – Event based, implicit invocation, Layered systems – Repositories – Interpreters – Process control – Heterogeneous Architectures.

Module 2

Shared Information Systems – Integration in software Development Environment – Integration in the design of Buildings – Architectural structures for based information systems

Module 3

Guidance for user interface architecture Artificial design space – Formal models and specifications-The value of architectural formalism – Formalizing the architecture of a specific system – Formalizing the architectural style – Formalizing an architectural design space

Module 4

Linguistic issues - Requirements for architecture – Description languages – first class connectors – Adding implicit invocation to factorial processing languages.

Module 5

Tools for architectural design – Unicon – Exploiting style in architectural design environments – Architectural interconnection

Reference

1. Software Architecture – perspectives on an emerging discipline- Mary Shaw, David Garlan, PHI

OPTICAL COMMUNICATION

T 706-7 **3+1+0**

Module 1

Optical fibres: Graded index and step index fibres- refractive index profiles, numerical aperture propagation of optical beams in fibres. Mode characteristics and cut off conditions (mathematical derivations required). MCVD technique for fibre fabrication, losses in fibres- attenuation, absorption, scattering and radiation losses.

Module 2

Signal distortion in fibres – Intra model and inter model distortion – group delay , material and wave guide dispersion. Optical sources : Light Emitting diodes – LED structures – surface and edge emitters, mono and hetero structures – internal – quantum efficiency , injection laser diode structures – comparison of LED and ILD.

Module 3

Optical Detectors: PN junction photo diodes, PN Photo detectors, Avalanche photo diodes, construction, characteristics and properties, Comparison of performance. Optical amplifiers (OAs): Need for OAs, Principles of operations of various OAs – SLAs, fibre amplifiers (FRA, FBA, EDFA). Comparison of performance.

Module 4

Optical communication systems: Direct detection and heterodyne receivers. SNR, advantage of coherent optical communications. Optical digital communications, Transmission link analysis, point to point links – system consideration – link power budget and rise time budget.

Module 5

Classification of light wave systems – linear systems: Intensity modulated Direct Detection (IMDD) and coherent systems. Non linear systems. Introduction to solitons –Solitons communications using lumped amplifiers, Bit error Rate performance.

References

1. Optical Fibre Communications- Gerd Keiser, Mc Graw Hill.
2. Fiber Optic Communications, 4th Edition. - Joseph C.Palais, Pearson Education.
3. Optical Fibre Communications- Senior, PHI.
4. Fibre Optic Communication – D C Agarwal, Wheeler Pub.
5. Optical Communication Components & Systems – Franz & Jain, Narosa Publishing.
6. Optical Communication Systems – Gowar, PHI

MULTIMEDIA LAB

T 707 **0+0+3**

1. Programs for
    a. Point plotting
    b. Line and circle drawing
    c. Line and Polygon clipping
    d. Transformations
    e. Hidden line elimination
    f. Curves
2. Web page design with HTML
3. Multimedia development using PowerPoint, 3D Studio, Adobe Photoshop.
4. Familiarization of latest multimedia development tools.

COMMUNICATION SYSTEMS LAB

T 708 **0+0+3**

1. Analog optical communication experiments based on optical communication kits / benches
2. Digital optical communication experiments based on optical communication kits / benches
3. Digital communication experiments based on trainer kits.
4. Design of digital filters (software simulation using MATLAB/ SIMULINK)
5. FFT, DFT Implementation using software simulation (MATLAB/ SIMULINK)
6. Study of transmission media – coaxial cables – Types-Hubs-Bridges-Repeaters-Routers-Gateways –Switches
7. Study of modems-NIC-Cable connectors and their usages
8. Study of Internet-accessing, services and applications
9. Simple network programming experiments in Java.

PROJECT & SEMINAR

T 709/ T 808 **0+0+3**

Each student is required to present a technical paper on subject approved by the department. The paper should, in general, reflect the state of the art technology. Report should be submitted to the department.

In addition to the seminar, the students shall undertake a project work (as a team or individually) in the 7^{th} semester itself in consultation with the guide (s). On completion of the project work in the 8^{th} semester, each student shall present the work done before a panel of staff members, and submit a report of the project work to the department.

EIGHTH SEMESTER

SECURITY IN COMPUTING

RT 801 **2+1+0**

Module1

Introduction: Security basics – Aspects of network security – Attacks – Different types – Hackers – Crackers – Common intrusion techniques –Trojan Horse, Virus, Worm – Security services and mechanisms.

Module 2

OS Security – Protection Mechanisms –Authentication & Access control – Discretionary and Mandatory access control – Authentication mechanisms – Official levels of computer security (DoD) - Security breaches – Concept of a hole - Types of a holes – Study of the security features for authentication, access control and remote execution in UNIX, WINDOWS 2000

Module 3

Cryptography: Basic Encryption & Decryption – Transposition & substitution ciphers – Caesar substitution – Polyalphabetic substitutions – Crypt analysis – Symmetric key algorithms – Fiestel Networks – Confusion – Diffusion – DES Algorithm – Strength of DES – Comparison & important features of modern symmetric key algorithms – Public key cryptosystems – The RSA Algorithm – Diffice Hellman key exchange – comparison of RSA & DES – Message Authentication & Hash functions – Digital signature

Module 4

Network & Application Security: Kerberos – X509 Authentication service – IP security Architecture – Secure socket layer – Electronic mail security – Pretty Good privacy – S/MIME – secure Electronic Transactions – Firewalls - Security mechanisms in JAVA platform – Applet security – Security policy and SecurityManager.

Module 5

Database Security: - Security issues – SQL security DAC based on granting & revoking privileges – MAC 4 multilevel security – Statistical database security.

Text Books

Module1, 4

1. Network Security Essentials Applications & Standards - William S., Pearson Education Asia

Module2

1. Modern operating System - Andrew S. Tanenbaum, Pearson Education Asia
2. Using JAVA 2 platform - Joseph L. Weber, Prentice Hall of India

Module3

1. Cryptography and network security principles and practice - William Stallings, Pearson Education Asia
2. Information theory coding and cryptography - Ranjan Bose, TMH

Module 4,5

1. Designing security Architecture Solutions - Jay Ramachandran, Wiley Dreamtech

Module 5

1. Database Security Mechanisms for Computer Network - Sead Muftic, John wiles

References

1. Security in Computing - Charles P. Pfleeger IEEE Computer Science Press
2. Database Security Mechanisms for Computer Network - Sead Muftic, John wiles
3. Designing Security Architecture Solutions – Jay Ramachandran, Wiley dreamtech
4. Firewalls Complete - Marcus Gonsalvus, TMH
5. Networking Technologies - Jaisal, Galgotia Publication
6. Security in Computer Operating System - G.O.Shea, NCC Blackwell Manchester Oxford
7. Mastering JAVA security: Cryptography, Algorithms and Architecture - Rich Helton, Wiley Dreamtech
8. Implementing IPv6 - Mark A. Miller P.E, IDG Books

INFORMATION SYSTEMS AND MANAGEMENT

T 802 **3+1+0**

Module 1

Introduction, Management and Systems, Classical and systems approach to organization, Organizational theory, Management and organizational behaviour, Factors affecting productivity, Leadership Styles, Organizational Effectiveness, Managerial Grid, Tasks and functions of Management, General management system. ERP & Related technologies, MIS, DSS, EIS.

Module 2

The management process and information needs, Data Bank concept, Information systems for decision making, Automation of Decision making, Management science and the Decision rule, Decision assisting Information systems – MIS, DSS, EIS, ERP.

Module 3

Management Information systems, Strategic and Project Planning for MIS, Conceptual system design, detailed system design, Implementation and maintenance. (Brief study only)

Module 4

ERP, Introduction, ERP-modules, benefits, market. Implementation Life cycle, Vendors, Consultants and Users, Future direction in ERP.

Module 5

Decision Support Systems – Managers and decision making, Decision Support Tools, Concept of DSS, Components, Basic concepts of Data Mining, Data Warehousing and Knowledge Management. Knowledge based decision support – Basic concepts only.

References

Module 1,2&3

1. Information Systems for Modern Management - Murdick, Ross & Claggett, PHI.

Module 4

2. Enterprise Resource Planning- Alexis Leon, TMH

Module 5

3. Decision Support Systems And Intelligent systems - Efraim Turban, Jay E. Aronson, Pearson Education.
4. Managing Information Technology- Bhushan Dewan, Vikas Publishing

E-COMMERCE

T803 **2+1+0**

Module1 Introduction to Electronic Commerce

E-Commerce Framework, Anatomy of E-Commerce Applications, E-Commerce Consumer & Organization Applications. E- Commerce and World Wide Web – Internet Service Providers, Architectural Framework for Electronic Commerce.

Module 2 Electronic Payment Systems

Types of Electronic Payment Systems, Digital Token Based Electronic Payment System, Smart Cards, Credit Cards, Credit card based Payment system, Online payment process, Risk in Electronic Payment Systems, Designing Electronic Payment Systems.

Module 3 Electronic Data Interchange

EDI – Architecture, Application in Business, EDI-Legal, Security and Privacy Issues, EDI standardization, EDI Envelope for Message Transport, Internet based EDI, EDI and MIME, Value added Network. EDI Gateways.

Module 4 Intra Organizational E-Commerce

Internal Information System, Work-flow Automation and Coordination, customization and internal Commerce, Supply Chain Management, Document

Library, Types of Digital Documents, Technological Architecture for Internal Commerce, Corporate Data Warehouses, advantages of Data Warehouses.

Module 5 Recent Trends in E-Commerce

Marketing on the Internet, Advertising on the Internet, Multimedia in E-Commerce, Video Conferencing with Digital Videos, Broad Band Telecommunication, Frame & Cell Relays, Switched Multimegabit Data Service (SMDS), Asynchronous Transfer Mode, Mobile Computing and Wireless Computing.

Text Book

1. Frontiers of Electronic Commerce - Ravi Kalakota & Andrew B Whinston/Pearson Education

References

1. Global Electronic Commerce – J Christopher Westland & Theodore H K Clark
2. E- Commerce The cutting edge of Business - Kamlesh K Bajaj & Debjani Nag / Pearson Education

ARTIFICIAL INTELLIGENCE

RT 804 **3+1+0**

Module 1

Introduction – Definitions – AI application areas – Example problems- Problems and problem spaces - Problem characteristics – Problem solving by searching, Searching strategies – Breadth first search, Uniform cost search, DFS, Depth – Limited search, Bi-directional search – Constraint satisfaction search.

Module 2

Informed search, A* algorithm, Heuristic functions – Inventing Heuristic functions - Heuristic for constraint satisfaction problem – Iterative deepening – Hill climbing – Simulated Annealing.

Module 3

Game playing and knowledge structures – Games as search problem – Imperfect decisions – Evaluation functions – Alpha – Beta pruning – state of art game programs, Introduction to frames and semantic nets.

Module 4

Knowledge and Reasoning – Review of representation and reasoning with Logic – Inference in first order logic, Inference rules involving quantifiers, modus ponens, Unification, forward and backward chaining – Resolution.

Module 5

Introduction to Prolog – Representing facts – Recursive search – Abstract data types – Alternative search strategies – Meta predicates, Matching and evaluation, meta interpreters – semantic nets & frames in prolog.

Text Books

Module 1,2,3,4

1. Artificial Intelligence – A modern approach - Stuact Russell – Peter Narang, Pearson Education Asia
2. Artificial Intelligence - Rich E. - McGraw Hill Booq Company

Module 5

3. Artificial Intelligence - George F Luger, Pearson Education Asia

Reference

1. An Introduction to Artificial Intelligence – Eugene Charniak & Drew McDermot, Pearson Education Asia

ELECTIVE - II

T 805 **3+1+0**

List of elective subjects

1.	CMELRPTA 805-01	Advanced Mathematics
2.	RT 805-02	Client Server Computing
3.	T 805-03	High Performance Computing
4.	RT 805-04	Analysis and Modeling of Digital Systems
5.	RT 805-05	Distributed Computing
6.	RT 805-06	User Interface Design
7.	T 805-07	Satellite & Mobile Communication
8.	T 805-08	Data Compression

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ADVANCED MATHEMATICS (ELECTIVE - II)

CMELRTA 805-1 **3+1+0**

Module 1 Green's Function

Heavisides, unit step function – Derivative of unit step function – Dirac delta function – properties of delta function – Derivatives of delta function – testing functions – symbolic function – symbolic derivatives – inverse of differential operator – Green's function – initial value problems – boundary value problems – simple cases only

Module 2 Integral Equations

Definition of Volterra and Fredholm Integral equations – conversion of a linear differential equation into an integral equation – conversion of boundary value problem into an integral equation using Green's function – integral equation with separable Kernels – Integral equations of convolution type – Neumann series solution.

Module 3 Gamma, Beta functions

Gamma function, Beta function – Relation between them – their transformations – use of them in the evaluation certain integrals – Dirichlet's integral – Liouville's extension of Dirichlet's theorem – Elliptic integral – Error function.

Module 4 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 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.

References

1. Linear Integral Equation - Ram P.Kanwal, Academic Press, New York
2. A Course on Integral Equations - Allen C.Pipkin, Springer – Verlag
3. Advanced Engg. Mathematics - H.K.Dass, S.Chand
4. Advanced Engg. Mathematics - Michael D.Greenberge, Pearson Edn. Asia
5. Numrical methods in Engg. &Science - B.S.Grewal, Khanna Publishers
6. Generalized functions - R.F. Hoskins, John Wiley and Sons.
7. Principles and Techniques of Applied Mathematics - Bernard Friedman, John Wiley and sons
8. Principles of Applied Mathematics - James P.Keener, Addison Wesley.
9. Numerical methods - P.Kandasamy, K.Thilagavathy, K.Gunavathy, S.Chand & co

CLIENT SERVER COMPUTING (ELECTIVE - II)

RT 805-2 **3+1+0**

Module 1 INTRODUCTION

History - uses - Client Server Computing & Hetrogenous Computing - Cross Platform Computing Distributed Computing - The costs of Client Server Computing - Advantages and Disadvantages - Client Server Databases.

Module 2 DESIGNS

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 3 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 4 SYNCHRONIZATION

Scheduling implementations - processing queues - context switching pre emptive systems - critical sections - mutual exclusion - semaphores - semaphore implementations in NT & Netware.

Module 5 COMMUNICATIONS

Network communication - Inter process communication - Building portable client server applications.

References

1. Novell's Guide to Client-Server Application & Architecture - Jeffrey D.Schqnk, Novell Press.
2. Client Server Computing - Dawna Travis Dewire, McGraw Hill.
3. Developing Client Server Applications -W.H.Inman, BPB.
4. Guide to Client Server Databases - Joe Salemi, BPB.
5. Client Server Strategies - David Vaskevitch, Galgotia.

HIGH PERFORMANCE COMPUTING

T 805-3 **3+1+0**

Module1

Introduction to parallel processing - Trends towards parallel processing - Parallelism in uniprocessor - Parallel computer structures-Architecture classification schemes - Indian contribution to parallel processing.

Module 2

Principles of pipelining and vector processing - Linear pipelining - Classification of pipeline processors - General pipelines - Instruction and Arithmetic pipelines – Design of Pipilined instruction unit-Prinnciples of Designing Pipeline Processors-Instruction prefetch and branch handling- Dynamic pipelines - Architecture of Cray-1.

Module 3

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 4

Multiprocessor architectures and Programming - Loosely coupled and Tightly coupled multiprocessors - Interconnection networks - Language features to exploit parallelism - Process synchronisation mechanisms.

Module 5

Dataflow computers - Data driven computing and Languages - Data flow computers architectures - Static data flow computer -Dynamic data flow computer -Data flow design alternatives.

Text Book

1. Computer Architecture & Parallel Processing - Kai Hwang & FayeA.Briggs, McGraw Hill

References

1. Elements of Parallel computing - V. Rajaraman - PHI
2. Super Computers - V. Rajaraman - Wiely arstern
3. Parellel Processing for Super Computers & AI - Kai Hwange & Douglas Degneot
4. Mc Graw Hill
5. Advanced computer Architecture - Sima, Fountain and Kacsuk, Pearson Edn
6. High Performance Computer Architecture - Harold S. Stone, Addison Wesley.
7. Advanced Computing - Vijay P.Bhatkar, Asok V.Joshi, Arirban Basu, Asok K.Sharma.
8. Parallel Computers, Architecture and Programming – Rajaraman & Murthy, PHI

ANALYSIS AND MODELING OF DIGITAL SYSTEMS (ELECTIVE - II)

RT 805-4 **3+1+0**

Module 1

Introduction to VHDL: Digital system design - Role of hardware description language- Modeling digital systems – events, propagation delays and concurrency – waveforms and timing – signal values – shared signals – simulation model – synthesis model – Field Programmable Gate Arrays.

Module 2

Basic language concepts simulation: signals – Entity architecture – concurrent statements – Constructing VHDL models using CSAs – delays.
Synthesis: Interface from declarations, simple CSA statements, conditional signal assignment statements, and selected signal assignment statements.

Module 3

Modeling behavior Simulation: The process construct – programming constructs – the wait statement – attributes – generating clocks and periodic waveforms – using signals – modeling state machines – constructing VHDL models – programming errors.
Synthesis: language directed view – inference from within process – issues – signals vs. variables – latch vs. flip flop – the wait statement – state machine.

Module 4

Modeling structure: Describing structure – structural VHDL model – hierarchy, abstraction and accuracy – generics – component instantiation and synthesis – the generate statement
Subprograms: functions – procedures – sub program and operator overloading – packages and libraries.

Module 5

Basic I/O operations – the package TEXTIO – ASSERT statement – terminology and directory structure – simulation mechanics – synthesis mechanics – identifiers – data objects – data types – operators.

Text Book

1. Introductory VHDL - Sudhakar Yalamanchili, Pearson Education Asia.

Reference s

1. VHDL primer - J Bhaskar, Pearson Education Asia
2. Analysis and modeling of digital systems - Zainalabedin Navabi, McGraw Hill.

DISTRIBUTED COMPUTING (ELECTIVE - II)

RT805-5 **3+1+0**

Module I Introduction

Introduction to Distributed Systems, evolution, characteristics, design issues, user requirements, Network technologies and protocols – overview, MACH, AMOBEA- overview.

Module 2 Distributed file system

File service components, design issues, interfaces, implementation techniques, Sun Network File System – architecture and implementation, other distributed file systems – AFS, CODA. Name services – SNS name service model.

Module 3 Communication in distributed systems

Client server communication, Group communication, Message passing – features, synchronizations, RPC – model, implementation, stub generation, messages, marshalling, Server management. Distributed shared memory – Architecture, design issues, structure of shared memory space, replacement strategy, thrashing. Synchronization – clock synchronization, event ordering, mutual exclusion

Module 4 Resource and Process management

Features of scheduling algorithms, Task assignment approach, load balancing, load sharing, Process migration mechanisms, Threads – scheduling.

Module 5 Consistency maintenance

Transaction recovery – methods- intention lists, Fault tolerance – failures, Byzantine failures. Deadlocks in distributed systems – detection and prevention, centralized and distributed approaches.

References

1. Distributed Systems – Concepts and designing - George Coulouris, Jean Dellimore Tim Kindberg, Pearson Education Asia
2. Distributed Operating Systems - Andrew S. Tenenbaum Pearson Education Asia
3. Distributed Operating Systems - Concepts and designing - Pradeep. K.Sinha, PHI

USER INTERFACE DESIGN (ELECTIVE - II)

RT 805-6 **3+1+0**

Module 1 Introduction

Importance of user interface – definition, importance of good design, brief history – Graphical User Interface – Web User Interface – Principles of User interface design.

Module 2 Design Process

Human Interaction with computers, Importance of Human Characteristics, Human consideration, Human Interaction speeds – Understanding Business function

Module 3 Screen Designing

Design goals - screen meaning and purpose, organizing screen elements- ordering of screen data and content – screen navigation and flow – visually pleasing composition – amount of information – focus and emphasis – presenting information simply and meaningfully – information retrieval on web – Statistical graphics – Technological considerations in Interface Design.

Module 4 Windows and components

Menus and navigation schemes, selection of windows, Selection of device based and screen based controls - text and messages – icons and images – Multimedia – colours- uses, problems, choosing colours.

Module 5 Software tools

Specification methods, interface building tools

Interaction devices: keyboard and function keys - pointing devices- speech recognition, digitization and generation – image and video displays – printers.

Text Books

1. The Essential Guide to User Interface Design – Wilbert O. Galitz, Wiley Dreamtech
2. Designing the User Interface – Ben Shneiderman, Pearson Education Asia

References

1. Human Computer Interaction – John M. Carroll, Pearson Education Asia
2. The Essentials of User Interface Design - Alan Cooper, Wiley Dreamtech

SATELLITE AND MOBILE COMMUNICATION

T 805-7 **3+1+0**

Module 1

Satellite Communication – review of basic concepts - emerging trends in communication satellites- orbits – Geosynchronous and sun synchronous orbits – Kepler laws – power systems and eclipses – station keeping – altitude control and stabilization, Frequency plan and reuse Transponders, relative power levels- Transmission path and path loss – power and link budget calculations – S/N ratio- saturation flux density and noise consideration – EIRP.

Module 2

Multiple access Techniques, Satellite earth station, special purpose communication satellite, satellite launch vehicles.

Module 3

Spread spectrum Communication – Direct Sequence or Pseudo noise, Frequency hopping, Time hopping, Hybrid and Chirp spread spectrum systems. Applications of spread Spectrum.

Module 4

Mobile cellular communications – introduction – basic cellular system-performance criteria – uniqueness of mobile radio environment – operation of cellular systems – elements of cellular radio system design – general description – Frequency reuse – co channel interference reduction factor – desired C/I from a normal case in an omni directional antenna systems – hand off mechanism – cell splitting – consideration of the components of cellular system.

Module 5

Digital cellular systems – multiple access schemes – Global Systems for Mobile (GSM)- TDMA-CDMA-Miscellaneous Mobile systems. Intelligent cell concept, CDMA cellular radio network. Advanced intelligent network (AIN), AIN for mobile communications.

References

1. Electronics Communication 4^{th} ed - Dennis Roody & John Coolen, PHI
2. Mobile Cellular Telecommunication -William C.Y Lee, Mc Graw Hill
3. Satellite Communications - D C Agarwal, Khanna Publishers.
4. Mobile Communications Satellite (Theory and Applications) - Tom Lodgdon, Mc Graw Hill.
5. Mobile and Personal Communication System and Services – Raj Pandya, PHI

DATA COMPRESSION

T 805-8 **3+1+0**

Module 1

Introduction – signal compression - fixed rate Vs variable rate – lossless Vs lossy compression – sources, channels and codes – components of compression system – issues – quantization – optimal and adaptive quantization.

Module 2

Predictive coding – DPCM – linear prediction – adaptive prediction – delta modulation – adaptive delta modulation.

Module 3

Transform coding – orthogonal transformations – bit allocation – performance gain of transform coding – sub band coding – coding based on models of human perception (human auditory system and visual system)

Module 4

Vector quantization – introduction – memoryless vector quantizers – llyod algorithm – vector quantization design – tree structured VQ – multistep VQ – product codes – grain/shape VQ – lattice VQ – feedback vector quantization – vector predictive quantization – vector tree and trellis coders – adaptive VQ – VQ for speech coding – VQ for image coding.

Module 5

Compression standards – CELP standard for speech – JPEG standard for still images – ISO/MPEG standard for audio and video – introduction to fractal image compression – application of wavelet analysis in signal compression – data compression – review of entropy coding – Huffman, runlength, arithmetic and ziv – lempel coding.

References

1. Gersho A, Gray R.M, Vector Quantization and Signal Compression, Kluwer Academic Publishers.
2. Jayant N.S & Noll P., digital Coding of Waveforms – Principle and /applications to Speech and Video. – Prentice Hall.
3. Nelson M. Jean & Loup Gailly, The Data compression book, BPB publications.
4. Solari S.J, Digital Video/Audio Compression, McGrawHill.
5. Kondoz A.M, Digital Speech, John Wiley.
6. Rao R.M & Bopadikar A.S, Wavelet Transforms – Introduction to Theory and Applications, Addison Wesley & Longman Inc.

ELECTIVE - III

T 806 **3+1+0**

List of elective subjects

1.	T 806-01	Information Theory and Coding
2.	RT 806-02	Embedded Systems
3.	RT 806-03	Neural Network
4.	RT 806-04	Genetic Algorithm and Applications
5.	RT 806-05	Advanced Networking Trends
6.	RT 806-06	Data Processing and Analysis Techniques
7.	RT 806-07	Bio metrics
8.	T 806-08	Fuzzy Systems

Note

New Elective subjects related to the recent trends in Information Technology can be added to this list. Institutions offering such courses should submit the detailed syllabus and get it approved from the University before offering the course.

INFORMATION THEORY AND CODING

T 806-1 **3+1+0**

Module 1

Information Theory: Concept of amount of information, units – entropy, marginal, conditional and joint entropies – relation among entropies – mutual information, information rate, channel capacity – redundancy and efficiency of a channel, symmetric channels – binary symmetric channel (BSC), binary erasure channel (BEC), deterministic and noiseless channels – capacity of band limited Gaussian channels, Shannon – Hartley theorem – band width – SNR trade off – capacity of a channel of infinite bandwidth , optimum modulation systems.

Module 2

Source coding: Instantaneous codes – construction of instantaneous codes – Kraft's inequality, coding efficiency and redundancy, noiseless, coding theorem – construction of basic source codes –Shannon –Fano Algorithm, Huffman Coding. Cryptography: Secret key Cryptography, block and stream ciphers, DES, public key cryptography, Diffie- Hellman Public key distribution – RSA system, digital signatures.

Module 3

Codes for error detection and correction -parity check coding – linear block codes – error detecting and correcting capabilities – generator and parity check matrices – standard array and syndrome decoding – Hamming codes – encoding and decoding.

Module 4

Cyclic codes – description – generator and parity check matrices – encoding of cyclic codes – syndrome computation and error detection, decoding of cyclic codes, BCH codes- description and decoding, Reed Solomon codes, burst error correction –block and convolutional interleaving.

Module 5

Convolutional codes - encoding – time and frequency domain approaches, state, Tree and Trellis diagrams – Transfer function and minimum free distance – maximum likelihood decoding of convolutional codes – The Viterbi Algorithm, Sequential decoding – Stack Algorithm. ARQ schemes – performance of ARQ – Probability of error and throughput.

References

1. Communication Systems - Simon Haykin, John Wiley & Sons Pvt. Ltd.
2. Principles of Communication Systems - Taub & Schilling, Tata Mc Graw Hill, New Delhi.

3. Principles of Digital Communication - Das, Mullick & Chatterjee. Wiley Eastern Ltd.
4. Information and Coding Theory - Dr. P. S. Sathya Narayana Probability Dynaram Publications, Bangalore.
5. Error Control Coding Fundamental s and Application - Shu Lin & Daniel J.Costello Prentice Hall Inc., Englewood Cliffs, NJ.

EMBEDDED SYSTEMS (ELECTIVE - III)

RT806-2 **3+1+0**

Module1 Overview of Embedded System

Embedded System, Categories of Embedded System, Requirements of Embedded Systems, Challenges and Issues in Embedded Software Development, Applications of Embedded Systems in Consumer Electronics, Control System, Biomedical Systems, Handheld computers, Communication devices.

Module 2 Embedded Hardware & Software Development Environment

Hardware Architecture, Micro-Controller Architecture, Communication Interface Standards, Embedded System Development Process, Embedded Operating systems, Types of Embedded Operating systems.

Module 3 Embedded Communication System

Serial Communication, PC-to-PC Communication, Serial Communication with the 8051 Family of Micro-controllers, Protocol Converter, Voice-over-IP, Embedded Applications over Mobile Network example MP3 Sound Player.

Module 4 Real Time & Database Applications

Real-Time Embedded Software Development, Sending a Message over a Serial Link, Simulation of a Process Control System, Controlling an Appliance from the RTLinux System, Embedded Database Applications using examples like Salary Survey, Energy Meter Readings.

Module 5 Java Applications & Future Trends in Embedded Systems

Networked Java-Enabled Information Appliances, Embedded Process Control System, Mobile Java Applications, Appliance Control using Jini, System on a Chip (SOC), Smart Cards and the Cashless Society, Security in Embedded Systems.

Text Book

1. Programming for Embedded Systems - Dreamtech Software Team, Wiley Dreamtech

Reference

1. Fundamentals of Embedded Software where C and Assembly Meet – Daniel W Lewis.

NEURAL NETWORKS (ELECTIVE -III)

RT806-3 **3+1+0**

Module 1

Introduction - Principles - artificial neuron - activation functions - Single layer & multilayer networks - Training artificial neural networks - Perception - Representation - Linear separability - Learning - Training algorithms.

Module 2

Back Propagation - Training algorithm - Applications - network configurations - Network paralysis - Local minima - temporal instability.

Module 3

Counter Propagation networks: Kebenon layer - Training the cohenen layer - Pre initialising the wright vectors - statistical properties - Training the Grosbery layer - Full counter propagation network - Application.

Module 4

Statistical methods - Boltzmann's Training - Cauche training - Artificial specific heat methods - Applications to general non-linear optimization problems.

Module 5

Hopfield nets - Recurrent networks - stability - Associative memory - applications - Thermo dynamic systems - Statistical Hopfield networks - Bidirectional associative memories - Continous BAM - Adaptive resonance theory - Architecture classification - Implimentation.

Text Book

1. Neural Computing Theory & Practice - Philip D. Wasserman.

References

1. Neural Networks - Simon Haykins
2. Adaptive Pattern Recognition & Neural Networks - Pay Y.H.
3. An Introduction to neural computing - Chapman & Hall

GENETIC ALGORITHMS AND APPLICATIONS (ELECTIVE - III)

RT806-4 **3+1+0**

Module 1 Architecture-Altering Operations

Introduction, Previous Methods of Determining the Architecture of a Multi-Part Program - On the origin of new function- Architecture-Altering operations for Subroutines -Automatically Defined Iterations, Loops, Recursion, Storage. Self-Organization of Hierarchies and Program Architecture - Rotating the Tires on an Automobile – Boolean Parity Problem- Time-Optimal Robot Control Problem - Multi-Agent Problem - Using Architecture Altering Operations for Subroutines. Transmembrane Segment Identification Problem using Architecture-Altering Operations for Iterations-Fibonacci Sequence- Cart Centering.

Module 2 Genetic Programming Problem Solver (GPPS)

Elements of GPPS 1.0-Problems Illustrating GPPS 1.0 - Elements of GPPS 2.0 - Problems Illustrating GPPS 2.0 - Previous Work on Automated Analog Circuit Synthesis.

Module 3 Automated synthesis of analog electrical circuits

Synthesis of a Low-pass Filter and High-pass Filter The Role of Crossover in Genetic Programming.

Module 4 Evolvable Hardware

Evolvable Hardware and Rapidly Re-configurable Field-Programmable Gate Arrays

Discovery of cellular Automata Rules: Discovery of a Cellular Automata Rule for the Majority Classification Problem.

Module 5 Programmatic Motifs for molecular Biology

Automatic Discovery of Protein Motifs –Programmatic Motifs and the Cellular Location Problem.

Parallelization and Implementation Issues: Computer Time- Parallelisation of Genetic Programming –Implementation Issues.

Reference

1. Johin R. Koza, Forrest H Bennett III, David Andre, Martin A. Kean, " Genetic Programming III: Darwinian Invention and Problem Solving", Morgan Kaufmann, 1999.

ADVANCED NETWORKING TRENDS (ELECTIVE – III)

RT806-5 **3+1+0**

Module 1

Ethernet Technology – Frame format – Interface Gap – CSMA/CD – 10 mbps Ethernet, Fast Ethernet, Gigabit Ethernet, Wireless Ethernet – SONET – Sonet multiplexing, Sonet frame structure

Module 2

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

Module 3

ATM – ATM Principles – BISDN reference model – ATM layers – ATM adaption Layer – AAL1, AAL2, AAL3/4, AAL5 – ATM addressing – UNI Signaling – PNNI Signalling

Module 4

SATELLITE COMMUNICATION: Satellite communication principles - Geo stationary satellites - block schematic of satellite earth station - VSAT - VSAT networks - applications in personnel communication. (basic ideas only)

Module 5

Wireless Lan – Infrared Vs Radio transmission – Infrastructure & ad hoc n/w – IEEE 802.11 – Hiper Law – Bluetooth – Physical Layer – MAC layer – Networking - Security

References

Module 1

1. An introduction to Computer Networking - Kenneth C Mansfield, Jr., James L. Antonakos, PHI

Module 1,2,3

1. Communication Networks Fundamental Concepts & Key Architecture - Leon-Garcia – Widjaja, Tata McGraw Hill
2. Mobile Communication - Jochen Schiller, Pearson Education Asia

DATA PROCESSING AND ANALYSIS TECHNIQUES (ELECTIVE - III)

RT806-6 **3+1+0**

Module 1

Introduction to COBOL programming -elements of COBOL divisions, sections and paragraphs -Table writing - complete program in COBOL using various options verbs, statements-conditions and conditional statements.

Module 2

Table Handling – Occur clause – PERFORM verb – SET verb, SEARCH verb – Occurs depending clause – Sorting a Table.

Module 3

Processing of various file structures in COBOL Language – File description – Fixed Length Record – Statements – Sequential File with variable length record – Sorting and merging of files – Direct access files.

Module 4

Data warehousing – Definition – Multidimentional datamodel – OLAP operation – Data warehouse architecture – Warehouse Server – Metadata – OLAP Engine.

Module 5

Data mining – Definitions, KDD Vs Data mining, DBMS Vs DM – DM Techniques, Issues and Challenges in DM – DM application areas.

References

1. COBOL programming - M.K. Roy & D Ghosh Dastidar, Tata McGraw Hill
2. Data mining Techniques - Arun K Pujari (Universal Press)
3. Data mining Concepts and Techniques- Jawei Han & Micheline Kamber (Morgan Kunfmann Pub.)
4. Data Mining - Pieter Adriaans, Dolf Zantinge, Person Education Asia
5. Structured COBOL Programming- E. Rajasekar & S.Selvi (Anuradha Agencies)
6. Structured COBOL - A. S. Philippakis & Leonard, J. Kazmier (Tata McGraw Hill)

BIOMETRICS (ELECTIVE - III)

RT806-7 **3+1+0**

Module 1

Introduction – Benefits of biometric security – verification and identification – basic working of biometric matching – accuracy – false match rate – false nonmatch rate – failure to enroll rate – derived metrics – layered biometric solutions

Module 2

Finger scan – features – components – operation (steps) – competing finger scan technologies – strength and weakness

Facial scan - features – components – operation (steps) – competing facial scan technologies – strength and weakness

Module 3

Iris scan - features – components – operation (steps) – competing iris scan technologies – strength and weakness

Voice scan - features – components – operation (steps) – competing facial scan technologies – strength and weakness

Module 4

Other physiological biometrics-Handscan-retina scan- AFIS (automatic fingerprint Identification systems)-Behavieral Biometrics-Signature scan-Key stroke Scan.

Module 5

Biometrics Application – Biometric Solution Matrix-Bioprivacy-Comparison of privacy factor in different biometrics technologies - Designing privacy sympathetie biometric systems-Biometric standards - (BioAPI, BAPI) - Biometric middleware.

Reference

1. Biometrics -Identify Verification in a Networked World - Samir Nanavati, Michael Thieme, Raj Nanavati- WILEY-dreamtech

FUZZY SYSTEMS

T 806-8 **3+1+0**

Module 1

Introduction to Fuzzy sets and systems. Basics of fuzzy sets membership function, support of a fuzzy set, height – normalized fuzzy set, α – cuts (decomposition of a fuzzy set), set theoretic definitions on fuzzy sets, complement, intersection and union equality.

Module 2

Subsethood – basic definition based on membership functions. The law of the excluded middle and law of contradiction on fuzzy sets. Properties of fuzzy sets operations (logical proof only). Extension of fuzzy sets concepts – type –2 and level 2 fuzzy sets – examples.

Module 3

Operations on fuzzy sets – intersection, algebraic sum – product, bounded sum – product, drastic sum product, t -norms and t -conorms (s-norms) on fuzzy sets,

typical parameterized t – norms and s-norms (with simplified proof). Extension principle and its applications.

Module 4

Fuzzy relation. Resolution form of a binary fuzzy relation. Operations on fuzzy relations – projection, max. – min. and min. and max., compositions cylindric extension. Similarity relations – reflexivity, symmetry, transitivity.

Module 5

Further operations on fuzzy sets and proposed by Zadeh – concentration dilation, contrast Intensification, a linguistic hedges, computation of the meaning of values of a linguistic variable, fuzzy algorithms, fuzzy engineering – applications of fuzzy controls, case studies.

References

1. Neural Fuzzy Systems - C.T Lin & C.S George Lee, Prentice Hall.
2. Fuzzy Systems Hand Book - Earl Cox, Associated Press.
3. Fuzzy Sets and Fuzzy Logic- Theory and Applications - Klir and Yuan, Prentice Hall of India.
4. IEEE Trans on Systems, Man & Cybernetics, vol. SMC – 3, No.1, January 1973, pp 28-44
5. Fuzzy Engineering - Bart Kosko, Prentice Hall.
6. Fuzzy Thinking, Bart Kosko - Hooper Collins Publications.

INTERNET LAB

T 807 **0+0+4**

1. Familiarization of Internet Accessing and Trouble shooting
2. Internet Programming with JAVA applets
3. Web development with XML, JAVA script, JAVA beans.
4. Implementation of Search Engine
5. Web Development with JSP and EJB
6. Familiarization to the latest web development tools

(Any experiment according to the syllabus of RT 605 and RT 705 can be substituted)

PROJECT & SEMINAR

T 709 / T808 **0+0+4**

Each student is required to present a technical paper on subject approved by the department. The paper should, in general, reflect the state of the art technology. Report should be submitted to the department.

In addition to the seminar, the students shall undertake a project work (as a team or individually) in the 7^{th} semester itself in consultation with the guide (s). On completion of the project work in the 8^{th} semester, each student shall present the work done before a panel of staff members, and submit a report of the project work to the department.

VIVA VOCE

T 809

A comprehensive viva voce examination will be conducted to assess the student's overall knowledge in the specified field of Engineering. At the time of viva voce, certified report of seminar, mini project and project work are to be presented for evaluation.