

CORE COURSES:

COURSE NUMBER	:	BHS-176
COURSE TITLE	:	TECHNICAL WRITING
CREDITS WITH BREAK-UP	:	3(2-0-2)
PRE-REQUISITE	:	NIL

CATALOGUE DESCRIPTION

The course is intended to train the students in preparing project reports of technical nature, e.g. seminar, dissertations and project report etc.

COURSE NUMBER	:	BHS-177
COURSE TITLE	:	SOCIAL SCIENCES
CREDITS WITH BREAK-UP	:	3(3-0-0)
PRE-REQUISITE	:	NIL

CATALOGUE DESCRIPTION

Indian Constitution and Government: A glimpse of India as a state, Nationalism and the constitution of development, constitutional governments, Indian constitution, the structure, Union Government, State Government, local government, Indian Federalism, Parliamentary Democracy in India, current events, India and the United Nations.

General Psychology, human mind, its faculties and abilities; models of man, behavior, cognitive processes, perception, learning, remembering, thinking, intelligence, personality.

Socio-cultural settings of India: traditions and customs, social institutions, rural-social problems; changes and impacts.

COURSE NUMBER	:	BPM-131
COURSE TITLE	:	ENGINEERING MATHEMATICS-I
CREDITS WITH BREAK-UP	:	3(3-2-0)
PRE-REQUISITE	:	NIL

CATALOGUE DESCRIPTION

Applications of derivative, convergence and divergence of infinite series, Taylor's Theorem with remainder, partial derivatives and its applications, integration and its applications of definite integrals, improper integrals, Gamma and Beta functions, Hyperbolic Functions, Polar Co-ordinates, parametric equations, space co-ordinates equations of surfaces, multiple integrals and its applications.

DETAILED CATALOGUE DESCRIPTION

The sign of the first derivative, concavity and point of inflection, asymptotes and symmetry, Rolle's Theorem, mean value theorem, extended mean value theorems, Taylor's formula, estimating approximation errors, Taylor's theorem with remainder and estimating the remainder, Newton's method for approximating solution of equation, inverse functions and Picard's method convergence and divergence of infinite series of non-negative terms with the help of comparison test, integral test, Limit comparison test, ratio test and root's test limit and continuity of functions of two or more variables, partial derivatives, chain rules for functions of two or more variables, linear approximation of two and more variables and their increment estimation. Maxima, minima and saddle points for functions of two or more variables, Lagrange multipliers method, the first and second fundamental theorems of integral calculus. Leibnitz's rule, approximating finite sums with integrals, rules for approximating definite integrals with the help of trapezoidal and Simpson's rules and their error estimation.

Convergence and divergence of improper integrals, calculating volume by slicing, volume modeled with shells and washers, length of a plane curve, area of a surface of revolution, polar coordinates, polar equations of conics and other curves, area of plane curves, are length and surface are

Multiple integrals, double integrals, area bounded by curves, first and second moments, polar moment of inertia, radius of gyration, changing double integrals from Cartesian to polar coordinates, evaluation of triple integrals, physical applications in three dimensions and idea of spherical and cylindrical coordinates, hyperbolic functions: definitions and identities, derivatives and integrals, inverse hyperbolic functions.

COURSE NUMBER	:	BPM-132
COURSE TITLE	:	ENGINEERING MATHEMATICS-II
CREDITS WITH BREAK-UP	:	4(4-1-0)
PRE-REQUISITE	:	BPM-131

CATALOGUE DESCRIPTION

Ordinary differential equations of the first, second and arbitrary orders. Laplace transformations, Power series solutions of ordinary linear second order differential equations, Legendre's equations, Legendre Polynomials, Bessel's equation and Bessel Function, Matrices and Determinants, Vector Calculus, line and surface integrals, Green's Divergence and Stoke's Theorems, Fourier Series and Integrals, Solutions of wave equations, heat conduction equation and Laplace

equation by the separation of variables (Product method), numerical solution of first order ordinary equations.

DETAILED CATALOGUE DESCRIPTION

Differential equations: Exact differential equations, integrating factors, linear first order differential equations, variation of parameters, orthogonal trajectories, Picard's iteration method for solving differential equations of order one, second order differential equations reducible to first order Homogeneous Linear differential equation of second order with constant coefficients (real roots, complex roots, double roots of the auxiliary equation), Cauchy's equation, linear dependency and order, non-homogeneous linear differential equations: Method of undetermined coefficients and general method.

Laplace transformation, definition, inverse L-transform, linearity, existence theorem, L-transform of derivatives and integrals, shifting on s and t axes, unit step function, convolution theorem, periodic functions, solution of differential equations and system of differential equation upto second order using Laplace transformation.

Matrices: Basic concepts, Gauss elimination method, rank, linear dependency and independency of vectors, inverse linear transformation, bilinear, quadratic, hermitian and skew-Hermitian and unitary matrices, solution of system of linear differential equations using eigen value-eigen vector method upto first order.

Vector: Vector calculus, derivatives, curves, arc length, tangent, curvature and Torsion, Frenet's formulae, directional derivatives, divergence, Curl and Gradient of vector field, line integral: evaluations, double integrals, Green's theorem, surfaces, tangent plane, first fundamental form, area surface integrals statement of divergence theorem of Gauss and Stock's theorem and related simple problems.

Fourier series: periodic functions, Euler's formulae, functions having arbitrary period, even and odd functions, half range expansions.

Partial differential equations: Basic concepts, solution by variable separable method (product method), solution of one dimensional heat equation, one dimensional wave equation and vibrating string.

Power series: Convergence and divergence, power series solution of differential equations of first and second order having distinct roots of indicial equation, Legendre's and Bessel's equations.

COURSE NUMBER	:	BPP-195
COURSE TITLE	:	PHYSICS-I
CREDITS WITH BREAK-UP	:	3(2-2-2)
PRE-REQUISITE	:	NIL

CATALOGUE DESCRIPTION

Rotation of rigid bodies, moment of inertia, relativistic mechanics, vector field, magnetic field, electromagnetic induction, electric and magnetic fields in matters, free oscillations with N-degrees of freedom.

DETAILED CATALOGUE DESCRIPTION

Rotation of rigid bodies, Angular momentum, inertial coefficients, Parallel and perpendicular axis theorem, Moment of inertia of rigid bodies like sphere, Spherical shell, Disk, cylinder and motion on inclined plane. Michelson Morley experiment, Inertial frames of reference, Postulates of special theory of relativity, Lorentz transformation equations of space and time, Length contraction, Time dilation, Longitudinal Doppler effect, Velocity addition formula, Relativistic mass, Relativistic energy, Transformation of momentum and energy, Equivalence of mass and energy.

Scalar and vector fields, gradient, divergence, curl of the fields, Gauss's divergence and Stroke's theorem, Gauss's law and its applications, Poisson and Laplace equations, Magnetic field, some properties of the magnetic field, vector potential, field of any current carrying wire, Electric conduction in a magnetic field (the Hall effect).

Faraday's law, Mutual inductance, self-inductance, Energy stored in magnetic field, a circuit containing L,C & R, the displacement current and Maxwell's equations, solution of Maxwell's equations in free space. Para-dia-ferro, antiferro magnetic materials, B-H curve, Hysteresis. Free oscillations of system with one and two degrees of freedom, Transverse mode of continuous string, Modes of non-continuous systems with N degrees of freedom. Transverse oscillations of a beaded string, longitudinal oscillations of springs and masses, coupled pendulums.

COURSE NUMBER	:	BPP-196
COURSE TITLE	:	PHYSICS-II
CREDITS WITH BREAK-UP	:	3(2-2-2)
PRE-REQUISITE	:	BPP-195

CATALOGUE DESCRIPTION

Interference, Diffraction and Polarization of light, Quantum Theory and concepts of Quantum Mechanics, Lasers, Nuclear structure, Crystal Structure.

DETAILED CATALOGUE DESCRIPTION

Coherent sources, Fresnel's Biprism, Young's double slit, Newton's rings, Single slit, double slit, Diffraction, Transmission Diffraction grating, Resolving power of telescope, microscope and grating, Polarization of light, Different kinds of polarized light, Brewster's law, Malus's law, Phenomenon of double refraction, Construction and working of Nicol prism, Retardation plates, optical activity, specific rotation and polarimeter.

Origin of x-rays, continuous and characteristic x-ray spectra, Moseley's law, Absorption of x-rays, Diffraction of x-rays, Bragg's law, Bragg's spectrometer, photoelectric effect, Compton effect and pair production.

Wave particle duality, Uncertainty principle and its applications, non-existence of an electron in a nucleus, minimum energy of harmonic oscillator, ground state energy of hydrogen atom.

Schrodinger's equation (Time dependent and independent), expectation values, particle in a box (one dimension), Harmonic Oscillator, Single step, rectangular barrier and tunnel effect.

Spontaneous and stimulated emission of radiation, Einstein's coefficients, Main components of laser, Population inversion, ruby and He-Ne laser. Classification and bonding in solids, Liquid drop and shell model of nucleus.

COURSE NUMBER	:	BPC-161
COURSE TITLE	:	ENGINEERING CHEMISTRY-I
CREDITS WITH BREAK-UP	:	2(2-0-0)
PRE-REQUISITE	:	NIL

CATALOGUE DESCRIPTION

Modern atomic theory, advanced treatment of chemical bonding, structure and directional properties of molecules, chemical kinetics, catalysis electro chemical cells, corrosion and its prevention, lubrication, semiconductors, coordination compounds, crystalline structure, chemical thermodynamics, instrumental methods of chemical analysis.

DETAILED CATALOGUE DESCRIPTION

Introduction to modern atomic theory, Schrödinger wave equation and its applications, wave mechanical model of hydrogen atom and hydrogen atom like ions, wave functions for hydrogen atom like ions and their usefulness in determination of most probable distance and nodal distances, mechanism of He-atom.

Molecular orbital theory of covalence and its application in energy determination of bonding and antibonding molecular of H_2 . V.B. theory of covalence and its application to H_2 molecule. Directional properties of H_2O and NH_3 molecules, SO_3 , PCl_5 and XeO_2 . Kinetics of reversible, parallel and consecutive reactions theory of absolute reaction rates.

Effect of temperature on surface reactions, pH-dependence of rate constants of catalyzed reactions, auto catalysis. Concentration cells, liquid junction potential fuel cells & their applications. Concept of corrosion, types of corrosion and factors affecting the corrosion, chemical and electrochemical theory of corrosion, methods of preventing the corrosion.

Classification and mechanism of lubrication. Theories of semiconductors, n-type and p-type semiconductors, conductivity of semiconductors, model for impurity semiconductors, organic semiconductors. Introduction, valence bond theory crystal field theory, ligand field theory and molecular orbital theory of bonding in co-ordination compounds, isomerism in co-ordination compounds. Crystalline structure-Born-Landé Cycle, Bragg's condition crystal defects.

Free energy and entropy changes the chemical process calculation of free energy change, entropy change and enthalpy in chemical and phase changing processes. Gibbs Helmholtz equation, Clausius clapeyron equation, chemical potential and Gibbs Duhem equation. Principles, instrumentation and application of IR, NMR, UV-VIS, Mass and AAS.

COURSE NUMBER	: BPC-162
COURSE TITLE	: ENGINEERING CHEMISTRY-II
CREDITS WITH BREAK-UP	: 2(1-0-3)
PRE-REQUISITE	:NIL

CATALOGUE DESCRIPTION

Water and waste water treatment, chemistry of strategic elements and their applications, basic organic reaction mechanism and reactions of industrial significance, polymer chemistry, environmental chemistry, pollution and majors of pollution control.

DETAILED CATALOGUE DESCRIPTION

Introduction, hardness of water and its disadvantages in industries with special reference to steam generation, softening methods, soda lime, zeolites, ion exchange and desatination methods (electro dialysis and reserve osmosis processes).

Chemistry of titanium, chromium, magnese and ziroonium their industrial applications. Basic principles, reaction intermediates, elementary stereochemistry and some name reactions of industrial application like Beckmann, Hoffman, reimon tieman, Cannizara, Dielselder and Skrauf's synthesis. Polymers and their classification, mechanism of polymerization and catalysts like Zeigler Natta catalystr. Tacticity of polymers, introduction and uses of natural and synthetic resins, fiber and rubber, introduction to biopolymers.

Introduction to environmental segments, structure and composition of atmosphere, chemistly and photochemical reaction (with special reference to ozone chemistry and chemistry of oxide of nitrogen and sulphure) sources and sinks for pollutants, pollutions control methods.

COURSE NUMBER	:	TCE-100
COURSE TITLE	:	ENGINEERING DRAWING
CREDITS WITH BREAK-UP	:	3(1-0-4)
PRE-REQUISITE	:	NIL

CATALOGUE DESCRIPTION

Uses of instruments and scale. Free-hand and technical lettering, geometrical construction. Theory of projections, projection of points, straight lines and planes, Auxiliary planes. Solids, development of surfaces of solid, sections of solids, interpretation of solids. Isometric and perspective views.

COURSE NUMBER	:	TCE-131
COURSE TITLE	:	SOLID MECHANICS
CREDITS WITH BREAK-UP	:	4(3-1-2)
PRE-REQUISITE	:	NIL

CATALOGUE DESCRIPTION

Mechanics of rigid bodies, Resultant of force systems, Equilibrium of forces, Trusses, centroid and centre of gravity, Second moment of area, Simple stresses and strains. Principal stresses an strains Strain energy, Bending moment and shear force diagram for beams, Bending and shearing stresses Torsion of circular shafts, Columns and struts, Slope and deflection in beams

DETAILED CATALOGUE DESCRIPTION

Mechanics of rigid bodies: various two dimensional system of forces, resultant of forces, equilibrium of forces. free body diagram, parallelogram law, polygon law, moment of a force, couple, resolution of forces into a force and a couple, Varignon theorem, various types of supports and corresponding reactions. Concept of centroid: centroid of two dimensional bodies, determination of centroid by integration method, centroid of geometrically composite plane figures, Second moment of area, rectangular second moment of area, polar second moment of area, product second moment of area, radius of gyration, parallel axes theorem, perpendicular axes theorem, second moment of area of geometrically composite sections. Simple stresses and strains: stress, strain, actual stress and strain, nominal stress and strain, stress—strain, curve for ductile and brittle materials, hook' law, Young's modulus of elasticity, concept of factor of safety, shear stress, shear strain, modulus of rigidity, complementary shear stress, elongation of various bars under self load and external loads. Temperature stresses due to uniform change in temperature, composite bars subjected to axial forces and temperature change, poisson's ratio, volumetric strain, pressure, bulk modulus, relation between various elastic constants. Complex stresses: stresses on oblique plane induced due to two mutually perpendicular normal stresses and to shear stresses, graphical solution to complex stresses i.e. mohar's circle method, principal stresses and principal planes. Introduction to bending moment and shear force: concept of bending moment and shear force, calculation of bending moment and shear force at any section, sign convention. B.M.D and S.F.D. for cantilever simply supported and overhanging beams subjected to various types of linearly varying loads. Stresses in beams: simple theory of bending (assumptions and derivation of expression for flexural and shearing resistance).

COURSE NUMBER	:	TPE-161
COURSE TITLE	:	WORKSHOP PRACTICE
CREDITS WITH BREAK-UP	:	3(1-0-6)
PRE-REQUISITE	:	NIL

CATALOGUE DESCRIPTION

Fundamentals of general engineering workshop practice including metals alloys wood-working, planer and casting operations.

DETAILED CATALOGUE DESCRIPTION

Introduction, safety, precautions, properties of metals and alloys, forging tools, operations and making of simple jobs, fitting, tools making, operations and

making of simple jobs including drilling. Carpentry work, types of timber, seasoning and wood preservation, plywood, wooden joint and tools, Lathes, specifications, tools and operations, shaper and planer, specifications, operations and tools, geometry of single point cutting tools, foundry, moulding sands, patterns and allowances, cores, core prints, chaplets, moulding methods, finishing of casting and defects, introduction to welding processes, arc and gas welding, gas cutting, brazing and soldering, laboratory experiments.

COURSE NUMBER	:	TME-101
COURSE TITLE	:	THERMODYNAMICS & HEAT ENGINES.
CREDITS WITH BREAK-UP	:	4(3-1-2)
PRE-REQUISITE	:	NIL

CATALOGUE DESCRIPTION

Systems and properties; concept of energy, temperature and heat; equation of state; first law for closed and open system pure substance and properties second law of thermodynamics and entropy; boilers, mountings and accessories, boiler efficiency; steam engine, Rankine Cycle; indicator diagrams; steam turbines; internal combustion engines; air standard Otto, Diesel dual and Joule cycles.

DETAILED CATALOGUE DESCRIPTION

Introduction: Engineering system of units, system and their properties, concept of energy, temperature work and heat. Zeroth law of thermodynamics, equation of state for an ideal gas.

Pure substance, phase diagrams, tabulated properties, property charts and their use,

First law of thermodynamics and engineering applications, flow and non-flow processes, general energy equation for steady flow, analysis of constant volume, constant pressure, isothermal and adiabatic processes, reversible and irreversible processes.

Introduction and definition of second law of thermodynamics, Carnot cycle, definition and concept of entropy, the change of entropy. The change of entropy for gas.

Steam boilers, types of boilers, high-pressure boilers, mounting and accessories, equivalent evaporation, boiler efficiency, boiler trial.

Steam engines: Rankin cycle, construction and working of steam engine, indicator diagrams, work output, steam consumption and efficiency,

Steam turbine: construction and working of steam turbines, impulse and reaction turbines, velocity diagrams, work output and efficiency, compounding of steam turbines.

Air standard cycles, Otto, diesel, joule dual Sterling and Atkinson etc.

I.C. engines, classification,. Construction and working of two stroke and four stroke, C.I. engine work output efficiency and mean effective pressure calculations, ignition system.

COURSE NUMBER : **TCT-100**
COURSE TITLE : **INTRODUCTION TO COMPUTERS AND PROGRAMMING**
CREDITS WITH BREAK-UP : **3(2-1-2)**
PRE-REQUISITE : **NIL**

CATALOGUE DESCRIPTION

Introduction binary number system; Elementary logic gate ; computer organization, Computer Peripherals, Computer Hardware and Architecture; Microprocessors, Application and System Softwares; Operating Systems, Logic and language Paradigms, Data Structures, Algorithms and Program Development Tools, Programming in Fortran and C. Basics of Digital & Data Communication, Computer Networks and Internet.

1. IITL Education Solutions Ltd, "Introduction to Computer Science"
Pearson Education Pub.
2. P.K. Sinha, "Computer Fundamentals"
BPB Pub.
3. Yashwant Kanetkar, "Let Us C"
BPB Pub.

COURSE NUMBER : **TWP-101**
COURSE TITLE : **WORK PROGRAMME**
CREDITS WITH BREAK-UP : **1(0-0-2)**
PRE-REQUISITE : **NIL**

COURSE NUMBER : **NSS-201**
COURSE TITLE : **NSS**
CREDITS WITH BREAK-UP : **2(0-0-4)**
PRE-REQUISITE : **NIL**

PROFESSIONAL COURSES

COURSE NUMBER	:	TCT-211
COURSE TITLE	:	MICROPROCESSORS
CREDITS WITH BREAK-UP	:	4(3-0-2)
PRE-REQUISITE	:	NIL

CATALOGUE DESCRIPTION

Introduction to microprocessors, basic architecture of microprocessors, microprocessor hardware, Instruction and timing diagram, addressing modes, Intel 8085 architecture & programming/ Intel 8086 architecture and programming, basic I/O interface.

DETAILED CATALOGUE DESCRIPTION

INTRODUCTION

Introduction to microprocessor, evolution, basic microprocessor architecture.

MICROPROCESSOR HARDWARE

System Bus, memory organization, main memory organization, cache memory organization.

INSTRUCTION & TIMING DIAGRAM:

Basic system timing and operation status for 8085 / 8086 microprocessors.

ADDRESSING MODES

Data addressing modes, register-addressing mode, immediate addressing mode, direct addressing mode, indexing, base register addressing, relative addressing. Scaled Index addressing, stack addressing.

INTEL 8085:

8085 pin diagram, 8085 instruction set, timing diagrams, Interrupt, I/O operations for 8085.

INTEL 8086:

Introduction, Architecture, Addressing modes for 8086. 8086-instruction set, Asm 86, Assembler pseudo instructions. Interrupts & Interrupt service procedures, Interrupt response.

BASIC I/O INTERFACE

Introduction to I/O interface for 8086

DIRECT MEMORY ACCESS

Basic DMA operation, DMA controller Programming on 8086, 8085 assembly language.

REFERENCE BOOKS

1. Microprocessor Architecture, programming and application with 8085
R.S. Gaonkar, Wiley Eastern
 2. Microprocessor interface programming and hardware
Douglas V. Hall, Tata McGraw Hill publication.
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COURSE NUMBER	:	TCT-311
COURSE TITLE	:	MICROPROCESSOR BASED SYSTEM
CREDITS WITH BREAK-UP	:	2(2-1-0)
PRE-REQUISITE	:	TCT-211

CATALOGUE DESCRIPTION

System design using microprocessor, digital interfacing and analog interfacing, Microcomputer system peripherals.

DETAILED CATALOGUE DESCRIPTION

SYSTEM DESIGN USING MICROPROCESSORS:

Address & Data bus Concepts, ROM, EPROM, static RAM, Dynamic RAM, programmed I/O, 8 bit I/O ports, 16 bit I/O ports, and microprocessor microcomputer system.

DIGITAL INTERFACING

Programmable I/O ports, Interfacing a microprocessor keyboard, interfacing to alphanumeric displays, optical Motor shaft encoders.

ANALOGUE INTERFACING & INDUSTRIAL CONTROL

D/A converters, Interfacing & applications; A/D converters, specifications, interfacing, Microprocessor based industrial process control system.

MICROCOMPUTER SYSTEM PERIPHERALS

CRT displays, CRT terminals Raster scan color graphics, mass data storage system, optical disc storage. Microprocessor based applications.

REFERENCE BOOKS

- Microprocessor interface programming and hardware
Douglas V. Hall, Tata McGraw Hill publication.
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COURSE NUMBER : **TCT-313**
COURSE TITLE : **NUMERICALLY
CONTROLLED MACHINES &
ROBOTICS**
CREDITS WITH BREAK-UP : **2(2-1-0)**
PRE-REQUISITE : **NIL**

CATALOGUE DESCRIPTION:

Introduction, NC Motion Control Systems, NC Programming, NC Machine Control Systems, Feed Back systems, CNC & DNC, CIMS, Robotics.

DETAILED CATALOGUE DESCRIPTION

INTRODUCTION

Numerical control, Basic components of N.C. System, machining center, N.C. procedure, characteristics of work part for N.C. advantages and disadvantages of N.C., cycles of N.C.; Drill cycle, dwell cycle, bore cycle, tap cycle, mill cycle, Linear interpolation, circular interpolation.

N.C. MOTION CONTROL SYSTEMS

Point to point control system, straight cut control system, contouring control system,

N.C. PROGRAMMING

Introduction to Computer assisted part programming with APT language, APT language: Geometry statements, motion statements. post processor statements, auxiliary statements. Drive surface, part surface, check surface of work part. writing simple programs and macros.

N.C.MACHINE CONTROL SYSTEMS

Controller unit, automatic control system, closed loop control system, open loop control system.

FEED BACK SYSTEMS

Transducers, direct feed back system, indirect feed back system.

CNC AND DNC

Configuration, functions, advantages.

CIMS (COMPUTER INTERGRATED MANUFACTURING SYSTEM)

Introduction types, different components: m/c tool, MHS, human labor, computer control system, CINS data files, advantages.

ROBOTICS

Robot technology physical configuration, motion system: degree of freedom point to unit introduction motion, contouring motion, to frequently used terms in robotics,; work volume, precision of movement ,weight carrying capacity. Methods of programming a robot, programming languages used in robotics, application of robot. Introduction CAD/CAM.

REFERENCE BOOKS:

1. Numerical control by Kundra Rao & Tiwari

COURSE NUMBER : **TCT-205**
COURSE TITLE : **DATA STRUCTURES**
CREDITS WITH BREAK-UP : **3(3-1-0)**
PRE-REQUISITE : **NIL**

CATALOGUE DESCRIPTION

Introduction to preliminary concepts, string processing, arrays, pointers, linked list, stacks, queues, trees, graphs & their applications, sorting & searching techniques "C" programming for developing programs for the above data structures & techniques.

DETAILED CATALOGUE DESCRIPTION

INTRODUCTION

Introduction, Basic terminology, elementary data organizations, Data structures, data structure operations, algorithmic complexities.

PRELIMINARIES

Mathematical notations & functions, algorithmic notations, control structures, sub-algorithms, variable data types.

STRING PROCESSING

String processing & storing

ARRAYS, RECORDS AND POINTERS

Linear arrays representation of arrays in memory, Traversing linear arrays, Inserting, deleting, sorting - Bubble sort, searching-linear search, Binary search. Multidimensional Arrays, pointers, pointer arrays, Records, structures, representation of records in memory, parallel arrays, matrices.

LINKED LISTS

Introduction, linked list representation of linked lists in memory, Traversing a linked list, searching a linked list, Deletion from linked list, insertion into linked list, header linked list and two-way linked list.

STACKS, QUEUES & RECURSION

Introduction, stacks, array representation of stacks, Arithmetic operations, polish notations, Quick sort, an application of stack- recursion, Tower of Hanoi, Implementation of recursion by stack, queues, Dequeues, priority queues.

TREES

Introduction, Binary tree, representation of Binary trees in memory, Binary search tree, AVL Tree, application of binary trees. Searching and inserting in binary trees, deletion in binary search tree, Heap sort, Huffman's algorithm, general trees.

GRAPHS & THEIR APPLICATION

Graph theory, terminology, sequential representation of graph, Adjacency matrix, path matrix, warshall's Algorithm, shortest paths, linked representation of graphs, traversing a graph.

SORTING & SEARCHING

Insertion sort, selection sort, merging, radix sort. Searching & data modification, Hashing.

Programming using 'C' for the above topics

REFERENCE BOOKS

1. Introduction to Data Structures in C
By Kamthane, Pearson Edition
 2. Data Structures Using C & C++ By Tannenbaum PHI
 3. Data structures
by Seymour Lipschutz McGraw Hill Publication
 4. Data structures & Program Design in "C"
by Rober L Kruse, Bruce & P. Leung & Clovis L. Tondo
Prentice Hall-Publication
 5. Data Structures, Sawhney Horowitz
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COURSE NUMBER : **TCT-305**
COURSE TITLE : **PROGRAMMING LANGUAGES**
CREDITS WITH BREAK-UP : **3(3-1-0)**
PRE-REQUISITE : **TCT-205**

CATALOGUE DESCRIPTION

Block structured languages-design principles,abstractions, control and data structures, binding, environment- parameter passing mechanisms, axiomatic semantics- introduction to applicative languages, study of LISP- programming style in LISP, data types-types and parameters, data abstraction- abstract data types, innovative features, design philosophies and comparative look at SNOBOL, APL, Prolog, Smalltalk, Backus' functional programming, Communicating sequential process .

DETAILED CATALOGUE DESCRIPTION

INTRODUCTION

Various desired feature of programming languages- readability writability, data type, efficiency, pedagogy, generality etc. interrelation between different features as readability writability Reliability etc. Properties of language-syntax, semantics, pragmatics.

EVOLUTION OF CONCEPT

Modularity, information hiding, Abstraction-their role in the evolution of programming languages, evolution and lineage of programming Languages.

DESIGN PRINCIPLE

Design of programming languages, Data Abstraction, Control abstraction, Run time structure, dynamic, static & stack based languages.

DATA ABSTRACTION

Data type and structure, abstract data type, advantages of strongly typed language, data type mismatch, coercion, various data aggregating techniques.

CONTROL STRUTURE

Procedural languages, block structured languages, control structures, statement level control structures, unit level control structures, D-structures, D-structures hierarchy of structures. Runtime structure, Code segment & activation records.

STUDY OF LANGUAGES

Axiomatic semantics; applicative language- LISP various features, data type & structure, control structure, parameter binding & parameter passing techniques. Study of SNOBOL, APL, prolog, & Smalltalk on the counts mentioned for LISP.

FUNCTIONAL PROGRAMMING

Mathematical back ground, Lazy calculus, essence and features of functional programming, introduction to Miranda.

REFERENCE BOOKS

1. Programming Languages Design & Implementation
Terrance W. Pratt (PHI Pub.)
2. Concept of Programming Language
Sebesta (Addison Wesley Pub.)
3. Programming Language
Ravi Sethi (Addison Wesley Pub.)
4. Fundamentals of Programming Language
E. Horowitz (Galgotia Pub.)

COURSE NUMBER : **TCT-310**
COURSE TITLE : **SYSTEM PROGRAMMING**
CREDITS WITH BREAK-UP : **4(3-0-2)**
PRE-REQUISITE : **TCT-240**

CATALOGUE DESCRIPTION

Introduction, system software -definition, components of system software, evaluation of system software, introduction to software processors, assembly language & machine language- 8086 languages-a review, Assemblers, Macros, Macroprocessors, Introduction to compilers, loaders & linkage Editors, introduction to operating system, virtual memory concept.

DETAILED CATALOGUE DESCRIPTION

INTRODUCTION

System software definition, components of system software, evaluation of system software, model of computer system.

INTRODUCTION TO SOFTWARE PROCESSOR

Translators & software processors.

ASSEMBLY LANGUAGE & MACHINE LANGUAGE

A review of IBM 360/370 assembly language and 8086 assembly language.

ASSEMBLERS

Overview of Assembly process. Designs of Two pass assemblers. Single pass assemblers for IBM PC, Macros & Macro processor, Table management, Sorting.

AN INTRODUCTION TO COMPILERS

LOADERS & LINKAGE EDITORS

A) Loader Schemes: -

Compile & Go loaders, General loader schemes, Absolute loaders, Relocating loaders, Direct linking loaders, Other loader schemes. Binders, linking loaders, overlays. Dynamic binders, design of absolute loader, design of direct linking loader, Sub routine linkages.

OPERATING SYSTEM:

Introduction, Batch processing, Multi programming, time sharing system and design concepts of Operating system.

REFERENCE BOOKS

1. System Programming
by John J Donovan Mcgraw Hill Int
2. System Programming & operating system
by DM Dhamdhare Tata Mcgraw Hill
3. System Programming by Beck (Wiley)

COURSE NUMBER	:	TCT – 321
COURSE TITLE	:	OPERATING SYSTEMS
CREDITS WITH BREAK-UP:		3(3-1-0)
PRE-REQUISITE	:	NIL

CATALOGUE DESCRIPTION

Historical perspectives, Batch processing, Time sharing components of an operating system. Review of device drivers, Basic system calls interrupt mechanism, concurrent processes, mutual exclusion, Synchronization; Process management, Handling deadlocks, Processor scheduling, switching, synchronizing. Memory Management, swapping, segmentation, paging, virtual memory, page replacement and space allocation policies, segmented paging, dynamic linking. Catching of secondary storage information, I/O scheduling policies, Terminal I/O handling. Data Management, directory structure, Basic file systems, gaining access to files, case studies.

DETAILED CATALOGUE DESCRIPTION

INTRODUCTION

What is an operating system? Early system Generation of operating Systems, Multi programming, Timesharing, Real Time systems unbundling of software and Hardware.

PROCESS MANAGEMENT

Process concepts, process states, process state transition the Process control block, operations on Processes process Graphs, Hierarchy of processes.

Concurrent Processes: Concurrency, concurrent statements, precedence Graphs, Concurrency condition Fork/Join constructs: Parbegin/parend constructs. Process synchronization and Mutual Exclusion

- The critical section problem,
- Data sharing, Resource sharing,
- Implementing Mutual Exclusion primitives,
- Two process solutions,
- Dekker's Algorithm,
- N-process software solution,
- Hardware solution to Mutual Exclusion,
- Test-and-set Instruction,
- Semaphores - process synchronization with semaphores,
- Counting semaphores,
- Examples/Classical problems:
 - *Producer-consumer
 - *Readers-Writers
 - *Dining Philosophers
 - *Bounded -Buffer

DEAD LOCKS

The Deadlock Problem

Deadlock characterization: Resource concepts, Permanent Resources

- Necessary condition for dead lock
 - Deadlock Prevention
 - Deadlock Avoidance and Banker's Algorithm.
 - Deadlock Detection - Resource Graphs
 - Deadlock Recovery
 - Combined approach to Deadlock Handling

MEMORY MANAGEMENT

Introduction: Storage Organization, Management storage Heirarchy.

Contiguous Vs Non-contiguous storage Allocation and Variable partition
Multiprogramming fetch, placement and Replacement strategies, Overlays,
Fragmentations.

Virtual Storage Organization:

- Virtual Storage: Basic Concepts

- Multilevel Storage Organization Block Mapping

- Paging: Basic Concepts

- Segmentation

- Passing/Segmentation Systems

Virtual Storage management

- Overlays, Demand Paging, Anticipatory Paging, Page size.

- Vertical Memory Mgt. Strategies

- Page Replacement strategies

- Locality of Reference

- Working set

- Page Replacement Algorithms

- Thrashing

- Program Behavior under Paging and other Considerations,

- Optimal page size consideration etc.

PROCESSOR MANAGEMENT

- Job and processor scheduling

- Scheduling levels

- Scheduling objectives

- Scheduling criteria

- Pre-Emptive Vs Non-pre Emptive Schedule

- Priorities, Deadline Scheduling

- FIFO, Round Robin, SJF, SRT, and other scheduling algorithms

- Algorithm Evaluation,

- Multiple processor scheduling.

DISK AND DRUM SCHEDULING

- Operations of Moving Head Disk storage

- Physical Characteristics

- Why scheduling Is necessary

- Desirable characteristics of scheduling policies

- Seek optimization

- Rotational optimization

- FEFS, SSTF, SCAN and other Algorithm

- Selecting a Disk Scheduling Algorithm

- Sector Queuing and systems Considerations.

FILE SYSTEMS

File system functions
 File System Services
 Data Hierarchy: Blocking and Buffering
 File Organization,
 Access Methods
 File Characteristics
 File system, Allocating and freeing space
 File Descriptor
 Access control Matrix, Access control by user classes
 Backup and Recovery Directory and Data structure Data Base Models

Example systems/Case Studies
 Unix, MS-Dos, Windows etc.

REFERENCE BOOKS

1. Operating systems,
 Harvey, M.Deitel, Addison Wesley (Narosa Pub.).
 2. Operating systems Concepts
 Peterson, Silberschatz, Addison Wesley (Narosa Pub.).
 3. Operating systems
 Andrew S. Tannenbaum, Prentice Hall of (I) Pub.
 4. Operating systems
 Per Brinch Hansen Prentice Hall of (I) Pub.
 5. Introduction to Operating Sys. Design
 A.N. Haberman Golgotia Pb.
 6. The Design of Unix Operating Sys.
 Maurice. J. Bach, Prentice Hall of (I) Pub.
-

COURSE NUMBER : **TCT-320**
COURSE TITLE : **LANGUAGE PROCESSOR**
CREDITS WITH BREAK-UP: **3(3-1-0)**
PRE-REQUISITE : **TCT-305**

CATALOGUE DESCRIPTION

Lexical analyzer, design of assemblers, two pass assembler location counter, symbol definition, symbol table, manipulation, expression parser expression evaluation machine code generation bootstrapping, absolute loader, relocation, relocating loader, linker, link editor, dynamic loader, dynamic linker debugger segments, multiple location counters, macros-macro pre-processor, macro assembler, introduction to compilation, recursive descent parsers, code generation for assignment Statements, expression, conditional statements etc.

DETAILED CATALOGUE DESCRIPTION

INTRODUCTION

Translators & compiler, cousin of compilers, boot strapping, compiler writing tools, phases of compilers.

LEXICAL ANALYZER

The role of lexical analyzer regular expression finite automata, implementation of Lexical analyzer from DFA, scanning & token generation; Buffer management of Lexical analyzer, various desired features of lexical analyzer.

PARSING

Syntactic specification of programming languages, context free grammar, capabilities of context free grammar, Basic Parsing technique- shift reduce, operator Precedence top down, predictive parsing, LR parsing.

ASSEMBLER

Design of Assembler-statement of problem, data structure format of databases Algorithm, look for modularity.

Loaders-design of absolute loader-statement of problem, data structure format of databases, Algorithm.

Macros-features of macro facility, macro instruction argument, conditional macro expansion. Implementation-two pass algorithm, single pass algorithm, Implementation within an assembler.

SYMBOL TABLE

Symbol, contents of symbol table data structure representation of scope information, implementation, simple list self-organizing list, hash table run time storage administration - case of FORTRAN, ALGOL

CODE GENERATION & OPTIMIZATION

Syntax directed translation, Intermediate code- Quadruple, Triple, Translation of statements assignment, Boolean Expression & arithmetic expression.

Principle services of optimization, loop optimization, loop invariant computation, Induction value elimination.

Problems in code generation, machine model, a simple code generator.

REFERENCE BOOKS

1. Compilers Design
Aho, Ullmann, Sethi, Addison Wesley Pub.
2. Compiler Construction
DM Dhamdhare TMH Pub.

COURSE NUMBER : **TCT- 323**
COURSE TITLE : **DATA BASE MANAGEMENT SYSTEMS**
CREDITS WITH BREAK-UP : **4(3-0-2)**
PRE-REQUISITE : **NIL**

CATALOGUE DESCRIPTION

Introduction, data independence, data models, network model, data definition and manipulation languages, hierarchical model, relational model, storage organization for relation, relational algebra and calculus, relational query languages, query processor and optimizer, decomposition of relation schemes, Security, concurrent operations on data bases, recovery, distributed data bases, data base machines, comparison of data base systems.

DETAILED CATALOGUE DESCRIPTION

INTRODUCTION

Conventional file Processing and DBMS approach

Data Independence

Three level architecture for a DBMS

Components of a DBMS, Advantage & Disadvantage of DBMS

Data Association and Entity- Relationship

Representation Entities

Representation, Generalization & Aggregation, E-R Diagrams

The Relational Model

Relational Data Base,

Relational Algebra,

Relational Calculus,

Relational Database Manipulation

Data Definition : SQL

Data Manipulation : SQL

Views : SQL

Relational Data Base Design

Relational Schema and Relational Design

Functional Dependency

Normal Forms-Anomalies and data Redundancies

Lossless Join

Boyce cold Normal form

Synthesis Approach and higher order Normal forms

Multivalued Dependency

Fourth Normal form

Lossless Join Decomposition in to 4 NF

Normalization using Join Dependency - fifth NF
Domain Key Normal form

The Network Model

DBTG Set construct and Restriction
Data Description in the Network Model
Data & database Manipulation
Schema & subschema

The Hierarchical Data Model

Hierarchical Data Model
Data manipulation
Updates

Database Security, Integrity and Control Concurrency Management etc.

Current Trends in Data Bases

REFERENCE BOOKS

1. Data Base Concepts
by Korth, Silbertz, Sudarshan Mc Graw Hill Pub.
2. Fundamental of Database System
by Ellmasari, Navathe Addison Wesley Pub.
3. An Addison to Database System
by Date C.J. Addison Wesley Pub.
4. Database Management System
By Majumdar & Bhattacharya TMH Pub.
5. Database Management System
By Vipin Chandra Desai, Galgotia Pub.

COURSE NUMBER	:	TCT-224
COURSE TITLE	:	COMPUTATIONAL & NUMERICAL ANALYSIS
CREDITS WITH BREAK-UP:		2(2-1-0)
PRE-REQUISITE	:	NIL

CATALOGUE DESCRIPTION

Floating-point computation, floating-point numbers, machine epsilon, sensitivity of problem and instability of certain algorithms, Finite differences, Interpolation and approximate integration, adaptive routines, solution of non-linear equations, Linear systems and matrix inversion, Eigen value problems, Least-squares and Chebyshev approximation, Initial and boundary value problems in ordinary differential equations.

DETAILED CATALOGUE DESCRIPTION

FLOATING POINT COMPUTATION

Normal form, floating point numbers, machine epsilon; computational pitfalls, Errors and their analysis. Errors in series approximation. Sensitivity of problem -Qualities of numerical algorithms, convergence, certainty of solution stability of algorithm, selection of initial solution values.

INTERPOLATION

Introduction, errors in polynomial interpolation, finite difference-forward difference, backward difference, central difference Lagrange interpolation formula, Hermite's integration formula, and method of successive approximation.

APPROXIMATE INTEGRATION

Numerical differentiation, minimum and maximum values of tabulator function, Numerical integration-Trapezoidal rules, Simpson rule, Romberg integration.

LINEAR EQUATION

Basic definition, transpose, Inverse, rank of a matrix; consistency of linear system of equation, matrix inversion method, Gaussian elimination method Iterative method.

ORDINARY DIFFERENTIAL EQUATION

Solution of Taylor series, Picard's method. Euler method, Runge-Kutta method. Boundary value problem.

REFERENCE BOOKS

1. Introductory Method of Numerical Analysis
by Sastry PHI
2. Numerical Methods for scientific & Engg. Computation
by Jain, Iyengar, Jain New Age International
3. Numerical Methods
by Balaguruswamy, TMH

COURSE NUMBER	:	TCT - 223
COURSE TITLE	:	DATA PROCESSING & FILE SYSTEMS
CREDITS WITH BREAK-UP	:	4(3-0-2)
PRE-REQUISITE	:	NIL

CATALOGUE DESCRIPTION

Data processing concepts, auxiliary storage media and physical file organization, Introduction to COBOL programming, Use, structure and characteristics of various file organizations such as serial, sequential, indexed sequential and direct, List structured files, multikey files, inverted files. Application of various file structures in the processing of large amounts of business & industrial data and the Case studies.

DETAILED CATALOGUE DESCRIPTION

DATA PROCESSING CONCEPTS

Data, information, hierarchy of data organization, purpose of data processing, data processing systems, data processing cycle, data processing operations, Modes of processing, keys, master file, transaction file, data management.

AUXILIARY STORAGE MEDIA

Magnetic tape storage, Magnetic disk storage, other direct access storage devices.

PHYSICAL FILE ORGANIZATION

Objectives, organizational characteristics, serial files.

SEQUENTIAL FILES

Applications file-creations, retrieval, update etc.

INDEXED SEQUENTIAL FILES

Applications, Implementation, Block indexes, prime and overflow data areas.

DIRECT FILES

Applications, direct mapping techniques, Directory lookup techniques, address calculation techniques, approaches to the problem of collision, use in programs.

MULTIKEY FILES

Applications, inverted files, linked list representation, basic operations on a linked list, header nodes, singly, doubly and multiway linked list files, ring files.

INTRODUCTION TO COBOL PROGRAMMING

Application areas and supporting languages, Nature of COBOL and its characteristics, characters used for words, punctuation, conditions, arithmetic expressions, print editing etc. rules for punctuation, reserved and non reserved words, COBOL coding from and rules for entering statements, structure of COBOL programs etc.

REFERENCE BOOKS

1. Data Processing & File Structures By E.S. Loomis, PHI
-

COURSE NUMBER	:	TCT-230
COURSE TITLE	:	DISCRETE STRUCTURE
CREDITS WITH BREAK-UP:		3(3-1-0)
PRE- REQUISITE	:	NIL

CATALOGUE DESCRIPTION

Propositional logic and proofs, Set theory, Algebraic structures, Groups and semi groups, Graphs, Lattices and Boolean algebra, Finite fields.

DETAILED CATALOGUE DESCRIPTION

SET THEORY

Set notation & Description. basic set operations & notation, Venn diagram, combinatorics, permutation combination, power set.

PROPOSITION LOGIC

Proposition, logical operation, propositions generated by a set, Tautologies, Equivalence & implication, Laws of logic.

PROOF

Mathematical system, proof in propositional calculus Direct proof, conditional conclusion, Indirect proof, Principle of mathematical induction, proof using previously proven theorem.

ALGEBRAIC SYSTEM

Common properties of operations, levels of abstraction, Group, some general properties of group, subsystem, Direct products, Isomorphism.

GROUP

Cyclic group, cosets & factor groups, permutation group, normal sub group & group Homomorphism, coding theory.

GRAPH

Introduction, data structure, connectivity, Traversal, Graph optimization, planarity & coloring.

BOOLEAN ALGEBRA

Posets, lattices, atoms of boolean algebra, finite boolean algebra as n-tuple boolean expression, application of boolean algebra to switching theory.

FIELDS

Ring, basic definition & concepts, fields polynomial ring, Field extension, finite fields.

REFERENCE BOOKS

1. Discrete Mathematical Structure with application to Computer Science ,
J.P. Trembley & R. Manohar, TMH
2. Discrete Mathematics for computer Scientist
J.Trauss (Addision Wesley)
3. Discrete Mathematics by Seymour Lipschutz, TMH
4. Discrete mathematics by Jhonson Baugh, Macmillan Pub.

COURSE NUMBER	:	TCT – 231
COURSE TITLE	:	FORMAL LANGUAGES & AUTOMATATHEORY
CREDITS WITH BREAK-UP	:	3(3-1-0)
PRE-REQUISITE	:	NIL

Introduction

Deterministic and non deterministic finite automata regular expression, two way finite automata, finite automata with output, properties of regular sets, pumping lemma closure properties MyHill-Nerode theorem.

Context free Grammars

Derivation trees simplification forms.

Push down automata

Definitions, relationships between PDA and context free language, properties of CFLs, decision algorithms

Turing Machines

The Turing machines model, complete languages and functions, modification of Turing machines, Church's machines undecidability.

Properties of recursive and recursively enumerable languages, universal Turing machines, post correspondence problems, introduction to recursive function theory.

Chomsky hierarchy:

Regular grammars, unrestricted grammars, context sensitive language, relation between classes of languages.

SUGGESTED TEXT BOOKS & REFERENCES:

1. Hopcroft and Ullman, "Introduction to Automata Theory Languages and Computation", Addison Wesley
2. Mishra & Chandrashekharan, "Theory of Computer Science", PHI
3. Daniel I.A.Cohen, " Theory of Computer Science.
4. Korral, " Theory of Computer Science".

COURSE NUMBER	:	TCT - 330
COURSE TITLE	:	DESIGN AND ANALYSIS OF ALGORITHMS
CREDITS WITH BREAK-UP :		3(3-1-0)
PRE-REQUISITE	:	TCT-230 AND TCT-205

CATALOGUE DESCRIPTION

Review of basic data structures and concepts in algorithm analysis, asymptotic complexity, domain independent techniques for algorithm design such as divide and conquer, greedy strategy, dynamic programming and backtracking, techniques for lower bound algorithms for sets, graphs and text processing, internal and external sorting/searching/merging, height balanced trees, 2-3 trees, B-trees hashing algorithms for dynamic storage allocation, Garbage collection and compaction.

DETAILED CATALOGUE DESCRIPTION

REVIEW OF BASIC DATA STRUCTURES

Data types and structures, arrays and arrays of structures, variables and expressions, primitive operations, precedence of operators, built - in functions, algorithm and heuristics

CONCEPTS IN ALGORITHM ANALYSIS

Space complexity, time complexity, asymptotic complexity, asymptotic notations etc.

TECHNIQUES OF ALGORITHM DESIGN

General algorithm, refinement, pseudo code, format conversions, statement and control structures, string operators, relational operators, logical operations and expressions, precedence of all operators, sub algorithm, parameters, tracing and trace table etc.

REVIEW OF SOME SAMPLE ALGORITHMS AND GENERAL PROBLEM SOLVING STRATEGIES.

REFERENCE BOOKS

1. Computer Algorithms Introduction to Design & Analysis
Basse (Addison Wesley Pub.)
2. Fundamental of Computer Algorithm
Corrman
3. Fundamental of Computer Algorithm
Horowitz & Sahani(Galgotia)

COURSE NUMBER : **TCT-335**
COURSE TITLE : **OPERATIONS RESEARCH**
CREDITS WITH BREAK-UP: **2(2-1-0)**
PRE-REQUISITE : **NIL**

CATALOGUE DESCRIPTION

Introduction, linear programming, duality, sensitivity and parametric analysis, transportation model, dynamic programming, project scheduling by PERT/CPM.

DETAILED CATALOGUE DESCRIPTION

INTRODUCTION

The art and science of operational research computations in Operations research, Computations in Operations research, Phases of O R Study

LINEAR PROGRAMMING

Formulation and graphical solution, Primal simplex method, Dual simplex method, special cases in simplex method application. Definition and solution of Dual problem, Sensitivity analysis and parametric analysis

TRANSPORTATION MODEL

Definition, application and solution of transportation model Assignment model and techniques of slider

DYNAMIC PROGRAMMING

Elements of D.P. Model, and Computation.

PROJECT SCHEDULING BY PERT-CPM

Network diagram representations, Critical path calculation, project control.

REFERENCE BOOKS

1. Operations Research, Wagner, PHI
2. Operations Research, Taha

COURSE NUMBER : **BPS-218**
COURSE TITLE : **PROBABILITY STATISTICS AND QUEUING MODELS.**
CREDITS WITH BREAK-UP : **2(2-1-0)**
PRE-REQUISITE : **NIL**

CATALOGUE DESCRIPTION

Sample spaces, random variables, probability distributions, expected values, joint distributions, variance, co-variance, statistics, single correlation and regression, statistical inferences, point and interval estimates, testing of Hypothesis, elements of stochastic processes, Marcovian chain, Queuing model, M/M/K behaviors, computer science applications.

DETAILED CATALOGUE DESCRIPTION

Statistics:

Importance of Statistics to Engineering, data collection, data representation, data processing, data analysis, interpretation of results, prediction of past / future trends, chances of errors, raw data, sample, primary data, secondary data, tabular form representation, graphical representation, one dimensional, two dimensional, three dimensional, and multidimensional representation, Computation, addition, subtraction, approximation, central tendency, basic measures of central tendency: arithmetic mean, geometric mean, harmonic mean, median, mode, deviations from means, median, and mode, sum of deviations, overall mean, reciprocal of mean, grouped and ungrouped data, range, Partition value, dispersion, measurement of dispersion, symmetry of data, quartile deviation, semi quartile range, percentile, decimal, average deviation, minimal property of average deviation, mean deviation from mean, variance, standard deviation, moment as measures of statistical properties, coefficient of variation, moments, effect of chance of origin and scale on

moments, skewness and its measurements, Pearson's B coefficient, Pearson's Y coefficient, factorial moments, curve fitting, method of Least Squares, fitting a polynomial of degree n, fitting of a straight line, changes of origin and scale, fitting of second degree Parabola, fitting of curves through the origin, line of regression, linear and nonlinear regression, lines of regression, derivation of lines of regression of Y on X, derivation of lines of regression of X on Y, regression coefficient, correlation, Bivariate Series, co-variation, types of correlations, positive or negative, simple, multiple and partial correlation, linear or nonlinear, degrees of correlation, measurements of linear correlation, scatter Diagram, Karl Pearson's Coefficient of Correlation, interpretations or significance, Bivariate frequency table, Correlation and regression in case of Bivariate Frequency Table or Correlation Table, Multivariate Series, Multiple Regression equation, Primary and Secondary Subscripts, Residual and its properties, Variance of Residual, Coefficient of multiple correlation, Coefficient of Partial correlation, Theorems, numerical problems.

Probability:

Meaning of Probability, subjective probability, objective probability, Random Experiment, tossing a coin, throwing a die, trial, outcome space, sample space, sample points, types of sample space, tree diagram, event, favorable sample points and occurrence of an event, odds, sure or Certain event, impossible events, simple event or elementary event, composite or complex event, compound or joint event, Mutually Exclusive or disjoint or Incompatible events, pair wise mutually exclusive events, Complementary events, Exhaustive Events, Exhaustive and Mutually Exclusive Events, Bayes' Theorem, Equally likely Events, Definition of Probability, Classical Approach, Empirical Approach, Axiomatic Approach, cases or ways, mutually exclusive cases, equally Likely cases, exhaustive cases, favorable cases, Priori Definition of Probability, Criticism of classical definition of Probability, Posteriori Definition of Probability, defects, Axiomatic Approach(probability as a function of an event), Natural choice or special cases, classical versus Axiomatic approach, Relative frequency Interpretation and Axiomatic Approach, Calculus of Probability in a Finite sample space by direct Enumeration of sample points, Counting rules, Addition rules, Inclusion and Exclusion rule, Multiplication rule, Selection with replacement, Addition theorem of probability, Various theorem based on addition theorem, The Inclusion-Exclusion formulas, bool's inequality (for two events, for three events, for n events), theorems, Conditional probability, Multiplication rule of probability or theorem of Compound probability, generalization of Multiplication rule, Stochastic independence, pair wise independent events, Multiplicative law of probability for independent events, Probability distribution, random variable, Types of random variables(discrete, continuous), Probability function , Probability density function, Distribution function, distribution function of a discrete random variable, discrete function of a continuous random variable, Joint probability distribution, Marginal asymptotic

efficiency, absolute efficiency, efficiency and sample size, criterion for determining sufficient statistics, point and interval estimates, simple problem of engineering use.

Queuing Model:

Queuing theory, its use in engineering, examples of real queuing systems, basic structure of queuing models, single channel Poisson Arrivals with Exponential service rate(M/M/I), multi-channel queuing models, other waiting-line models, engineering problems of queuing theory, their model development, Markovian Chain queuing model, M/M/K behavior, Hospital problem, engineering Store problem, Inventory control models.

Reference Books:

1. Statistics and Queuing Models for Computer Science by Trivedi PHI Pub

COURSE NUMBER	:	TCT-240
COURSE TITLE	:	COMPUTER ORGANISATION
CREDITS WITH BREAK-UP:		3(2-0-2)
PREREQUISITE	:	NIL

CATALOGUE DESCRIPTION

Introduction, evolution of computers, Von Neumann's model IBM 360/370 model, evolution of operating system, organization-study of different type of M/c, processors, memory, Input-Output devices, introductory concepts of networking, memory organization, instruction formats, addressing, assembly language programming, input-output organization.

DETAILED CATALOGUE DESCRIPTION

INTRODUCTION:

Evolution of computers, Newman's stored program principle, functional components of computers, general purpose computers, IBM 360/370 Model, Introduction to operating system, evolution of operating system, language, levels & virtual machines, Hardware & software, Multilevel machines, Zero address m/c, single address m/c, two address m/c, 3 addressing m/c, 4 address m/c

COMPUTER SYSTEM ORGANISATION:

Study of different type of organization, IBM 360, 8086 based m/c, 80186, 80286, 80386, 80486 based system organization.

PROCESSORS:

Instruction Execution, parallel Instruction execution, processor classification.

MEMORY

Memory address, megabits, secondary memory.

INPUT/OUTPUT:

I/O devices, I/O processors.

COMPUTER NETWORKS & DISTRIBUTED SYSTEMS:

Local Area Network, Wide Area Networks, Distributed system.

MEMORY ORGANIZATION:

Main memory, virtual memory, basic concepts, cache memory, memory management.

INSTRUCTION FORMATS:

Instruction formats-introduction, Design criteria for Instruction formats, Examples for instruction formats for IBM 360,8086,80386; RISC,CISC, Microcodes.

ADDRESSING:

Immediate addressing, direct addressing, register addressing, Indirect addressing, Indexed addressing, Base register addressing, stack addressing, addressing for 8086 systems, discussion on addressing mode for 80386 systems.

ASSEMBLY LANGUAGE PROGRAMMING:

IBM 360 & 8086 assembly language programming - a comparison, Macros, sub routine's, linking & loading.

INPUT OUTPUT ORGANIZATION:

Peripherals, DMA, Input/output processors.

REFERENCE BOOKS

1. Computer organization & programming
by CW Gear
2. Structured computer organization
by Tenenbaum
3. The Intel Microprocessors 8086,80186,80286, 80386, 80486.
by Barry B Berry.
4. Computer Organization by Hamacher, McGraw Hill
5. Computer Organization and Architecture, Hayes, TMH

COURSE NUMBER : TCT - 443
COURSE TITLE : COMPUTER GRAPHICS AND ANIMATION
CREDITS WITH BREAK-UP : 4(3-0-2)
PRE-REQUISITE : TCT-205

CATALOGUE DESCRIPTION

Introduction, point plotting, line drawing, raster graphics and vector displays, two dimensional transformations, clipping, Windowing, Graphic input devices and input techniques, graphic packages, segmented display files, Geometric models and picture structure, three dimensional graphics, curves and surfaces transformations, perspective hidden-surface elimination, device independent graphic systems.

DETAILED CATALOGUE DESCRIPTION

INTRODUCTION

State of the art trends, dimensionality and coordinate systems, continuous and discrete graphics, points plotting, line drawing, vector graphics, vector refresh display etc.

RASTER GRAPHICS

Bitmap aspect ratio, spatial and intensity resolution, video card scanning process, spot size, gray-level and color displays, scan conversion, symmetrical DDA, Bresenham's line drawing and circle generation algorithms.

2-D TRANSFORMATIONS

Representation of a point as a column vector and row-vector and matrix notations, affine transformations, composing, homogeneous transformations etc.

WINDOWING AND CLIPPING

Window and view port, transformation from picture plane to screen coordinates, clipping, scissoring, cohen-sutherland algorithm etc.

GRAPHIC INPUT DEVICES AND TECHNIQUES

Analog and digital input devices, logical input functions, Non-traditional devices.

GRAPHIC PACKAGES

Ground rules for graphics software design, functional domains, graphic primitives, windowing functions, and miscellaneous functions.

SEGMENTED DISPLAY FILES

Segments, functions for segmenting the display files, posting and unposting a segment, segment naming schemes.

GEOMETRIC MODELS

Global, local, view, picture plane and screen coordinate systems, displaying a geometrical model, instance transformations.

PICTURE STRUCTURE

Defining symbols by procedures, boxing, structured display files.

3-D GRAPHICS

Wire frame models, introduction to projections 3-D affine transformations, perspective transformation, two approaches to hidden surface elimination.

DEVICE INDEPENDENT GRAPHIC SYSTEMS

Normalized device coordinates, Mapping Normalized device coordinates on to the device.

REFERENCE BOOKS

- 1.Principles of Interactive Computer Graphics
Sproul, Newmann McGraw Hill
- 2.Procedure Elements of Computer Graphics
Rogers, McGraw Hill
- 3.Computer Graphics C –Version”
Donald Hearn,MPalinBecker

COURSE NUMBER	:	TCT-315
COURSE TITLE	:	FUNDAMENTAL OF COMPUTER COMMUNICATION SYSTEM
CREDITS WITH BREAK-UP	:	4(3-1-2)
PRE-REQUISITE	:	NIL

CATALOGUE DESCRIPTION

Communication concepts, channel, signal characteristics, noise, modulation fundamentals of data communication, data rates, full duplex, synchronous communication, encoding at bit, byte and frame levels, error detection & correction, data communication sub-systems, Multiplexing including statistical multiplexing, telephone system characteristics, modems, introduction to computer networks and application, store and forward, switching ,layered architecture of communication protocols, physical and data link layer protocols, multi channel access.

DETAILED CATALOGUE DESCRIPTION

COMMUNICATION CONCEPTS

Analog and digital transmissions, digital radio, channels and Shannon law, signal characteristics, causes and sources of noise, SNR

MODULATION FUNDAMENTALS OF DATA COMMUNICATION

Amplitude modulation, frequency shift and phase shift keying, quadrature amplitude modulation, trellis coded modulation, pulse code modulation, delta modulation etc.

DATA RATES

Bps, baud, dibit, tribit etc and multi level modulation.

DIRECTIONAL CHARACTERISTICS

Simplex, half-duplex, full duplex and full duplex modes of communication.

ENCODING

Return-to-zero, non-return to zero, alternate mark inversion, Manchester encoding, decoding etc.

ERROR DETECTION AND CORRECTION

Block parity check. Cyclic redundancy check, forward error correction.

DATA COMMUNICATION SUB-SYSTEMS

Modems, Dow inline Processor, front-end processor, host processor, terminals.

MULTIPLEXING

Frequency-division, time division, statistical time division multiplexing, data concentrators.

TELEPHONE SYSTEM CHARACTERISTICS

Basic telephone systems, telephone instruments, local switching equipments.

INTRODUCTION TO COMPUTER NETWORKS

Wide area and local area networks, protocol etc.

REFERENCE BOOKS

1. Data Communication and Networking, Forouzen, Tata McGraw Hill
2. Understanding Data Communication & Networks, William. A. Shany, Vikas

COURSE NUMBER : **TCT-300**
COURSE TITLE : **COMPUTER & SOCIETY**
CREDITS WITH BREAK-UP : **3(3-0-0)**
PRE-REQUISITE : **NIL**

CATALOGUE DESCRIPTION

Role of computers in society, scientific computing, product design, information systems, process control, instrumentation, office automation, expert systems modernization, labour displacement, changing workplace, model of social interaction, expanding computer industry, manpower needs, privacy and security, effect of government, banking, journalism, judiciary, literature, communication, intelligent machine, roles and ethics of a computer scientist.

DETAILED CATALOGUE DESCRIPTION

INTRODUCTION

Role of computers in society. Issues of privacy, confidentiality and security. Threat to privacy. Uses and abuses of computers. Threats to computer systems, security considerations of a computer system/network. Passive and active infiltration. Counter measures against infiltration: Access control, Privacy transformations, Processing restrictions, monitoring procedures, integrity management etc. cryptographic techniques to data processing, security matrix.

DATA BANK SYSTEMS

Structure (subject, controller, custodian, collector, intruder, society), privacy and security.

Computer related frauds. Graceful degradation in case of computer failure.

ROGUE PROGRAMMES

Various types of rogue software and their impact on computer security. Popular methods of infection used by computer viruses.

Computer and Law

REFERENCE BOOKS

1. IT Act 2000, Govt. of India

2. EDP Auditing by Ronweber
 3. Data Security by Ankit Firodia
-

COURSE NUMBER : **TCT-400**
COURSE TITLE : **MANAGEMENT INFORMATION SYSTEMS**
CREDITS WITH BREAK-UP: **3(2-0-2)**
PRE-REQUISITE : **NIL**

CATALOGUE DESCRIPTION

Introduction to management information systems, system approach to management and information, MIS planning and development analysis, design tools, data modeling, MIS design and evaluation, Technological aspects of MIS.

DETAILED CATALOGUE DESCRIPTION

INTRODUCTION

Basic definitions of information systems (IS) and MIS etc, Levels of management, concept and types of management information, functions and roles of management information needs of managers, properties of useful management information characteristics of MIS, structure of MIS.

SYSTEM APPROACH TO INFORMATION AND MANAGEMENT

System concepts, feedback and control, control of system performance, other system characteristics, a business as a system, Is concepts, Is model, Is activities, Is resources, operations information systems, Is for management decision making, information reporting systems, decision support system, executive information system.

MIS PLANNING AND DEVELOPMENT ANALYSIS AND DESIGN TOOLS

Introduction to planning terminology, types of planning, role of planning, tactical and operational planning, planning methodologies, business system planning(BSP), BSP approach, critical success factors(CSF), CSF approach, development cycle, systems investigation, planning and feasibility, organizational environment, system requirements analysis, system design, user interface design, data design, process design, logical system design, physical system design.

DATA MODELLING

Hierarchical, Network, Relational, Micro-based, client server models.

MIS DESIGN AND EVALUATION

Gross design, detailed design, steps in the design of MIS, Evaluation, technological and behavioral aspects,

REFERENCE BOOKS

1. Management Information System by O. Brain (TMH Pub.)
2. Management Information System by Jawadegar (TMH Pub.)

COURSE NUMBER	:	TPE-486
COURSE TITLE	:	PRINCIPLE OF MANAGEMENT
CREDITS WITH BREAD-UP:		2(2-0-0)
PRE-REQUISITE	:	NIL

CATALOGUE DESCRIPTION

Growth of Management thought, Management and industry, functions of a Manager, Qualities, Responsibilities, Planning, organizing, staffing controlling & Directing, motivation & Work environment. Planning & Management of Computer Centers.

COURSE NUMBER	:	TEC-240/ TEE – 240
COURSE TITLE	:	INSTRUMENTS & MEASUREMENTS
CREDITS WITH BREAK-UP :		3 (2 – 1 – 2)
PRE-REQUISITE	:	NIL

CATALOGUE DESCRIPTION

Units & Errors, Measuring Instruments, Resistance measurement, Capacitance Measurement, Inductance Measurement, CRO, Sensors and transducers, measurement of non-electrical quantities.

DETAILED CATALOGUE DESCRIPTION

Units and Dimensions, unit systems, errors and sources of errors, statistical measurement analysis, Classification of Indicating and integrating type Instruments, construction, theory and limitations of PMMC, MI, rectifier type instruments, dynamometer and electrostatic type instruments, watt meters, energy meters. Measurement of resistance, inductance, and capacitance (low, medium and high), dc bridges, ac bridges, earthing and shielding of components, ohmmeters, megger, surface resistivity, guard wires, VTVM, TVM, IC based voltmeters, DVMs,

electronic meters, DPM, Sensors and transducers, measurement of non-electrical quantities e.g. displacement, force, acceleration, pressure, and temperature, moisture, humidity, strain, turbidity, pH, nitrogen concentration, oxygen, pollution, smoke, CROs, Special purpose CROs, Spectrum analyzers, wave analyzers, Measurement of electrical quantities e.g. frequency, phase, voltage, current, power, power factor and energy, General instrumentation engineering, active transducers, piezoelectricity, piezo-resistivity, optical transducers, microwave transducers, pulse transformer, small potential transformers, ammeters, and voltmeters, multimeters, numerical.

Reference Books:

- Electrical Measurements & Measuring Inst. - Golding and Widdis
- Electrical Measurement - M.B. Stout.
- Instrumentation, Devices and Systems – Rangan, Sarma and Mani
- Digital Instrumentation, By Bouwens
- Electronic Instruments and Systems, By R.G. Gupta
- Applied Electronics and Instrumentation, By Dhir
- Instrumentation, Measurement and Feedback, By Jones

COURSE TITLE	:	CONTROL SYSTEM
COURSE NUMBER	:	TEE-300/TEC-312
CREDITS WITH BREAK-UP:	4(3-1-2)	
PRE-REQUISITE	:	TEC-220/TEE-150

CATALOGUE DESCRIPTION

General introduction to control systems, Control System Components, Linear Feedback control systems, Transfer Functions, Block diagrams, Signal flow graphs, derivation of transfer functions, Transient response analysis- response of first and second order systems, effects of derivative and integral control on the transient performance, Routh-Hurwitz and Nyquist stability criterion, Root-locus technique, Polar plots, Bode plots, Nyquist criterion, closed loop frequency response, experimental determination of transfer functions, State variable analysis, Controllability and observability, feedback system design, compensation techniques, design of compensation networks, Design via State feed back, non-linear systems, describing functions, Lyapunov Stability, Phase plane analysis, limit cycles

DETAILED CATALOGUE DESCRIPTION

General introduction to Control System: Feedback types and effect, historical development; recapitulation of Laplace transform; inverse Laplace transform; application to electrical engineering problems.

Transfer Functions: introduction, impulse response and transfer function of linear systems, Block diagrams, block diagram reduction signal flow graphs;

definitions, properties, signal flow graph algebra, gain formula, application of gain formula to block diagrams, signal flow graph derivation of transfer functions.

Transient response analysis - response of first and second order systems to step function, ramp function inputs, steady state errors, type of control systems, error constants, effects of derivatives and integral control on the transient response, illustrative electrical methods of stability determination of linear control system.

Routh-Hurwitz criterion of stability analysis, stability tests, special cases, Root locus technique- basic properties and construction of root loci, Effects of addition of poles and zeros to open-loop transfer function on root loci, Polar plots: Frequency response of closed-loop systems, effect of addition of poles and zeros, Bode Plot-Stability analysis, gain and phase margin, relative stability. Nyquist stability criterion-definitions of encirclement and enclosures, principle of argument, Nyquist path, application to problems.

Closed loop frequency response: Constant M-circles, Constant N-circles, Nicholas chart, closed loop frequency response for unity and non-unity feed-back systems, experimental determination of transfer functions, . Compensation Techniques, Lead, Lag, Lag-Lead compensation, PI, PD, PID controllers, Compensation techniques based on the root-locus approach & Bode plots, stability of Non-linear systems, State variable analysis, transfer matrix, controllability, observability, state space equations in different forms, Liapunov stability analysis of linear and non-linear time invariant systems.

REFERENCE BOOKS

1. Automatic Control Systems - B.C. Kuo
 2. Modern Control Engineering K. Ogata
 3. Control System Engineering I.J. Nagrath & M. Gopal
-

COURSE NUMBER : **TCT-325**
COURSE TITLE : **COMPUTER NETWORKS**
CREDITS WITH BREAK-UP: **3(3-1-0)**
PRE-REQUISITE : **TCT-315**

CATALOGUE DESCRIPTION

Networking goals and applications, design-cost, delay and throughput, packet switching versus circuit switching, broadcast channel, access in satellite-based networks, local area networks, bus and ring structures, data link and network transport, network services, electronic mail, file transfer , Introduction to protocol specification, validations and testing.

DETAILED CATALOGUE DESCRIPTION

INTRODUCTION

Networking goals, It's application techno-economic factor of computer networking, Introduction to ARPANET, SNA, DECNET, X.25.DESIGN, cost & delay analysis, Network topology, connectivity analysis, cuts and network flow, Maxflow algorithm, Monte-carlo connectivity analysis. Delay analysis - Queuing theory, M/M/1 queue, backbone design, and placement of concentrator, Perturbation Heuristics.

PHYSICAL LAYER

Introduction to CCITT, Transmission & Multiplexing, X.21 interface, circuit switching & Packet switching, communication satellite, Transmission error, error correcting code, error detecting code, broad band & Base band channel.

DATA LINK LAYER

Simplex protocol, stop & wait protocol for noisy channel, window-sliding protocol, protocol efficiency, verification.

NETWORK LAYER

Virtual circuit & Datagram, routing algorithm - static, centralized, isolated and distributed routing, congestion-causes and remedies satellite packet broad cast; pocket radio.

TRANSPORT & SESSION LAYER

Addressing & connection establishment, flow control & Buffering, inter connection of packet switched network, Internet, gateways, X.75 model.

PRESENTATION LAYER

Data Representation and Compression, Network security, cryptography.

APPLICATION LAYER

File transfer, Access and Management, Electronic mail, virtual terminals, Directory services, Picture Storage& transfer, Teletext and videotext.

VARIOUS SERVICES PROVIDED BY COMPUTER NETWORK

Email, ATM, Internet text & Graphics Services, database access etc.

REFERENCE BOOKS

- 1.Computer Networks, A.S. Tanenbaum, , PHI
- 2.Computer Networks, Black, PHI
- 3.Unix Network Programming, Stevens

COURSE NUMBER : **TCT-421**
COURSE TITLE : **SOFTWARE ENGINEERING**
CREDITS WITH BREAK-UP : **2(2-1-0)**
PRE-REQUISITE : **NIL**

CATALOGUE DESCRIPTION

Definition, Phase Definition of Software Engineering, Goals of Software Engineering, life cycle, Prototyping, A Generic view of software Engineering, system requirements analysis, preliminary software planning, Software requirements.

DETAILED CATALOGUE DESCRIPTION

DEVELOPMENT PHASE

Preliminary Design, Detailed Design, Organization for software development.

MAINTENANCE PHASE

Software Engineering, Maintenance.

STRUCTURED CODING

Importance of structure, Structured coding, code format.

SOFTWARE ENGINEERING FOR SMALL PROJECTS

Nature of small projects, small project definition, small project development, small project maintenance, Fundamentals of Software Engineering Economics, Software cost estimation methods and Procedures.

MANAGEMENT ISSUES

An Organizational framework, software project failure, software engineering, education, how to establish software engineering.

REFERENCE BOOKS

1. Software Engineering a Practitioner Approach
Pressman R. (Mc Graw Hill Pub.)
 2. Software Engineering
Sommerville (Addition Wesley Pub.)
 3. Software Engineering
Martin L.Shooman (Mc Graw Hill Pub.)
-

COURSE NUMBER : **TCT-407**
COURSE TITLE : **STATE OF THE ART COMPUTER**
CREDITS WITH BREAK-UP : **2(1-0-2)**
PRE-REQUISITE : **NIL**

CATALOGUE DESCRIPTION

Course Contents

Latest Computer systems-their architecture and salient features, Cost comparisons, storage media, Input/Output systems in vogue, Latest trends in Computer applications, Familiarization with state of art hardware and software in Computers.

COURSE NUMBER : **TCT-232**
COURSE TITLE : **THEORY OF COMPUTING**
CREDITS WITH BREAK-UP: **3(3-0-0)**
PRE-REQUISITE : **NIL**

CATALOGUE DESCRIPTION

Deterministic and Non- deterministic computation; Wang machines, post machines, RAMs and their equivalence, Universal machines, Halting problem, solvability and undecidability, Introduction to recursive function theory, equivalence of general recursive function and Turing computable functions, Church's thesis, regular, Context free, context sensitive languages and their relation to automata, complexity classes.

Introduction to logic for computer:

Syntax of propositional formulas, Truth and the semantics of propositional Logic, Notions of satisfiability, validity, inconsistency, Deduction Systems for propositional logic, Completeness of Deductive system, For, Proof Theory of for,

Introduction to model theory, Completeness and compactness theorems, First order theories, Robinsons Revolution Herbrand models, Completeness of resolution, Application of resolution to automatic theorem proving and logic programming.

Text Book & Reference Book

1. Introduction to computer theory, Cohen Daniel A.
2. Introduction to theory computation, Gurari Eiten M.
3. Recursive function theory and logic, AnnYasuhara

COURSE NUMBER	:	TCT- 471
COURSE TITLE	:	MULTIMEDIA TECHNOLOGY
CREDITS WITH BREAK-UP	:	3(2-1-2)
PRE-REQUISITE	:	TCT-205

CATALOGUE DESCRIPTION

Introduction, Stages of Multimedia Projects, Multimedia Building Blocks, Data Compression, Speech Compression & Synthesis, Images, Video

DETAILED CATALOGUE DESCRIPTION

Introduction

Introduction to Multimedia, Multimedia objects, Multimedia in business & work

Stages of Multimedia Projects

Multimedia Hardware, Memory & Storage Devices, Communication Devices, Multimedia software's, presentation tools, tools for object generations, video, sound, image capturing, authoring tools Card and page based authoring tools.

Multimedia Building Blocks : Text, sound, MIDI, Digital Audio, audio file formats, MIDI under windows environment, Audio & video Capture

Data Compression

Huffman Coding, Shannon Fano Algorithm, Huffman Algorithms, Adaptive Coding, Arithmetic Coding, Higher Order Modeling, Finite Context Modeling, Dictionary based Compression, sliding window compression, LZ77, LZW compression, Compression ratio, loss less & lossy compression

Speech Compression & Synthesis

Digital Audio concepts, Sampling variables, Lossless compression of sound, lossy compression & silence compression

Images: Multiple monitors, bitmaps, vector drawing, lossy graphic compression, image file formation animations, Images standards, JPEG Compression, Zig Zag Coding

Video: Video representation, Colors, Video Compression, MPEG standard, recent development in Multimedia.

Text Book & Reference Book

1. Tay Vaughan “Multimedia, Making it work”, Osborne McGraw Hill
2. Buford, “Multimedia Systems”, Addison Wesley
3. Mark Nelson “Data Compression Book”, BPB
4. Rosch “Multimedia Bible”, Sams Publishing

COURSE NUMBER	:	TEC-261
COURSE TITLE	:	ELECTRONIC DEVICES AND CIRCUITS
CREDITS WITH BREAK-UP	:	4(3-1-2)
PRE-REQUISITE	:	TEE-150/TEC-220

CATALOGUE DESCRIPTION

Energy Bands in Solids, Transport phenomenon in semiconductor, p-n junction diode and its characteristics and Applications, Transistor, Stability, Small Signal Analysis, High Frequency Model, FET, MOSFET, Amplifier, Power Amplifier, Multistage Amplifier, Tuned Amplifier, Frequency response of Amplifiers, Power Circuit and Systems.

DETAILED CATALOGUE DESCRIPTION

Energy Bands in Solids: metals, semiconductor and Insulator; Transport phenomenon in semiconductor: mobility and conductivity, Impurities, Doping., Diode Circuit Analysis: Introduction to Semiconductor junction diode; Nonlinear properties; Ideal diode; Basic theory and analysis of simple diode circuit; load line; Small signal analysis and concept of dynamic resistance; AC load line; Different types of diode., Rectifiers: Circuit analysis of half wave and full wave rectifier using semiconductor devices; Bridge rectifier; Ripple and form factor calculation for above circuits; Efficiency and PIV for above circuits; Types of filters; C filter, L filter, LC filter, PIE filter; Analysis of filter and calculation of ripple and regulation., Introduction to Transistor Circuits: Transistor characteristic; Plots for NPN and PNP configurations; Current flow mechanism in the junction transistor and calculation of Alpha and Beta; Analysis of CE configuration; Current amplification in the transistor; Graphical analysis of transistor circuits; Power calculations; Infinite bypass capacitor; Infinite coupling capacitors; Different dc biasing methods; Fixed bias, emitter stabilized bias, potential divider bias, dc bias with voltage feedback; Common base configuration analysis; Emitter follower.,

Bias Stability: Quiescent point variation due to uncertainty in Beta; Effect of temperature on the Q point; Stability factor analysis; Temperature compensation using diode biasing., Transistor amplifier at Low frequencies; Hybrid parameters; CE configuration; CB configuration; CC configuration High Transistor amplifier at high frequencies; Hybrid PIE equivalent circuit at high frequency; High frequency behavior of CE & CC amplifier., Power Amplifiers: Introduction to Class A, B, AB and C operation; Class A common-emitter power amplifier; Transformer coupled amplifier; Class B push-pull power amplifier; Amplifiers using complementary symmetry; Class C amplifier, Tuned amplifier., Multiple Transistor Circuits: Cascading of amplifier stages; Difference amplifier Darlington amplifier; Cascode amplifier., FET: Introduction to theory and operations of n-channel JFET & MOSFET; Reversibility of drain & source; P-channel FET; FET switch; Bias stability in FET; Different FET configuration; Small signal analysis of FET. Low frequency analysis of FET amplifier; Source bypass capacitor; Drain coupling capacitor and gate coupling capacitor. FET at high frequencies; CD and CS amplifier at high frequency; GBW products of above circuits., Power Circuit and Systems: Regulated power supplies.

Reference Books:

- Schilling & Belove: *Electronic Circuits - Discrete and Integrated*, McGraw Hill Publication.
- Millman & Halkias: *Integrated Electronics*, McGraw Hill Publication
- Millman & Grabel: *Micro Electronics*, McGraw Hill Publication.

Boylestad & Nashlesky: *Electronic Devices & Circuit Theory*, PHI

COURSE NUMBER	:	TCT-200/TEC-203
COURSE TITLE	:	Digital Logic & Circuits
CREDITS WITH BREAK-UP	:	4(3-1-2)
PRE-REQUISITE	:	NIL

CATALOGUE DESCRIPTION

Digital Code, Logic gates, Boolean Algebra, Combination logic Circuits & design; K-Map, QM Technique, Adder, Subtractor, Encoder, Decoder, seven segment display, MUX, DEMUX, Parity checker, Semiconductor Memories, ALU and other circuits. Sequential circuits; Synchronous /Asynchronous circuits, Latch, Flip flop, Counters, registers, Practical sequential circuits, design & application. Introduction to finite State Machine: Mealey & Moore Machine

DETAILED CATALOGUE DESCRIPTION

Number systems: decimal, Binary, Octal, Hexadecimal number systems and their inter-conversion, Binary Arithmetic (Addition, Subtraction, Multiplication and Division), Diminished radix and radix compliments, BCD codes, 8421 code,

Excess-3 code, Gray code, ASCII and other codes., Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Boolean Functions, Canonical and Standard forms, Digital Logic Gates: AND ,OR, NOT, NAND, NOR, Ex-OR., Boolean function Minimization: The map method, Two, Three, Four and Five variable maps K-maps, Sum of products and Product of Sums Simplification, NAND and NOR implementation, The tabulation method, Determination of Prime implicants, Selection of Essential Prime implicants., Binary adder and subtractor, Multiplexer and Demultiplexer, Encoder and Decoders, code converters, Parity checker, arithmetic and logic unit, magnitude comparator, Programmable Logic Arrays, Programmable Array Logic, Implementation of Combinatorial Logic using these devices., Flip-flops, Triggering of Flip-flops, Analysis of clocked sequential circuits, state reduction and assignment, Flip-flop Excitation tables, Design procedures, Design of counters and registers, Design of other, Hazards and Glitches, Race conditions, incompletely specified cases Introduction to finite State Machine: Mealey & Moore Machine., Classification of Memories; Random Access Memories, Read Only Memory and erasable and programmable ROMS

Reference Books

- 1.Digital Logic and computer Design By- M Mano, PHI
- 2.Digital fundamentals By – J Floyd Pearson
- 3.Digital Logic By M. Leach

COURSE NUMBER : **TEE-150/TEC-220**
COURSE TITLE : **CIRCUIT THEORY**
CREDITS WITH BREAK-UP : **4(3-1-2)**
PRE-REQUISITE : **Nil**

CATALOGUE DESCRIPTION

Development of circuit concepts, Network equations, Network theorems, D.C. and A.C. (single phase) circuits, Coupled circuits, Resonance, Magnetic circuits, 3-phase balanced A.C. circuits, 3-phase unbalanced A.C. circuits, Symmetrical components, Fourier series, Laplace transforms, electrical transients

DETAILED CATALOGUE DESCRIPTION

Circuit variables, system of units, circuit analysis, An overview, voltage and current, The ideal basic circuit element, Power and energy, circuit elements, voltage and current sources. Analysis of circuits containing dependant sources, simple resistive circuits, equivalent resistance computation, voltage and current divider circuit. □ to Y equivalent circuits, Node voltage method, Node voltage method with dependant sources, Mesh current methods with and dependant sources, sources transformation methods, Network theorems, Thevenin's and Norton equivalents, Maximum power transfer theorem, Superposition theorem, subTCTution theorem, Compensation theorem, Millmans theorem, Inductors and capacitors, series and parallel

combination of Inductors and capacitors, Natural response of R-L and R-C circuits, Step response of R-L and R-C circuits, sinusoidal Steady state analysis, sinusoidal generation, sinusoidal response, The phaser , The passive circuit elements in phaser domain, Kirchoff's laws in phaser domain, Phaser diagrams, Real and Reactive power, The effective or r.m.s. value of a sinusoidal signal, complex power, Impedance and admittances, Power calculations, series and parallel resonance, Bandwidth and quality factor, Balanced three phase circuits, Analysis of star and Delta connected circuits, Power calculation of three phase circuits. Measurement of average power in three phase circuits. Mutual Inductance, Polarity of mutually induced voltages. Energy calculations, Equivalent circuits for magnetically coupled coils, Magnetic circuits, Series and parallel magnetic circuit calculations, Fourier series. Transients and Laplace transform method to solve transients. Concept of symmetrical components

Books:

1. Principle of electrical Engineering by V. Deltoro
2. Circuit Theory by W. Hayt

ELECTIVE COURSES

COURSE NUMBER	:	TCT- 420
COURSE TITLE	:	ARTIFICIAL INTELLIGENCE
CREDITS WITH BREAK-UP	:	3(2-1-2)
PRE-REQUISITE	:	NIL

CATALOGUE DESCRIPTION

Introduction, State space search, game tree search, architecture of artificial intelligence systems, production systems, knowledge representation, predicate calculus, structural/casual networks, deduction, truth maintenance, case study from any of natural language processing, question answering, vision, expert system etc.

DETAILED CATALOGUE DESCRIPTION

WHAT IS ARTIFICIAL INTELLIGENCE

The Computer and the Brain; Theories of Intelligence, Detecting and Measuring Intelligence, What makes a computer program intelligent ? The AI problems; What is an AI technique ?

PROBLEMS, PROBLEM SPACES AND SEARCH

Defining the problem as a state space search.
Production systems and its characteristics
Issues in the design of search programs

KNOWLEDGE REPRESENTATION

Knowledge Representation Issues
Representation and Mappings
Approaches to knowledge Representation
Issues in knowledge Representation
Structural/ Causal networks

Using Predicate Logic

Representing simple Facts in Logic
Representing Instance and ISa Relationships
Computable functions and predicates
Resolution
Natural Deduction

Representing Knowledge using Rules

Procedural versus declarative knowledge
Logic Programming

Forward versus Backward reasoning
Matching

EXPERT SYSTEMS AND KNOWLEDGE ENGINEERING

Representing and using domain knowledge
Expert system shells
Knowledge Acquisition
Case studies

HEURISTIC SEARCH TECHNIQUES

Search Applications
Basic search Algorithms

The " British Museum "Procedure
Generate and Test
Depth first Search
Breadth first search
Uniform cost search
Hill climbing

Intelligent Searching

Best first search
The A* Algorithm

Measuring search, Design of Heuristics,
Choice of Search Algorithm

GAME PLAYING

MINMAX and Game Trees Cutting of search with static Evaluations
ALPHA-BETA PRUNING Analysis of Alpha-Beta Pruning Alternatives to Alpha-Beta Pruning Enhancements to the Alpha-Beta Algorithm Quiescence search
Iterative deepening
Killer Move Heuristics

NATURAL LANGUAGE PROCESSING

Syntax, semantics, and pragmatics Parsing Languages, - Regular Languages, Context free languages Context free subsets of Natural languages Weak and strong context free Languages General Grammars and Augmented Transition Networks Natural Language interfaces to software systems Case study of one or more examples from Natural Language Processing, Question, Answering, Expert system, Vision etc.

REFERENCE BOOKS

1. Artificial Intelligence
Elaine Rich, Kerin Knight, Tata McGraw Hill
 2. Principles of Artificial Intelligence
Nils J Nilsson; Narosa Publ.
 3. Artificial Intelligence
Winston; Addison Wesley
 4. Introduction to Artificial Intelligence
Charniak and Mcdermott Addison wesley
-

COURSE NUMBER	:	TCT - 413
COURSE TITLE	:	DIGITAL CONTROL
CREDITS WITH BREAK-UP	:	3(2-1-2)
PRE-REQUISITE	:	TEE-300

CATALOGUE DESCRIPTION

Basic elements of a digital control systems, Introduction to supervisor digital control and direct digital control, Direct digital transducers and actuators, sampling process and construction of discrete signals, hold circuits, Z-transform of difference equations, pulse transfer function, modified Z-transform, Inverse Z-transform and its applications, stability in the Z-plane, Application to digital control in Railway/Air reservations, Traffic control, Process control, off and on-line control.

DETAILED CATALOGUE DESCRIPTION

INTRODUCTION

Discrete data control systems, sampled data control systems, digital control systems supervisory digital control, direct digital control, numerical control etc.

DIRECT DIGITAL TRANSDUCERS AND ACTUATORS

Sampled-data transducer, digital transducer, digital controllers, hybrid controllers, advantages of digital controllers, digital filters.

MATHEMATICAL MODELLING OF DIGITAL CONTROL SYSTEM

Block diagrams of digital control system.

SAMPLING PROCASS

Mathematical analysis, types of sampling operations, sampling theorem.

HOLD CIRCUITS

Function of a clamper, zero, first, and fractional order holds.

Z-TRANSFORM

Theory, solution of difference equations, pulse transfer function, ;modified zL-transform, inverses Z-transform and its applications.

STABILITY ANALYSIS

Mapping of left half s-plane into the z-plane, stability analysis in the z-plane.

REAL-LIFE ILLUSTRATIONS

Applications in process control, serve systems, two - position control, traffic control etc.

STATE-SPACE ANALYSIS

State-space representation of discrete-time systems, solution of discrete time state equations.

REFERENCE BOOKS

1. Digital Logic Application and Design

By John M. Yarbrough (Vikas Pub.)

COURSE NUMBER	:	TCT - 442
COURSE TITLE	:	DISTRIBUTED COMPUTING
CREDITS WITH BREAK-UP	:	3(2-1-2)
PRE-REQUISITE	:	TCT-321

COURSE CATALOGUE

Motivation, Topology, Communication, System Type, File system, Modes of Computation, Event Ordering, Synchronization, Deadlock Handling, Robustness, Reaching Agreement Election Algorithms etc.

DETAILED CATALOGUE DESCRIPTION

THE TREND TO DISTRIBUTED PROCESSING

Meaning of distributed processing/computing

Local Vs remote distribution

Distributed data and categories of data diatribe.

Centralization Vs de centralization.

TYPES OF DISTRIBUTED SYSTEMS

- Horizontal Vs vertical distribution
- Function distribution Vs. system distribution
- Hierarchical distributed processing
- Non cooperative system, cooperating systems

PRIVATE NETWORKS AND PUBLIC NETWORKS INTRODUCTION TO DISTRIBUTED ALGORITHMS

- Parallelism and distribution
- Basic Elements; Processes, Communication paths
- Features of distributed algorithms
- Classifying distributed algorithms

ELECTION AND MUTUAL EXCLUSION ALGORITHMS

- Ricart and Agrawala/Suzuki Kasami Algorithms
- Messages and time stamping
- Algorithm for regenerating the token
- Various Elective Algorithms

ALGORITHMS FOR DETECTION AND RESOLUTION OF DEADLOCK

- Problem of deadlock
- Characterization of deadlock situation
- Distribution of a centralized algorithm:
Lomet's algorithms
- The Rosenkrantz, Stearns and Lewis Algor.
- Algorithms for detection deadlocks
- Deadlocks due to communications : algorithm of chandy, Misra and Haas

ALGORITHMS FOR DETECTING TERMINATION

Problem of termination, Termination and Deadlock, Use of diffusing computation:, algorithm of dikstra and scholtein, Termination on a ring : algorithm of Dijkstra, feijen and van Gasteren, Use of time stamping-Rana's Algorithm

PROTOCOLS FOR DATA TRANS FOR

- Introduction
- Protocols for the implementations of
CSP : Silberschatz's protocol Bernstein's protocol
- Methods of or scribble broadcasting of Messages:
The problem, context of the problem

MANAGEMENT OF DISTRIBUTED DATA

- Nature and Distribution of data Consistency of duplicated data

Detection of mutual in consistency :
algorithm of Parker et.al.
Maintaining mutual consistency
Initializing a new site
Distribution of control algorithms
Construction of a total ordering
Distributed tonicity.

PROBLEMS OF GAINING CONSENSUS IN THE PRESENCE OF UNCERTAINTIES (OR HOW TO AVOID BYZANTINE QUARRELS)

The problem of consensus
The lamport, shostak, and Pease alga.
Solutions using signed messages
Broad casting in a less connected system
The babaoglu and Drummed algor.

REFERENCE BOOKS

1. Computer Networks and Distributed Processing
James Martin. PHI
2. Distributed systems Concepts and Design
G.Conloris et.al; addision wesley PHI
3. Distributed Algorithms and protocols
Michel Raynal, John wiley & Sons. PHI

COURSE NUMBER : **TCT - 446**
COURSE TITLE : **IMAGE PROCESSING**
CREDITS WITH BREAK-UP: **3(2-1-2)**
PRE-REQUISITE : **TCT-443**

CATALOGUE DESCRIPTION

Image representation, digitization, quantization, image compression and coding problem, data structures for picture representations, quad trees, template matching, region analysis, contour following, frequency-domain operations, descriptions of line and shape, descriptive methods in scene analysis, statistical and syntactical models for picture classification.

DETAILED CATALOGUE DESCRIPTION

INTRODUCTION

Relation among graphics, image processing and pattern recognition.

IMAGE REPRESENTATION

Chain codes, Polygon approximation, signatures

SAMPLING AND QUANTIZATION

Uniform sampling and quantization, non uniform sampling and quantization

IMAGE DATA COMPRESSION AND CODING PROBLEMS

Data compression versus bandwidth compression, pixel coding, predictive coding, transform coding, other methods

DATA STRUCTURES FOR PICTURE PRESENTATION

Region oriented segmentation, quad tree etc

IMAGE SMOOTHING

Neighborhood averaging, median filtering, low-pass filtering, averaging of multiple images

TEMPLATE MATCHING

Mask operations, correlation

REGION ANALYSIS

Region-oriented segmentation, basic formation, region growing by pixel aggregation, region-splitting and merging

CONTOUR FOLLOWING

i-contour, d-contour, tracing of a single contour, traversal of all the contour of a region.

FREQUENCY-DOMAIN OPERATIONS

Image enhancement, Convolution theorem, convolution masks

DESCRIPTION OF LINE AND SHAPE

Shape description requirements, parametric functions.

SCENE ANALYSIS

Image analysis techniques, edge detection, boundary representation, fitting line segments, B-spline representation, control points, effect of geometric transformations, boundary matching.

STATISTICAL AND SYNTACTIC MODELS FOR PICTURE CLASSIFICATION

Perception models, local models, global models, orthogonal basis image series, causal models, non causal models, semi causal models.

REFERENCE BOOKS

1. Digital Image Processing
by Castleman (PHI)
 2. Image Processing Analysis and Machine Vision
By Milan Sonka (Vikas Pub)
-

COURSE NUMBER : **TCT - 447**
COURSE TITLE : **FAULT TOLERANT COMPUTING**
CREDITS WITH BREAK-UP: **3(2-1-2)**
PRE-REQUISITE : **TCT-240**

CATALOGUE DESCRIPTION

Introduction, fault diagnosis of digital systems, The use of error-correcting codes in fault-tolerant computer-design, Reliability modeling and analysis of Ultra-reliable fault-tolerant computers.

DETAILED CATALOGUE DESCRIPTION

INTRODUCTION

Fault diagnosis of digital system; Problems and concepts of Design For testability (DFT).Fault modeling and Fault-simulation to evaluate the fault coverage of test vectors Redundancy Techniques/nor line like Structural Time Information and Software Redundancy. Principles & practice of fault tolerance in software and distributed systems. System model- Error, Failure, faults Software Fault Tolerance Byzantine Agreement Fail Stop Processors Stable storage, Reliable and Atomic broadcasting Process Resiliency, Data Resiliency & Recovery commit protocols Reliability Modeling & Performance Evaluation Crash recovery in data bases Voting methods.

REFERENCE BOOKS

1. Fault Tolerant computing by Pankaj Jalote Kluwer PBI
2. Fault Tolerant Computing Theory & Technique D.K. Prahan (Editor)
Prentice Hall,
3. Design and Analy. of Fault Tolerant Digital Sys. N.J. 1986Barry

Johnson Addison
4. Fault Tolerance in Distributed sys., Wesley 1989 P. Jalote, Prentice Hall
Ivc. 1994.

COURSE NUMBER : **TCT - 440**
COURSE TITLE : **COMPUTER ARCHITECTURE**
CREDITS WITH BREAK-UP: **3(2-1-2)**
PRE-REQUISITE : **TCT-240**

CATALOGUE DESCRIPTION

Basic computer organization, Bus structure, language features that influence architecture, bit-slice architecture, multiprocessor architecture, pipelined architecture, tagged architecture, multiprocessor architecture, pipelined architecture, tagged architecture, data-flow architectures, special purpose architecture. Review of computer organizations; Difference between Architecture and organization, Von - Neumann architect; Harvard Architectures, Innovations that led to various architectures.

DETAILED CATALOGUE DESCRIPTION

INSTRUCTION SET

Opcode Encoding Techniques, Innovation in Instruction set RISC architectures CISC Characteristics RISC characteristics Overlapped Register windows Berkeley RISC - I m/c

EXECUTION UNIT

Arithmetic unit Adders, Carry propagation adders, Carry look ahead adders, Carry save adders, Parallel adders Wallace Tree Multipliers, Design of Efficient Logical Units Bit slice Architecture Characteristics

CONTROL UNIT

Innovations in control units
Data flow architectures

MEMORY

Innovation in memory hierarchies
Tagged Architectures
Associative Memories

PIPELINE AND VECTOR PROCESSING

Parallel Processing
pipelining -General considerations

- Arithmetic pipeline
- Instruction pipeline
 - Four segment Instruction pipeline
 - Data dependency
 - Handling of Branch Instruction
- RISC pipeline
 - Three segment Instruction pipeline
 - Delayed Load
 - Delayed Branch
- Vector Processing
- Vector operations
- Matrix Multiplication
- Memory interleaving

- Array Processors
- Attached Array Processors
- SIMD array Processor

MULTIPROCESSORS

Characteristics of Multiprocessors

Interconnection Structures

- time shared common Bus
- Multi port memory
- Cross Bar Switch
- Multistage switching network
- Hypercube Interconnection

Inter processor Arbitration

- System Bus
- Serial Arbitration Procedure
- Parallel arbitration logic
- Dynamic Arbitration Logic Algorithms

Inter processor communication and Synchronization

Cache Coherence

- Conditions for Incoherence.
- Solutions to cache coherence.

REFERENCE BOOKS

1. Computer system Architecture
Morris Mano, PHI
2. Computer Architecture and Parallel Processing
K. Hwang and F.A. Briggs, Mcgraw Hall
3. Modern Computer Architectures

- Rafiquazzaman, Galgotia
4. High Performance Computer Architecture
H. Stone, Addison wesley
 5. Perspectives in Computer Architectures
Rao, PHI
 6. Computer Organization and Architecture
Hayes TMH

COURSE NUMBER : **TCT - 430**
COURSE TITLE : **SIMULATION & MODELLING**
CREDITS WITH BREAK-UP: **3(2-1-2)**
PRE-REQUISITE : **BPS-218**

CATALOGUE DESCRIPTION

Systems and models, discrete and continuous simulation, programming considerations and languages, random number generations, testing of random number, stochastic variants generation, output analysis, control of length of simulation, verification and validation of simulation.

DETAILED CATALOGUE DESCRIPTION

INTRODUCTION

Mathematical modeling -Basic axioms; Qualities of a good model and some elementary case studies; classification of modeling: Discrete and continuous modeling Deterministic and probabilistic models; Simulation -Simulation programming (SIMULA-67)Programming considerations and Languages. Simulation software's (SIMSCRIPT)Advantages of simulation case studies –

1. SIMULATION and NUKE test
2. Flight simulators
3. Modeling and Analysis of computer communication Networks.
4. Some practical applications of simulation and modeling to the problems related to computer science and engineering.

REFERENCE BOOKS

1. Modeling and Analysis of Computer Communication Networks by J.P. Hayes (Khanna)

COURSE NUMBER : **TCT-410**
COURSE TITLE : **VLSI TECHNOLOGY**
CREDITS WITH BREAK-UP : **3(2-1-2)**
PRE-REQUISITE : **TCT-240**

CATALOGUE DESCRIPTION

VLSI device fundamentals, VLSI architecture, VLSI applications and testing, VLSI-memories, future prospects.

DETAILED CATALOGUE DESCRIPTION

INTRODUCTION TO VLSI DESIGN & METHODS

Evolution of IC technology, CMOS device modeling, CMOS circuit design and layout of few selected circuits, parasitic capacitances, circuit simulation VLSI design methodology, introduction to sea of gates, semi custom and full custom design. Physical and Logical design Tools. Testability and characterization Introduction to CAD tools and Algorithms. Implementation of simulation, Timing, placement and routing algorithms in C++/or C.

REFERENCE BOOKS

1. Basic VLSI, D.A. Pucknell & Eshraghia, PHI
2. Modern VLSI Design Systems on Silicon, Wayne Wolf, Addison Wesley
3. Introd. to Digital micro Electronic Circuits, K Gopalan, TMH
4. Micro Electronics , Millman and Grabel, McGraw Hill

COURSE NUMBER : **TCT-431**
COURSE TITLE : **COMPUTER SYSTEM
RELIABILITY**
CREDITS WITH BREAK-UP : **3(2-1-2)**
PRE-REQUISITE : **BPS-218**

CATALOGUE DESCRIPTION

Software Reliability and Hardware Reliability, Management Technique for Reliability, Programming Languages and Reliability, Computer Architecture and Reliability models, Practical Reliability Calculations.

DETAILED CATALOGUE DESCRIPTION

SOFTWARE RELIABILITY

The concept of software reliability, Probabilistic & deterministic model; definition of S/W reliability. Concept of S/W repair & availability. Estimating No. of bugs in program Error removal data, estimating the no of residual error Reliability Models - stochastic model, Bug proportion model, other Macro models. Binomial type error model, structural micro model availability model.

HARDWARE RELIABILITY

Concept of failure theoretical failure prediction-processor module, over all processor, peripheral and system Reliability variation with time; wear out failure; life time expectancy - general electronics items, computers spares and peripherals.

MANAGEMENT TECHNIQUE FOR RELIABILITY

Quality consideration- Design, resulting reliability, quality Assurance organization, design qualification, In words quality control, testing-module, unit & system testing, Packing & Delivery. Environmental aspects- air-conditioning; room condition, mains power supply, electromagnetic radiation, shock & vibration.

LANGUAGE & RELIABILITY

Features of Languages, features contributing for reliability; modularity, cohesion & computing, effect of structure programming & object oriented programming.

COMPUTER ARCHITECTURE & RELIABILITY

Various architectures of systems; SIMD, SISD, MISD, MIMD
Configuration, fault tolerating feature of the architectures.

PRACTICAL RELIABILITY CALCULATION

Practical calculation; Multiplication factor for passage of time-for CPU, store, peripheral controllers, floppy disk magnetic tape etc.,

REFERENCE BOOKS

- 1.Computer System Reliability
by the Longbattom (Wiley Interscience Pub.)
- 2.Software Engineering Design, Reliability & Management
By Martin A (McGraw Hill Pub)

COURSE NUMBER : **TCT - 414**
COURSE TITLE : **REAL TIME SYSTEMS**
CREDITS WITH BREAK-UP: **3(2-1-2)**
PRE-REQUISITE : **TCT-321**

CATALOGUE DESCRIPTION

Introduction, Nature of real-time operations, Difficulties encountered in real time systems, applications, Timesharing and Multiple-user systems.

DETAILED CATALOGUE DESCRIPTION

Characteristics of a Real time system Producing timely output Keeping a record of the past Handling concurrent input processing Competing and cooperating processes Coping with failures Providing a reliable service. Defining the special requirements of a real time system. Defining the system outputs Defining the system inputs Problems of real time processing & their solution The situation so far Single process system Multi process system Speed and how it is achieved Producing a resilient system Producing a reliable system Keeping historical record Operating system support Real time operating system (RTOS)Languages for real time systems(CORAL, RTL/2, Ada) Real Time software Development techniques.

REFERENCE BOOKS

1. Real Time System
C.M. Krishna (McGraw Hill Pub.)
 2. Real Time System
Leri & Agarwal (McGraw Hill Pub.)
 3. Real Time System : Specification, Validation & Analysis
Mathi Joseph (PHI Pub.)
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COURSE NUMBER : **TCT-448**
COURSE TITLE : **SATELLITE COMMUNICATION**
CREDITS WITH BREAK-UP : **3(2-1-2)**
PRE-REQUISITE : **TCT-315**

Satellite Networks, Modulation Techniques, Altitude and orbit, Operational parameters, space environment, sub-systems, ground station, VSAT, Low Earth Orbit (LEO) satellite systems, Prediction of Range performance, Signal to noise Ratio, system losses, Doppler effect, Tracking, Phase Shifter, Dielectric and Magnetic absorbers. Future Public Land Mobile Telecommunication System (FPLMTS), Satellite based system Traffic Demand, LEO Topologies, Uniqueness of LEO topologies, ATM and Satellite systems.

COURSE NUMBER : **TCT – 474**
COURSE TITLE : **MOBILE COMPUTING**
CREDITS WITH BREAK-UP : **3(2-1-2)**
PRE-REQUISITE : **TCT-315**

Mobile Computing Framework, Wireless Delivery Technology & Switching methods: Radio Based Systems, Cellular Communications, Wireless packet Data Network, Satellite Networks, Very Small Aperture Terminals (VSAT), Paging and Satellite Networks, Infrared or Light Based Mobile Computing, Mobile Information Access Devices: Portable Computers, Hybrid Computer, Personal Digital Assistants (PDAs), Personal Communicators, Palmtops, Cellular Modems and PCMCIA adapters. Mobile Data Internetworking Standards, Code Division Multiple Access (CDMA), TDMA, Mobile IP, How Mobile IP Works, Network Computers and Mobile Computing, Changes with IPV6. Cellular Data Communication Protocols, Circuit Transmission, Cellular Digital Packet Data (CDPD). Mobile Computing Applications : Tracking and Dispatching, Online Transaction Processing, Common Communication Mobile, API, Personal Communication Services, Support and Security Issues for Mobile users.

COURSE NUMBER : **TCT – 473**
COURSE TITLE : **DATA MINING & WAREHOUSING**
CREDITS WITH BREAK-UP : **3(2-1-2)**
PRE-REQUISITE : **TCT-323**

CATALOGUE DESCRIPTION

Introduction, Data Mining, Association Rules, Clustering Techniques, Decision Trees, WEB Mining, Temporal and Spatial Data Mining, Other Techniques.

DETAILED CATALOGUE DESCRIPTION

Introduction: Data Warehousing: Multidimensional Data Model, OLAP operations, Ware house schema Data Ware housing architecture, Ware house server, Metadata, OLAP Engine.

Data Mining (DM) Introduction : Data Mining (DM) Definitions, KDD vs Data Mining, DBMS vs DM, DM Techniques Issues and challenges in DM, DM application areas – Case Studies.

Association Rules : Methods to discover Association Rules, A Priori Algorithm, ParTCTion Algorithm , Pioneer- Search Algorithm, Dynamic Item set counting

Algorithm, FP-tree Growth Algorithm Incremental Algorithm Border Algorithm, Generalized Association rule.

Clustering Techniques : Introduction, Clustering Paradigms, ParTCTioning Algorithm, K-Medoid Algorithm, CLARA, CLARANS Hierarchical Clustering, DBSCAN, BIRCH, CURE, Categorical Clustering Algorithms, STIRR, ROCK, CACTUS.

Decision Trees : Introduction, Tree Construction principle, Best Split, Splitting Indices, Splitting Criteria, Decision Tree construction Algorithms, CART, ID3 C4.5, CHAID, Decision Tree Construction with Presorting, Rain Forest, Approximate Methods, CLOUDS, BOAT, Pruning Technique, Integration of Pruning and construction.

WEB Mining : Introduction, Web content mining, Web structure Mining, Web Usage Mining, Text mining, Unstructured Text, Episode Rule. Discovery for Texts, Hierarchy of categories Text clustering.

Temporal and Spatial Data Mining : Introduction, Temporal Association Rules, Sequence Mining, GSP Algorithm, SPADE, SPIRIT, WUM, Episode Discovery, Event Prediction Problem, Time-Series Analysis, Spatial Mining, Spatial Mining Tasks, Spatial Clustering, Spatial Trends.

Other Techniques : Neural Network (NN) Learning in NN, Unsupervised Learning, Data Mining NN, Genetic Algorithms, Rough Sets, Support Vector Machines.

Books : 1. Data Mining Techniques by Arun K Pujari

COURSE NUMBER : **TCT-479**
COURSE TITLE : **NEURO COMPUTING**
CREDITS WITH BREAK-UP: **3(2-1-2)**
PRE-REQUISITE : **NIL**

DETAILED CATALOGUE DESCRIPTION

Introduction and motivation, Biological neural networks and simple models. The artificial neuron model. Hopfield nets. Energy functions and optimization. Perceptrons and threshold logic machines. Multilayer networks-their variants and applications, Capacity of multiplayer networks. Back propagation. Recurrent nets. Tree structured networks. Unsupervised learning. Hebbian learning. Principal component analysis. Competitive learning, Feature mapping. Self organizing maps.

Adaptive resonance theory. Hardware realization of ANNs. Recent trends and future directions.

COURSE NUMBER : **TCT- 462**
COURSE TITLE : **CLIENT/SERVER COMPUTING**
CREDITS WITH BREAK-UP: **3(2-1-2)**
PRE-REQUISITE : **TCT-325**

CATALOGUE DESCRIPTION

Introduction, Components of Client Server Application, Client-Server System Development, Distributed Database System.

DETAILED CATALOGUE DESCRIPTION

Introduction

Client Server Computing DBMS concepts and architecture, Single system image, client server computing, mainframe- centric client server computing, downsizing and client server computing, preserving mainframe applications investment through porting, client server development tools, advantage of client server computing.

Components of Client Server Application.

The client services, request for services, RPC, Window services, fax print services, remote boot services, other remote services, utility services, dynamic data exchange, object linking and embedding, common object request broker architecture, the server, detailed server functionality, the network operating system, available platforms, the server operating system.

Components of client server application connectivity, communication interface technology, intercrosses communication, wide area network technologies network management, client-server system development software.

Client-Server System Development

Hardware, Network Acquisition PC-level processing unit, Macintosh, notebooks. Pen, UNIX work station, x-terminals, server hardware, data storage, magnetic disk, CD ROM WORM erasable optical, mirrored disk array tape, optical disks, network protection devices UPS, surge protectors, client server systems development services and support, system administration, Availability, Reliability, Serviceability, Software Distribution, Performance, Network Management, Help Desk, Remote Systems management Security, LAN and Network Management issues.

Training advantages of GUI application, system Administrator Training, Database Administrator training, End-user training, The Future of client server computing-Enabling technologies, The transformation system.

Distributed Database System

Structure of Distributed database, Data Model, Query Processing, Semi Join, Parallel & pipeline Join, Distributed Query Processing in R* system, Concurrency Control in Distributed Database System, Recovery in Distributed Database System,

Text Books:

1. Client/Server Computing (2nd Edition) by patrick smith & steave guengerich, Publishers: PHI
2. Majumdar & Bhattcharya, "Database management System" TMH
3. Koth, Silbertz, Sudarshan, "Database Concepts", Mcgraw Hill
4. Elmasri, Navathe, S.B. Fundamentals of Data base System, Adision Wesley

COURSE NUMBER	:	TCT- 444
COURSE TITLE	:	PARALLEL COMPUTING
CREDITS WITH BREAK-UP	:	3 (2-1-2)
PRE-REQUISITE	:	TCT-240

CATALOGUE DESCRIPTION

Introduction, Memory, Pipeline Processing, Synchronous Parallel Processing, Interconnection Network.

DETAILED CATALOGUE DESCRIPTION

Introduction:

Introduction to Parallel Computing, Need for Parallel Computing, Parallel Architecture, Architectural classification schemes, Flynn's, Shores, Feng's Classification, Performance of Parallel Processors, Amdahl Law, Distributed Processing.

Memory

Processor & memory hierarchy , bus, cache & shared memory, introduction to superscalar architectures

Pipeline Processing

Introduction to Pipeline Processing, SIMD parallel processors, Arithmetic pipelines, steady state analysis of pipeline, Pipelined instruction processing, interlocks, hazards, hazards detentions & resolution, memory systems used in pipelines, scheduling of dynamic pipelines.

Synchronous Parallel Processing

SIMD parallel Algorithm, recurrence & matrix computations, Distributed array processor, Processor Arrays, Multiprocessors, Parallel programming languages, mapping & scheduling

Interconnection Network

Introductions, Elementary Permutations used in Interconnection Network, Network Classification, Cross bar network, Commonly used Interconnection Network , Cross bar, Data Manipulator Network, Routing, Multistage Data manipulator.

Text Book & Reference:

1. Bhujade, "Parallel Computing, "New Age International
2. Hwang,"Advanced Computer Architecture, McGraw Hill
3. Quinn, "Parallel Computing, theory & Practices", McGraw Hill
4. Peterson & Hennessy, "Quantitative Approach to Computer Architecture"

COURSE NUMBER : TCT – 477
COURSE TITLE : COMPUTATIONAL LINGUISTIC &
HUMAN COMPUTER INTERFACE
CREDITS WITH BREAK-UP : 3(2-1-2)
PRE-REQUISITE : TCT-231

DETAILED CATALOGUE DESCRIPTION

Description of English syntax in the Government and Binding framework; Augmented Transition Network; issues in Natural Language Understanding; frame-based knowledge representation; use of knowledge in disambiguation and understanding.

COURSE NUMBER : **TCT – 449**
COURSE TITLE : **DIGITAL SIGNAL PROCESSING**
CREDITS WITH BREAK-UP : **3(2-1-2)**
PRE-REQUISITE : **TCT-315**

CATALOGUE DESCRIPTION

Sampling of continuous time signals, Transform analysis of linear time invariant system, Structures for Discrete time system, Filter Design techniques, Discrete Fourier Transform,

DETAILED CATALOGUE DESCRIPTION

Sampling of continuous time signals

Periodic sampling, frequency domain representation of sampling, discrete time processing, multi rate signal processing, digital processing of analog signals, over sampling & noise sampling in A/D & D/A converters.

Transform analysis of linear time invariant system;

Frequency response of LTI systems, frequency response for rational system function, minimum phase systems

Structures for Discrete time system;

Block diagrams of linear constant coefficient difference equations, signal flow graph, basic structure of IIR system, transposed form, basic network structure for FIR systems, Effect of coefficient quantization, effect of round off noise in digital filters.

Filter Design techniques;

Design of discrete time IIR filters from continuous time filters, design of FIR filters by windowing, optimum approximation of FIR filters, comments on IIR & FIR discrete time filters.

Discrete Fourier Transform

Computation of Discrete Fourier Transform

Fourier Analysis of signals using the discrete Fourier transform

Text Book & Reference:

1. Oppenheim & Schiffer, “Discrete Time Signal Processing”, Addison Wesley