'Annexure-A'

Department of Computer Science and Engineering
National Institute of Technology, Hamirpur
(July 2015 Onwards)

FIRST YEAR													
I Semester							II Semester						
SN	**Code**	**Subject**	**L**	**T**	**P**	**Credits**	**SN**	**Code**	**Subject**	**L**	**T**	**P**	**Credits**
1	CSS-111	Engineering Mathematics-I	3	1	0	3	1	CSS-121	Engineering Mathematics-II	3	1	0	3
2	CSS-112	Physics for Computer Engineers	3	1	0	3	2	CSS-122	Chemistry for Computer Engineers	3	1	0	3
3	CSD-113	Computer Fundamentals & Programming	3	1	0	3	3	CSH-123	Communication Skills	3	1	0	3
4	CSD-114	Computer Workshop	1	0	3	2	4	CSD-124	Basic Electrical Engineering	3	1	0	3
5	CSD-115	Basic Electronics Engineering	3	1	0	3	5	CSS-125	Chemistry Lab	0	0	3	1
6	CSH-116	Engineering Economics and Management	3	1	0	3	6	CSH-126	Communication Skills Lab	0	0	3	1
7	CSD-117	Physics Lab	0	0	3	1	7	CSD-127	Engineering Graphics	1	0	3	3
8	CSD-118	Computer Fundamentals & Programming Lab	0	0	3	1							
9	CSD-119	Basic Electronics Engineering Lab	0	0	3	1							
		Total	**Hrs = 33**			**20**				**Hrs = 26**			**17**

SECOND YEAR													
III Semester							**IV Semester**						
SN	**Code**	**Subject**	**L**	**T**	**P**	**Credits**	**SN**	**Code**	**Subject**	**L**	**T**	**P**	**Credits**
1	CSS-210	Probability & Queuing Models	3	1	0	3	1	CSD-221	Computer Organization	3	1	0	3
2	CSD-211	Discrete Structure	3	1	0	3	2	CSD-222	Operating System	3	1	0	3
3	CSD-212	Object Oriented Paradigm	3	1	0	3	3	CSD-223	Data Structure	3	1	0	3
4	CSD-213	Computer Graphics	3	1	0	3	4	CSD-224	System Software	3	1	0	3
5	CSD-214	Microprocessor and Interfacing	3	1	0	3	5	CSD-225	Theory of Computation	3	1	0	3
6	CSD-215	Digital Electronics & Logic Design	3	1	0	3	6	CSS-226	Basic Environmental Science and Engineering	3	1	0	3
7	CSD-216	Object Oriented Paradigm Lab	0	0	3	1	7	CSD-227	Computer Organization Lab	0	0	3	1
8	CSD-217	Computer Graphics Lab	0	0	3	1	8	CSD-228	Operating System Lab	0	0	3	1
9	CSD-218	Microprocessor and Interfacing Lab	0	0	3	1	9	CSD-229	Data Structure Lab	0	0	3	2
10	CSD-219	Digital Electronics & Logic Design Lab	0	0	3	1							
		Total	**Hrs = 36**			**22**				**Hrs = 33**			**22**

THIRD YEAR													
V Semester							**VI Semester**						
SN	**Code**	**Subject**	**L**	**T**	**P**	**Credits**	**SN**	**Code**	**Subject**	**L**	**T**	**P**	**Credits**
1	CSD-311	Modelling and Simulation	3	1	0	3	1	CSD-320	Computer Networks	3	1	0	3
2	CSD-312	Analysis & Design of Algorithms	3	1	0	3	2	CSD-321	Software Engineering	3	1	0	3
3	CSD-313	Data Base Management Systems	3	1	0	3	3	CSD-322	Advanced Database Management System	3	1	0	3
4	CSD-314	Compiler Design	3	1	0	3	4	CSD-323	Digital Image Processing	3	1	0	3
5	CSD-315	Communication Engineering	3	1	0	3	5	CSO-324	Open Elective-II	3	1	0	3
6	CSO-316	Open Elective-I	3	1	0	3	6	CSD-325	Computational Tools and Techniques	1	0	3	2
7	CSD-317	Modelling and Simulation Lab	0	0	3	2	7	CSD-326	Computer Networks Lab	0	0	3	2
8	CSD-318	Data Base Management Systems Lab	0	0	3	2	8	CSD-327	Software Engineering Lab	0	0	3	2
9	CSD-319	Compiler Design Lab	0	0	3	2	9	CSD-328	Digital Image Processing Lab	0	0	3	2
							10	CSD-329	Seminar	0	0	3	2
		Total	**Hrs =33**			**24**				**Hrs = 36**			**25**

FOURTH YEAR													
VII Semester							**VIII Semester**						
SN	**Code**	**Subject**	**L**	**T**	**P**	**Credits**	**SN**	**Code**	**Subject**	**L**	**T**	**P**	**Credits**
1	CSD-410	Information Security	3	1	0	3	1	CSD-421	Data Ware Housing and Data Mining	3	1	0	3
2	CSD-411	Advanced Computer Architecture	3	1	0	3	2	CSD-422	Mobile Computing	3	1	0	3
3	CSD-412	Advanced Operating System	3	1	0	3	3	CSD-423	Software Project Planning	1	3	0	3
4	CSE-413	Departmental Elective-I	3	1	0	3	4	CSE-424	Departmental Elective-III	3	1	0	3
5	CSE-414	Departmental Elective-II	3	1	0	3	5	CSE-425	Departmental Elective-IV	3	1	0	3
6	CSD-415	Information Security Lab	0	0	3	1	6	CSD-426	Data Ware Housing and Data Mining Lab	0	0	3	1
7	CSD-416	Advanced Operating System Lab	0	0	3	1	7	CSD-427	Mobile Computing Lab	0	0	3	1
8	CSD-417	Industrial Training Viva	0	0	0	2	8	CSD-428	Major Project-II	0	3	9	6
9	CSD-418	Term Paper-V	0	0	0	1	9	CSD-429	General Proficiency	0	0	0	3
10	CSD-419	Major Project-I	0	3	6	4							
		Total	**Hrs = 35**			**24**				**Hrs = 38**			**26**

CSE-413 Department Elective-I			L	T	P	H	C	CSE-424 Department Elective-III			L	T	P	H	C
1	CSE-413(a)	Web Technologies	3	1	0	4	3	1	CSE-424(a)	Distributed Systems	3	1	0	4	3
2	CSE-413(b)	Information Retrieval	3	1	0	4	3	2	CSE-424(b)	Agent Based Systems	3	1	0	4	3
3	CSE-413(c)	CAD of Digital Systems	3	1	0	4	3	3	CSE-424(c)	Reconfigurable Computing	3	1	0	4	3
4	CSE-413(d)	Artificial Intelligence	3	1	0	4	3	4	CSE-424(d)	Mobile Databases	3	1	0	4	3
CSE-414 Department Elective-II								CSE-425 Department Elective-IV							
1	CSE-414(a)	Management Information System	3	1	0	4	3	1	CSE-425(a)	Advance Computer Networks	3	1	0	4	3
2	CSE-414(b)	Advanced Microprocessors	3	1	0	4	3	2	CSE-425(b)	Embedded Systems	3	1	0	4	3
3	CSE-414(c)	Parallel Algorithms	3	1	0	4	3	3	CSE-425(c)	Programming Language Security	3	1	0	4	3
4	CSE-414(d)	Soft Computing	3	1	0	4	3	4	CSE-425(d)	Wireless Sensor Networks	3	1	0	4	3

CSO-316 Open Elective-I			L	T	P	H	C	CSO-324 Open Elective-II			L	T	P	H	C
1	CSO-316	Data Structure	3	1	0	4	3	1	CSO-324	Computer Graphics	3	1	0	4	3

Summary									
Semester	**Sem-I**	**Sem-II**	**Sem-III**	**Sem-IV**	**Sem-V**	**Sem-VI**	**Sem-VII**	**Sem-VIII**	**Overall**
Credits	**20**	**17**	**22**	**22**	**24**	**25**	**24**	**26**	**180**
Hours/week	**33**	**26**	**36**	**33**	**33**	**36**	**35**	**38**	**270**

CSS-111 ENGINEERING MATHEMATICS-I

Matrices

Matrices, Related matrices, Complex matrices (Hermitian and skew-Hermitian matrices, Unitary matrix), Solution of linear system of equations, Rank of a matrix, Gauss-Jordan method, Normal form of a matrix, Vectors, Linear dependence, Consistency of a linear system of equations, Rouche's theorem, System of linear homogeneous equations, Linear and orthogonal transformations, Characteristic equation, Eigen values, Eigen vectors, Properties of eigen values, Cayley-Hamilton theorem, Reduction to diagonal form, Quadratic form and their reduction to canonical form.

Infinite Series

Convergence and divergence of infinite series, Geometric series test, Positive term series, p-series test, [Comparison test, D'Alembert's ratio test, Cauchy's root test (Radical test), Integral test, Raabe's test, Logarithmic test, Gauss's test] (without proofs), Alternating series and Leibnitz's rule, Power series, Radius and interval of convergence.

Differential Calculus

Indeterminate forms, Partial Differentiation and its geometrical interpretation, Homogeneous functions, Euler's theorem and its extension, Total differentials, Composite function, Jacobian, Taylor's and Maclaurin's infinite series, Errors and increments, Introduction to limits and Indeterminate forms, Maxima and minima of functions of two variables, Method of undetermined multipliers. Curve tracing.

Integral Calculus

Quadrature, Rectification, Surface and Volume of revolution for simple curves, Double integrals and their applications, Change of order of integration, Change of variables, Triple integrals and their applications, Change of variables.

Vector Calculus

Differentiation of vectors, Curves in space, Velocity and acceleration, Relative velocity and acceleration, Scalar and vector point functions, Vector operator del, gradient, divergence and curl with their physical interpretations, Formulae involving gradient, divergence and curl. Line, surface and volume integrals, Theorems of Green, Stokes and Gauss (without proofs) and their verifications and applications, Irrotational and Solenoidal fields.

Text Books

1. Advanced Engineering Mathematics: by Erwin Kreyszig, John Wiley and Sons, NC, New York.
2. Advanced Engineering Mathematics: by R. K. Jain & S. R. K Iyengar, Narosa Pub. House.

Reference Books

1. Advanced Engineering Mathematics: by C. R. Wylie & L. C. Barrett, McGraw Hill
2. Differential & Integral Calculus: by N. Piskunov, MIR Publications.

CSS-112 PHYSICS FOR COMPUTER ENGINEERS

Dielectric Solids

Polarization, polarizability, susceptibility, polar and nonpolar dielectrics, dispersion and absorption, electronic, ionic and orientational polarizabilities. Magnetism, para, dia and ferromagnetic solids, exchange interactions and antiferromagnetism, magnetic ordering, spin waves, applications in computer science.

Semiconductor Device Physics

Energy bands in solids, the E-k diagram, Density of states, Occupation probability, Fermi level and quasi Fermi levels, p-n junctions, Schottky junction and Ohmic contacts. Semiconductor optoelectronic materials, Bandgap modification, Heterostructures and Quantum Wells.

Lasers and fiber Optics

Concepts of maser and laser, spontaneous and stimulated emission, characteristics of laser light, three and four level laser system, coherence,; Ruby, He-Ne, CO2 and semiconductor lasers, applications of lasers in computer science.

Optical Fiber, physical structure and basic theory, modes in optical fibers, step index and graded index fibers, losses in optical fibers, applications of optical fibers.

Electrostatics and Electrodynamics

Gauss's law in dielectric medium, Equation of continuity, displacement current, Maxwell's equations, wave equation for electromagnetic radiation, electromagnetic wave propagation in free space and isotropic dielectric medium, Poynting theorem & Poynting vector.

Superconductivity

Introduction and discovery of superconductivity, superconducting materials, Meissner effect, critical magnetic field and critical current, type -I and type-II superconductors, Isotope effect, BCS theory of superconductivity, flux quantization, SQUIDS, applications of superconductivity

Text / References books:

1. J. Singh, Semiconductor Optoelectronics:Physics and Technology, McGraw-Hill Inc. (1995)
2. Introduction to Solid State Physics, C. Kittel.
3. Solid State Physics, N.W. Ashcroft and N.D. Mermin.
4. A text Book of Engineering Physics; M.N. Avadhanulu and P.G. Kashirsagar, S. Chand & Co. Ltd.
5. Modern Engineering Physics; A.s. Vasudeva, S. Chand & Co. Ltd.
6. Optical Electronics; AK Ghatak and Thyagarajan, Foundation Books, New Delhi.
7. Introduction to electrodynamics; David J Griffiths, Prentice Hall of India, New Delhi
8. Concepts of modern Physics; Arthur and Beiser, McGraw Hill Publication.
9. Optical Fiber Communication and Technology, D.K. Mynbaev and L.L.Scheiner, Pearson Education

CSD-113 COMPUTER FUNDAMENTALS AND PROGRAMMING

Programming fundamentals

Introduction to computer, block diagram and organization of computer, number system and binary arithmetic, processing data, hardware, software, firmware, types of programming language-Machine language, Assembly level language, higher level language, source file, object file, translators-assembler, compiler, interpreter, translation of source code into object code, library files, linking, loading process and executable code, testing and debugging, software maintenance, hardware maintenance.

Programming Techniques

Steps in program development, algorithm, flowchart, pseudo code, evolution and classification of programming languages.

'C' as Structured programming language

'C' character set, literals, keywords, identifiers, data types and size, variable declaration, expression, labels, statements, formatted input output statements, types of operators, data type conversion, mixed mode arithmetic's, control structures. 'C' functions, library functions, parameter passing, recursion, storage classes, scope rules and visibility, arrays: declaration, initialization and usage, pointers, dynamic storage allocation, structures and unions, self-referential structures. 'C' files, function for file handling, 'C' pre-processors and command line arguments, macros and conditional compiler directives.

Text and Reference Books

1. P.K.Sinha, "Computer fundamentals", BPB Publication
2. Byron Gottfried, "Programming with C", Tata McGraw Hill.
3. Herbert Schildt, "The complete Reference C", TMH
4. YashwantKanetkar, "Let us C", BPB Publication
5. Henrry Mulish, Herbert L. Cooper, "The Spirit of C: An Introduction to Modern Programming", Jaico Books.
6. Briain W. Kenigham and Dennis Ritchie, "C Programming language", Prentice Hall of India.

CSD-114 COMPUTER WORKSHOP

Objectives:

PC Hardware Identification of basic peripherals, assembling a PC, installation of system software like MS Windows, Linux and the device drivers. Troubleshooting Hardware and software - some tips and tricks.

Internet & World Wide Web: Different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet, web browsers, email, newsgroups and discussion forums .Awareness of cyber hygiene(protecting the personal computer from getting infected with the viruses), worms and other cyber attacks .

Productivity tools: Crafting professional word documents; excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools and LaTeX.

PC Hardware

Identification of peripherals of a computer. To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. A practice on disassemble the components of a PC and assembling them to working condition.Installation of MS windows and LINUX on PC. Exposure to Basic commands and system administration in Linux including: Basic Linux commands in bash, Create hard and symbolic links.

Hardware Troubleshooting (Demonstration):

Students have to be given a PC which does not boot due to improper assembly or defective peripherals. Identifying problem and fixing it for getting to working condition.

Software Troubleshooting (Demonstration): Students have to be given a malfunctioning CPU due to system software problems.

Internet & World Wide Web

Orientation & Connectivity Boot Camp and surfing the Web using Web Browsers: Students should get connected to their Local Area Network and access the Internet. In the process they should configure the TCP/IP setting and demonstrate how to access the websites and email. Students customize their web browsers using bookmarks, search toolbars and pop up blockers.

Search Engines &Netiquette: Students should know what search engines are and how to use the search engines.

Cyber Hygiene (Demonstration): Awareness of various threats on the internet. To install an antivirus software and to configure their personal firewall and windows update on their computers.

Using LaTeX and word to create project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

References/Text Book:

1.HTML Programming, Freeman and Robson, Oreilly publications
2.Computer peripherals and interfacing, Jyotisnehi, Firewall Media
3.http://openbookproject.net/courses/intro2ict/hardware/peripherals.html

CSD-115 BASIC ELECTRONICS ENGINEERING

Semiconductors

Insulators, semiconductors and metals, Mobility and conductivity, Intrinsic and extrinsic semiconductors, Charge Densities in Semiconductors, Mass action Law, Current Components in Semiconductors, The Continuity Equation, Injected minority Charge Carrier, Hall effect.

PN Junction Diode

Characteristic and analysis, Types of diodes – Zener diodes, Photodiodes, Light emitting diodes (LED's), Varactor diodes and tunnel diodes. Rectifiers and filter circuit: Half wave, full wave and Bridge rectifier circuits and their analysis, L, C and Pi filters, Basic regulator supply using zener diode, Clipping and clamping circuits.

Transistors

Construction and characteristics of bipolar junction, transistors (BJT's)-Comm. Base, Comm. emitter, Comm. Collector configuration. Transistor at low frequencies – small signal low frequency transistor model (h-parameters). Analysis of transistor amplifier circuit using h-parameters. Transistor biasing and bias stabilization: the operating point, stability factor, analysis of fixed base bias, collector to base bias, Emitter resistance bias circuit and self bias circuit. Bias compensation techniques.

Field Effect Transistor

Construction and characteristics of JFET, JFET biasing circuit, JFET amplifier, MOSFET construction and characteristics.

Amplifiers And Oscillators

Classification of amplifiers, concept of feedback, general characteristics of feedback amplifiers, Single stage RC coupled amplifier. Oscillators – Criterion for Oscillation, type of oscillators: Hartley oscillator, Colpitt Oscillator, RC Phase shift oscillator, Crystal oscillator.

Operational Amplifiers:

Introduction to Op-amp, Inverting and non-inverting configuration, Applications – adder, subtractor, integrator, differentiator.

Text Books

1. Integrated devices & Circuits by Millman & Halkias.
2. Electronics Devices and Circuit Theory by R. Boylestad.

Reference Books

1. Electronics Devices and Circuits-II by A.P. Godre & U.A. Bakshi.
2. Electronics Devices and Circuit by G.K. Mithal.

CSH-116 ENGINEERING ECONOMICS AND MANAGEMENT

Unit-I

The Elementary Economics and Demand, Law of Demand, The Elasticity of Demand, Price, Income and Cross-Elasticity of Demand.

Unit -II

Production function, Laws of returns to scale, Economies and diseconomies of scale of production, Least cost combinations, Cost and cost curves, Revenue and revenue curves, Break even analysis.

Unit –II

Long Range and Short Range Budgeting, Criteria for Project Appraisal, Social Benefit-Cost Analysis, Concept and Techniques of Depreciation, Book Keeping, Single and double entry system, Journal and ledger, Trading account, profit and loss account, Balance Sheet.

Unit IV

Introduction to Management: Classification, characteristics, and objectives of management, Social Responsibility and Ethics, Development of Management thought, Nature and function of management, Management by Objective.

The nature and purpose of organization, Basic Departmentation, line / Staff Authority and Decentralization, Organizational Culture

Unit –V

Human Resource Management: Selection, Training and Development, Performance Appraisal, Teamwork, Team Building for Enhanced Efficiency and Productivity, Leadership Processes and framework, Content theories and Importance of Motivation.

Unit –VI

Personality: personality factors, Big –five model, The Myers-Briggs Type Indicator (MBIT)

Persons Perceptions: making judgments about others. Attribution theory, frequently used short cuts in judging others with special reference to organization.

Decision Making: establish link between perception and individual decision making. Factors affecting perception and decision making. Concept and techniques of forecasting, Strategic and Tactical decisions, Decision making process, Rationality & Creativity in decision making. Program Evaluation and Review Technique, Critical Path Method.

Text Books References:

1. Managerial economics: by Craig Peterson & W. Cris Lewis, PHI Publication
2. Modern Microeconomics: by A. Koutsoyiannis, Macmillian
3. Managerial Economics Theory and Application: by D.M. Mithani, Himalaya Publication House
4. Project Planning Analysis, Selection, Implementation and Review: by Prasanna Chandra, Tata McGraw Hill.
5. Engineering Economics: by Degramo, Prentice Hall
6. Fundamental of Management : by S.P.Robbins & D.A. Decenzo, Wiley India Edition
7. Management in Global perspectives: by Koontz , Tata McGraw Hill
8. Principles of Management: by Anil Bhat, Oxford

CSS-121 ENGINEERING MATHEMATICS-II

Fourier Series

Euler's formula, Conditions for a Fourier expansion, Functions having points of discontinuity, Change of interval, Odd and even periodic functions, Expansion of odd and even periodic functions, Half-range series, Typical wave-forms, Parseval's formula, Practical harmonic analysis.

Ordinary Differential Equations

Brief review of first order ordinary differential equations, Exact equations, Equations reducible to exact equations, Equations of the first order and higher degree, Clairaut's equation, Applications of differential equations of first order (Orthogonal trajectories). Linear differential equations with constant co-efficients, Complimentary functions and particular integral, Method of variation of parameters, Equations reducible to linear equations with constant co-efficients (Cauchy's and Legendre's linear equations), Simultaneous linear equations with constant co-efficients, Applications of linear differential equations in engineering.

Complex Numbers

Applications of De Moivre's theorem, Exponential, Circular, Hyperbolic and Logarithmic functions of a complex variable, Inverse Hyperbolic functions, Real and imaginary parts of Circular and Hyperbolic functions, Summation of the series-'C+iS' method.

Functions Of Complex Variable

Limit and derivative of complex functions, Cauchy-Riemann equations, Analytic functions and its applications, Geometrical representation of complex function, Conformal mapping and standard transformations, Complex integration, Cauchy's theorem, Cauchy's integral formula, Series of complex terms, Taylor's and Laurent's series, Cauchy's residue theorem and its application for the evaluation of real definite integrals.

Integral Transforms

Laplace Transforms of standard functions and their properties, Inverse Laplace Transforms, General Properties of inverse Laplace transforms and Convolution Theorem, Laplace Transforms of periodic functions, Bessel functions, Error function, Dirac-delta Function, Heaviside's Unit Function, Applications to linear simultaneous differential equations.

Text Books

1. Advanced Engineering Mathematics: by Erwin Kreyszig, John Wiley and Sons, NC, New York.
2. Advanced Engineering Mathematics: by R. K. Jain & S. R. K Iyengar, Narosa Pub. House.

Reference Books

1. Advanced Engineering Mathematics: by C. R. Wylie & L. C. Barrett, McGraw Hill.
2. Vector Calculus: by C. E. Weatherburn. John Wiley and Sons, NC, New York.
3. Complex variables and Applications: by R. V. Churchill, T. J. Brown & R. F. Verhey, McGraw Hill.
4. Differential Equations: by Shepley L. Ross, John Wiley & Sons, New York.

CSS-122 CHEMISTRY FOR COMPUTER ENGINEERS

Polymers

Introduction, classification, tacticity, types of polymerization, coordination polymerization, mechanisms of polymerization, synthesis and applications of some important polymers Effect of polymer structure on properties, Moulding of plastics into articles, Conducting polymers: preparation, types, properties and applications.

Science of Composite Materials

Introduction, Classification, constituents of composites, Fiber reinforced composites, unidirectional fibre reinforced composites, short fibre reinforced composites, particle reinforced composites, important types and failures of fiber reinforced composites, Advantages and applications of composites.

Characterization Techniques

Introduction to spectroscopy; UV-Visible spectroscopy- Absorption laws, Instrumentation, formation of absorption bands, Theory of electronic spectroscopy, Chromophore and auxochrome concept, fluorescence & phosphorescence, application of UV-Visible spectroscopy ; IR spectroscopy- Principle, theory of molecular vibrations, selection rules, spectral features of some classes of compounds, important features of IR spectroscopy and applications; NMR- Principle, relaxation processes, Instrumentation, shielding-desheilding effects, spinspin coupling, coupling constant, applications of NMR; MS spectroscopy- Basic principle, Instrumentation, determination of molecular formulae, important features of mass spectroscopy; Chromatography- Introduction, types, gas chromatography ; thermal method- instrumentation, fundamental principles and applications of TGA, DTA and DSC.

Nanochemistry

Introduction to nanochemsitry, synthesis, characteristics and applications of carbon nanostructures fullerenes, carbon nano tubes and graphene.

Fuels and Non-Conventional Energy Sources

Introduction, classification, solid, liquid and gas fuel; Nuclear energy- Breeder reactor and light water nuclear reactor for power generation (Block diagram only),solar energy conservation and solar cells; Fuel Cells- Introduction, types and their characteristics, alternate fuels.

Corrosion and Its Control

Introduction, Types of corrosion – chemical and electrochemical, Mechanisms of corrosion, factors affecting corrosion and different protection techniques for corrosion control.

Lubricants

Introduction, Mechanisms of lubrication, Types and selection of lubricants, synthetic lubricants, properties and different methods for testing of lubricating oils and greases. Books recommended.

***Text Books*:**

1. Applied Chemistry- A textbook for engineers and technologist by H.D. Gesser.
2. Engineering Chemistry: by P C Jain & Monika Jain
3. A Text Book of Engineering Chemistry: by Shashi Chawla

Reference Books:

1. Fundamental of organic spectroscopy by Y. R. Sharma
2. Introduction to spectroscopy by Pavia, Lampman, Kriz.
3. Science and Engineering of Materials by Askeland and Phule
4. Introduction to nanotechnology by C. P. Poole Jr. and F.J. Owens
5. Principles of polymerization by George Odian
6. Textbook of polymer science by F.W. Billmeyer Jr.

CSH-123 COMMUNICATION SKILLS

The Process Of Comunication

Introduction. What is communication? Barriers to communiction. Different types of communiction. Written vs. oral communicatio. Diffeent types of face-to-face interactions, characteristics and conventions of conversation, conversational problems of second foreign language users, difference between conversation and other speech events.

Telephone Techniques

Speaking and listening, commonly used phrases in telephone conversations, reading: confence calls, vocabulary, writing and listening, leaving a message, grammar and usage: the perfct tense, pronunciation: contracted forms.

Job Applications And Interviews

Reading, vocabulary, apply for a job, curriculum vitae, language focus: some useul words, study skills: prepriing for an interview, listening, speaking , writing.

Group Discussions:

Reading, writing skills, listening: how to be succesful in a group discussion, study skills, language facts, vicabulary, speaking, grammar: connectives, pronunciation

Managing Organistional Structure

Warm up, value to influence and lead, reading: the role of a manager, vocabulary: leadership. Speaking and listening, language focus, degree of probability Grammar: modals, wriing, reports, pronunciation.

Meetings

Reading: a sucessful meeting, speaking: one to one meetings, language focus: opening, middle and close, study skills, editing, listening, criteria for sucssful meetings, vocabulary, grammar: reporting verbs, writing:memos, pronunciation: stress according to part of speech.

Taking Notes And Preparing Minutes

Taking notes, the note-taking skill: the essential components, the note-taking skill: an example preparing minutes, format of minutes, language and style of minutes, grammar: using the passive voice.

Presenttion Skills-1

Reading, presentation skills, grammar: verbs often required in presentations, language focus, listening: importance of body language in presentations, speaking: preparing an outline of a presentation, pronunciation.

Prentation Skills-II

Reading: structure of presentation, study skills: visual aids, ending the presentation, language focus: taking about increase and decrease grammar: prepositions. Listening: podium panic, speaking, pronunciation: emphasizing the important words in context.

Negotiation Skills

Language focus, idiomatic expressions, study skills: process of negotiations, grammar: phrasal verbs, listening: effective negotiations, speking, writing.

Reference books:

1. Effective technical communication by M. Ashraf rizvi Pub:tata McGrow Hill (2009)
2. Developing communiction skills by krishna mohan Pub: Mac Millan India Limited (2009)
3. An approach to communiction skills by Indrajit Bhatacharya Pub: Dhanpat Rai Co. Pvt. Ltd. New Delhi (2007)
4. Handbook of practicl commu. Skills by wright, chrissie, Pub: jaico publishing house, mumbai (2007)
5. The skills of communicating by bill scott. Pub: jaico publishing house, mumbai (2009)

CSD-124 BASIC ELECTRICAL ENGINEERING

Electric Circuits

Introduction to linear and non linear circuits, circuit elements, various sources and source transformation, star delta transformation, solution of D.C. circuits using Kirchoff's laws, signal wave forms and passive elements specifications, basic theorems, generation of A.C. sinusoidal voltage and currents, average and r.m.s. values, Form factor and peak factor, phasor representation, phasor in polar, rectangular and exponential forms, terminal relationship for pure passive elements and their combination in series and parallel.

Analysis of single phase series, parallel and series-parallel circuits. Active and reactive power, P.F. and volt-ampares, frequency response and Q-factor.Analysis of balanced three phase A.C. circuits - Introductory concept, voltage, current and power in three phase balanced circuits. Introduction to Domestic Electric Wiring and Storage Batteries.

Electromagnetic and Transformer

Magnetic circuit concept, B-H curves characteristics of magnetic materials, practical magnetic circuits, magnetic circuits with D.C. and A.C. excitation, hysteresis and eddy current losses.

Magnetic force, self and mutual inductances, Faraday`s laws, Lenz`s Law, statically and dynamically induced EMFs, energy stored in magnetic fields. Principle of Transformer operation, construction & equivalent circuit of transformer.

Measuring Instruments

Introduction to galvanometer (Moving coil and moving iron), ammeter, voltmeter, wattmeter, energy meter, use of shunt and multiplier.

Electrical Machines

Fundamentals of D.C. and A.C. machines.

Books/References:

1. Fundamentals of Electric Circuits by Charles K Alexander and Matthew N. O. Sadiku, TMH Publication, 2nd Edition, 2009.
2. Electrical Engineering Fundamentals by Vincent Del Toro, PHI Publication, Second Edition
3. Electrical Technology by H Cotton, CBS Publishers and Distributors, 7th Edition, 2005
4. Basic Electrical Technology by A.E. Fitzgerald, McGraw Hill Publication

CSD-127 ENGINEERING GRAPHICS

Basic Concepts

Sheet layout, Border Lines, Title Block, Introduction to drawing instruments and use of instruments, Types of line and their uses, Technical lettering as per BIS codes.

Basic Elements

Significance and scope of drawing, Methods of Dimensioning, Different types of projections and their uses. Basic definition of geometrical objects: solids, lines, points and planes.

Projections of Points

Projections of points in different quadrant, Projection of point on auxiliary planes.

Projections of Lines

Projections of lines in different quadrant, Parallel to both H P and V P, Parallel to one and inclined to other, and inclined to both, contained in profile plane, Shortest distance, intersecting lines.

Projection of Planes

Types of planes (perpendicular to both the reference planes, perpendicular to one plane and parallel to other plane, perpendicular to one plane and inclined to the other plane), Projection of planes parallel to one of the reference of plane (when the plane is parallel to H.P, when the plane is parallel to V.P), projection of plane inclined to one reference plane and perpendicular to other.

Orthographic Projections

Review of principle of Orthographic Projection, Sketch/drawing of blocks, and of simple machine parts.

Books/References:

1. Narayana K L and Kanaiah P, "Engineering Graphics", Tata McGraw Hill Publishing Company Limited, New Delhi.
2. Gill P S, "Engineering Graphics and Drafting", Katria and Sons, Delhi.
3. Bhat N D, "Elementary Engineering DrawingPlane and solid Geometry", Chartotar Publishing House, Anand.
4. A Text Book of Engg Drawing by R. K. Dhawan, S. Chand and Co. Ltd
5. Engineering Drawing by Basant aggarwal and B.C Rana

CSS-210 PROBABILITY AND QUEUING MODEL

Probability and Random Variable

Axioms of probability – Conditional probability – Total probability – Baye's theorem – Random variable- Probability mass function – probability density function – properties – Moments – Moment generating function and their properties.

Standard Distributions

Binomial, poisson, Geometric, Negative Binomial, Uniform, Exponential, Gamma, Weibull and Normal distributions and their properties- Function of a random variable. Probability density function and its properties

Two Dimensional Random Variables

Joint distributions – Marginal and conditional distribution – Covariance – Correlation and regression – Transformation of random variables- Central limit theorem.

Random Processes And Markov Chains

Classification – Stationary process – Markov process –Poisson process- Birth and death process – Markov chains- transition probabilities – Limiting distributions.

Queueing Theory

Markovian models – M /M/1, M/M/C, finite and infinite capacity- M/M/8 queues – Finite source model – M/G/1 queue (steady state solution only) – Pollaczek – Khintchine formula- Special cases.

Text Books

1. Ross, S., "A first course in probability " , Sixth Edition , Pearson Education , Delhi , 2002.
2. Medhi j., "Stochastic Processes ", New Age Publishers, New Delhi, 1994. (Chapters 2,3 & 4)
3. Taha, H.A., "Operations Research – An introduction", Seventh Edition, Pearson Education Edition Asia, Delhi, 2002.

References

1. Veerarajan. T., "Probability, Statistics and Random. Processes", Tata McGraw – Hill, Second Edition, New Delhi, 2003.
2. Allen., A.O., " Probability , Statistics and Queuing Theory ", Academic press , New Delhi, 1981.
3. Gross, D. and Harris, C.M., "Fundamentals of Queuing theory ", John Wiley and Sons, Second Edition, New York, 1985.

CSD-211 DISCRETE STRUCTURE

Introduction to Preliminaries and Predicate Calculus

Basic concepts of discrete mathematics and related problems**,** propositions and predicates, disjunction and conjunction, tautologies and contradiction, laws of equivalence, rules of substitution and transitivity, normal forms.

Set Theory and Functions

Basic concepts, ,Venn Diagrams, set operations, power set, methods of proof for sets, Relations and ordering, Types of relations, Graph and matrix of a relation, properties of a relation, Functions: definitions and notation, one to one, onto, one to one and onto, composition, identity and inverse, related results.

Graph Theory

Basic concepts of graph theory, multigraphs and weighted graphs, walk path and circuits, Warshall's algorithm: shortest path, Eulerian paths and circuits, Hamiltonian paths and circuits, factors of a graph and planar graphs, Graph colorings.

Binary Trees

Introduction, complete and extended binary tree, traversing binary tree, binary search tree, Heaps, Huffman's algorithm.

Basics of Structures

Mathematical induction, Algebraic structures properties, Semi group, Monoid, Group and Sub group - examples and standard results, generators and evaluation of powers, cosets and Langranges's theorem, rings, integral domains, fields.

Logic and Recursion

Propositional calculus - propositions, logical operators, truth tables, Lattice, propositions generated by a set of recurrence relations – partial and total recursion - problems.

Text and Reference Books

1. J. P. Tremblay and R Manohar, "Discrete Mathematical structures with applications to Computer Science", McGraw Hill.
2. C.L. Liu, "Elements of Discrete Mathematics", McGraw Hill.
3. Scheinerman, Edward, Mathematics: A Discrete Introduction, Cengage.
4. Roman, Steven. An Introduction to Discrete Mathematics, Saunders, NY.
5. Rosen, Kenneth h. Discrete Mathematics and Its Applications, McGraw/Hill
6. Barnett, Steven. Discrete Mathematics, Addison Wesley
7. Dossey, John A. et al, Discrete Mathematics, Addison-Wesley,
8. SemyourLipscdutz, Marc Lipson, "Discrete Mathematics", Schaum's outlines, Tata McGraw-Hills.

CSD-212 OBJECT ORIENTED PARADIGM

Concepts of Object-Oriented Programming

Oriented Programming Paradigm, Basic concepts of OOP's, Benefits of OOPS, Introduction to object oriented design and development, Design steps, Design example, Object oriented languages, Comparison of structured and object-oriented programming languages.

Arrays, Pointers and Functions

Arrays, Storage of arrays in memory, Initializing Arrays, Multi-Dimensional Arrays, Pointers, accessing array elements through pointers, Passing pointers as function arguments, Arrays of pointers, Pointers to pointers, Functions, Arguments, Inline functions, Function Overloading Polymorphism.

Classes and Objects

Data types, operators, expressions, control structures, arrays, strings, Classes and objects, access specifiers, constructors, destructors, operator overloading, type conversion.

Storage classes

Fixed vs Automatic declaration, Scope, Global variables, register specifier, Dynamic memory allocation.

Inheritance

Inheritance, single Inheritance, Multiple Inheritance, Multi level inheritance, hierarchical inheritance, hybrid inheritance, Virtual functions.

Streams and Files

Opening and closing a file, File pointers and their manipulations, Sequential Input and output operations, multi-file programs, Random Access, command line argument, string class, Date class, Array class, List class, Queue class, User defined class, Generic Class.

Exception Handling and Graphics

List of exceptions, catching exception, handling exception. Text Mode, Graphics mode functions, Rectangles, and Lines, Polygons & Inheritance, Sound & Motion, Text in Graphics Mode.

Standard Template Library

Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators, Other STL Elements, Container Classes, General Theory of Operation, Vectors.

Text and Reference Books

1. Robert Lafore, "Object Oriented Programming in Turbo C++", Galgotia Publications,
2. Balagurusamy, 'Object Oriented programming with C++", Tata McGraw Hill.
3. Bjarne Strustrup, "The C++ programming Language", Addison Wesley,
4. Booch, "Object Oriented Analysis and Design with Applications, Addison Wesley.
5. Chair H. Pappas & William H. Murray, "The Complete Reference Visual C++", TMH.

CSD-213 COMPUTER GRAPHICS

Introduction to Computer Graphics

Overview of Graphics Systems, Display Devices, Hard copy Devices. Interactive Input Devices, Display Processors, The Graphical Kernel System, Output Primitives, Line drawing algorithms, Circle Generation algorithms, Character Generation.

Raster Scan Graphics

Line Drawing Algorithms, Circle Generation, General Function Rasterization, Scan Conversion-Generation of the display, Image Compression, Polygon Filling, Fundamentals of Antialiasing.

Two-Dimensional Geometric Transformation & Viewing

Basic Transformation, Translation, Rotation, Scaling, Other Transformation Reflection, Shear, Transformation functions, Window to viewport co-ordinate transformation, Clipping Operations, Point Clipping, Line Clipping, Polygon Clipping.

Three- Dimensional Concepts & Object Representations

Three Dimensional Display Methods, Parallel Projection, Perspective Projection, Translation, Rotation, Scaling, Composite Transformation, Three dimensional Transformation function, Polygon Surfaces, Curved Lines and surfaces, Bezier Curves and surfaces, B-Spline Curves and surfaces.

Graphics hardware

Display technology, random scan, raster scan display processing, input devices for interaction.

Visible Lines and Visible Surfaces

Visual Realism, Hidden line and hidden surface removal: depth buffer algorithm, geometric computations, scan line coherence algorithms, area coherence algorithms, priority algorithm, shading and color models, Modeling methods.

Rendering

A simple illumination model, Transparency, Refraction effects in transparent materials, Simple Transparency Models, Z-Buffer Transparency, Shadows, Texture.

Text and Reference Books

1. D.F. Rogers, “Procedural Elements for Computer Graphics”, McGraw Hill.
2. Hearn and Baker, “Computer Graphics”, PHI.
3. S. Harrington, “Computer Graphics - A programming approach”, McGraw Hill.
4. D.F. Rogers, “Mathematical Elements for Computer Graphics”, McGraw Hill.

CSD-214 MICROPROCESSOR AND INTERFACING

Introduction to Microprocessor

History and Evolution, types of microprocessors, 8085 Microprocessor, Architecture, Bus Organization, Registers, ALU, Control section, Instruction set of 8085, Instruction format, Addressing modes, Types of Instructions.

Assembly Language Programming and Timing Diagram

Assembly language programming in 8085, Macros, Labels and Directives, Microprocessor timings, Microinstructions, Instruction cycle, Machine cycles, T states, State transition diagrams, Timing diagram for different machine cycles.

Serial I/O, Interrupts and Comparison of Contemporary Microprocessors

Serial I/O using SID, SOD. Interrupts in 8085, RST instructions, Issues in implementing interrupts, Multiple interrupts and priorities, Daisy chaining, Interrupt handling in 8085, Enabling, disabling and masking of interrupts. Brief comparison of contemporary 8-bit microprocessors like Z-80, M68000 with 8085.

Data Transfer techniques

Data transfer techniques, Programmed data transfer, Parallel data transfer using 8155. Programmable parallel ports and handshake input/output, Asynchronous and Synchronous data transfer using 8251A. Programmable interrupt controller 8259A. DMA transfer, cycle stealing and burst mode of DMA, 8257 DMA controller.

Microprocessor Interfacing Techniques

Interfacing memory and I/O devices, Addressing memory, interfacing static RAMs, Interfacing and refreshing dynamic RAMs, Interfacing a keyboard, Interfacing LED and seven segment displays, interfacing a printer, Interfacing A/D converters, D/A converters.

Architecture of 8086

Memory Address space and data organization,- segment registers and memory segmentation, Generating memory addresses, IO address space, addressing modes, Comparison of 8086 and 8088, minimum mode maximum mode, system timing, introduction to Pentium and further series of microprocessors.

Text and Reference Books

1. B. Ram, “Fundamentals of microprocessors and microcomputers”, Dhanpat Rai and Sons.
2. R.S. Gaonkar, “Microprocessor Architecture, Programming and applications with the 8085/8080A”, Wiley Eastern Ltd.
3. YU-Cheng Liu & Glenn A Gibson, “Microprocessor System, Architecture Programming & Design”.
4. Douglas V Hall, “Microprocessors& Interfacing”. McGraw-Hill
5. D.V. Hall, “Microprocessors and Digital Systems”, McGraw Hill
6. A.P. Mathur, “Introduction to Microprocessor”, Tata McGraw Hill.

CSD-215 DIGITAL ELECTRONICS & LOGIC DESIGN

Number System & Codes

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, error detection and correction, Hamming code.

Logic Gates, Boolean Algebra & Logic Families

Axiomatic definition of Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Boolean Functions, Canonical and Standard forms, Digital Logic Gates. Various Logic Families like TTL and ECL etc., working and their characteristics, MOS and CMOS devices.

Combinational Logic Design

The map method, Two, Three, Four and Five variable maps, Sum of products and Product of Sums Simplification, NAND and NOR implementation, incompletely specified functions, Ex-OR functions, The tabulation method, Determination of Prime implicants, Selection of Essential Prime implicants, The cubenotation, Sharp operation, Iterative Consensus, Generalized Consensus, Minimization of Multiple outputswitching functions, Determining Prime implicants using Generalized Consensus, Finding a Minimum cover, Breaking cyclic and similar structures.

MsiAndPld Components

Binary adder and subtractor, Multiplexers, Decoders / Demultiplexers, Read Only Memory, Programmable Logic Arrays, Programmable Array Logic.Implementation of Combinatorial Logic using these devices.

Introduction to Sequential Logic

Introduction, S-R Flip-flops, JK flip-flop, D flip-flop, T flip-flop, master slave flip-flop. Flip-flop excitation table, Classification of sequential circuits, Registers and A to D and D to A converter circuits, design & analysis of synchronous and asynchronous sequential circuits: Counters, Sequence Detector and Sequence Generator.

Semiconductor Memories

Introduction, Memory organisation, Classification and characteristics of memories, Sequential memories, ROMs, R/W memories.Content addressable memories, Programmable logic arrays, Charged-Coupled device memory.

Books Suggested:

1. M. Morris Mano, Digital Design, Prentice Hall of India.
2. Thomas Downs and Mark F Schulz, Logic Design with Pascal, Van Nostrand Reinhold.
3. Digital principle and applications Malvino and Leach- (TMH)
4. Modern digital systems design Cheung (WPC)

CSD-221 COMPUTER ORGANIZATION

General System Architecture

Stored Program control concept (Von-Newman architecture principle), Flynn's Classification of computers (SIMD, MISD, MIMD), Structure organization (CPU, Caches, Main memory, Secondary memory unit & I/O), Register Transfer Operation, Micro-operation, Instruction Set Architecture (Instruction set based classification of processor i.e. RISC, CISC, RISC vs CISC Comparison), Addressing Modes, Operation instruction set (Arithmetic & logical, Data transfer, Control flow), Instruction set format.

Processor Design

Arithmetic & logic unit, Stack organization, CPU Architecture types, Accumulator Based- Register, Stack-Memory, Register, Detailed data path of a typical register based CPU, Fetch, Decode, and Execute Cycle.

Computer Arithmetic

Addition & Subtraction, Multiplication Algorithms (Booth's Multiplication Algorithm), Division Algorithm, Floating point arithmetic operations.

Control Design

Microprogrammed& Hard-wired control options, Hard-wired design methods, State table method, Multiplier control, CPU control unit. Microprogrammed, Basic concepts, control Memory, Address Sequencing.

I/O Organization & Memory Hierarchy

Programmed, Interrupt driven & Direct Memory Access, Synchronous & synchronous data transfer, The need for Memory Hierarchy, locality of reference principle, Memory Hierarchy, cache, main & secondary, Memory parameters, access cycle time, cost per unit.

Introduction to Parallelism

Goals of parallelism, Instruction level parallelism, pipelining, superscaling, Processor level parallelism, Multiprocessor system overview.

Text and Reference Books

1. J.P. Hayes, "Computer architecture &Organization", McGraw Hill.
2. William Stallings, "Computer Organisation and Architecture, Designing for Performance", Pearson Education Asia.
3. M. Morris Mano, "Computer system architecture". PHI
4. David A. Patterson & John. L. Hennessy, "Computer Architecture: A quantitative Approach". Morgan Kaufmann

CSD-222 OPERATING SYSTEM

Evolution of operating systems

Evolution of operating systems, Types of operating systems. The process concept, system programmer's view of processes, operating system's views of processes, operating system services for process management.

CPU Scheduling

Scheduling concepts, scheduling algorithms, algorithm evaluation, multiple processor scheduling, real time scheduling.

Concurrent programming and Deadlocks

Critical regions, Conditional critical regions, Monitors, Interprocess communication, Messages, Pipes, Semaphores, Modularization, Synchronization, Concurrent languages. Deadlocks: Characterization, Prevention, Avoidance, Detection and Recovery, Combined approach to Deadlock Handling, precedence graphs.

Memory management

Memory Management, Contiguous allocation, static-swapping, overlays, dynamic partitioned memory allocation, demand paging, page replacement, segmentation.Non-contiguous allocation, paging, Hardware support, Virtual Memory.

File systems

A Simple file system, General model of a file system, Symbolic file system, Access control verification, Logical file system, Physical file system, Allocation strategy module, Device strategy module, I/O initiators, Device handlers, Disk scheduling.

Networks, Security and Design Principles

Network operating system, distributed operating system, external security, operational security, password protection, access control, security kernels, hardware security, layered approach, design principle.

Text and Reference Books

1. J.L. Peterson and A. Silberchatz, “Operating System Concepts”, Addison Wesley.
2. Harvey M. Dietel, “An Introduction to Operating System”, Addison Wesley.
3. C. Crowley, “Operating Systems - A Design Oriented Approach”, Irwin Publishing
4. W. Stallings, “Operating systems”, Prentice Hall.
5. A.S. Tanenbaum, “Modern Operating system”, PHI

CSD-223 DATA STRUCTURE

Introduction

Data types, data structures, abstract data types, the running time of a program, the running time and storage cost of algorithms, complexity, asymptotic complexity, big O notation, obtaining the complexity of an algorithm.

Development of Algorithms

Notations and Analysis, Storage structures for arrays - sparse matrices - structures and arrays of structures, Stacks and Queues: Representations, implementations and applications.

Linked Lists

Singly linked lists, Linked stacks and queues, operations on Polynomials, Doubly Linked Lists, Circularly Linked Lists, Operations on linked lists- Insertion, deletion and traversal, dynamic storage management – Garbage collection and compaction.

Trees

Basic terminology, General Trees, Binary Trees, Tree Traversing: in-order, pre-order and post-order traversal, building a binary search tree, Operations on Binary Trees - Expression Manipulations - Symbol Table construction, Height Balanced Trees(AVL), B-trees, B+ -trees.

Graphs

Basic definitions, representations of directed and undirected graphs, the single-source shortest path problem, the all-pair shortest path problem, traversals of directed and undirected graphs, directed acyclic graphs, strong components, minimum cost spanning tress, articulation points and biconnected components, graph matching.

Sorting and Searching Techniques

Bubble sorting, Insertion sort, Selection sort, Shell sort, Merge sort, Heap and Heap sort, Quick sort, Radix sort and Bucket sort, Address calculation, Sequential searching, Binary Searching, Index searching, Hash table methods.

Text and Reference Books

1. J.P. Tremblay and P.G. Sorenson, “An Introduction to Data Structures with applications”, Tata McGraw Hill.
2. S. Sahni, “Data structures, Algorithms ad Applications in C++”, WCB/McGraw Hill.
3. Aho Ullman and Hopcroft, “ Data Structures and Algorithms”.
4. Y. Langsam, M. J. Augenstein and A. M. Tenenbaum, “Data Structures using C”, Pearson Education
5. Richard F. Gilberg, Behrouz A. Forouzan, “Data Structures – A Pseudocode Approach with C”, Thomson Brooks / COLE

CSD-224 SYSTEM SOFTWARE

System Software

Distinction between system software and application software, Components of System Software, Evolution of System Software, H/W Independent features of System Software, General features of a System Software, Layered Organization of System Software, Overview of Compilers and Interpreters.

Machine Language and Microprocessor

Defining and Usage of Macro Expression, Macro Definition Language: Macro generation, Positional Parameters and Keyword parameters, Conditional Macro expansion, Macro Calls within Macros and its implementation, Macro Instructions Defining Macros, One-Pass Macro Processor.

Assembler

Machine Structure, Machine Languages, Elements of Assembly language Programming, Machine Independent features: Instructions, Program location, Command to Loader, Machine Dependent features: Literals, Symbol defining statements, Expressions, Program Block, Control section and program linking, Design of Two-Pass Assembler, Data Structures Format of Databases, Algorithm, A Single-Pass Assembler.

Loaders

Object Code, Function to be performed by Object Code, Machine dependent Features: Location, Linking, Machine Independent features: Automatic Library Search, Loader options, Overlay program, Loader Schemes: Compile and go Loaders, Absolute Loaders, Relocatability: Non-Relocating Program, Relocatable Program, Self-Relocating Programs, Algorithms for Relocating Loaders Using Relocation bit, Algorithm for Relocating loader Using Relocatable Location table, design of BSS Loader, Linking Schemes.

System Software Tools

Elements of System software Tools, Text Editor: Line and Stream Editor, Screen Editor, Structure Editor, Word Processor, Editor Structure, Debug Monitor, Programming Environment, DOS functions, Keyboard Management, Screen Management, Window or Display management, Text or Graphics, Overlayed or Tiled, Transcription and Image Buffer process per Window, Multi Tasking Window System, Machine and Assembly language Programming Interface. Device Driver Programming

Virus

Classification of Virus, Virus Detection and Control System, Virus in other environment, case studies.

Text and Reference Books

1. John J. Donovan, “System Programming”, TMH
2. D. M. Dhamdhere, “System Software and Operating System”, TMH.
3. Leland L. Black, “System Software-An Introduction to System Programming”, AddisonWesley.
4. Intel Users manual for 8086, 80386 & 80486, Pentium & Pentium pro.

CSD-225 THEORY OF COMPUTATION

Machines

Basic machine, FSM , Transition graph, Transition matrix, Deterministic and non-deterministic FSM'S, Equivalence of DFA and NDFA, Mealy & Moore machines, minimization of finite automata, Two-way finite automata.

Regular Sets and Regular Grammars

Alphabet, words, Operations, Regular sets, Finite automata and regular expression, Pumping lemma and regular sets, Application of pumping lemma, closure properties of regular sets.

Formal Grammars & Languages

Basic definitions and examples of languages, Chomsky hierarchy, Regular grammars, context free & context sensitive grammars, context free languages, non-context free languages, Chomskey normal forms, binary operations on languages.

Turing Machines & Pushdown Automata

TM model, representation and languages acceptability of TM Design of TM, Universal TM & Other modification, composite & iterated TM, Pushdown automata, Acceptance by PDA.

Computability

Basic concepts, primitive & partial recursive function, Recursive function, Decidability, Kleen's theorem.

Undecidibility

Properties of recursive & recursively enumerable languages, Universal Turing machine and undecidable problem, Rice's theorem & some more undecidable problems.

Computational Complexity Theory

Definition, linear speed-up, tape compression & reduction in number of tapes, Hierarchy Theorem, Relation among complexity measures, Transition lemmas & non deterministic hierarchies, properties of general complexity measures, the gap, speed-up, union theorem, Automatic complexity theorem.

Text and Reference Books

1. John E. Hopcroft, Jeffery Ullman, "Introduction to Automata theory, Langauges & computation", Narosa Publishers.
2. E.V. Krishnamurthy, "Introductory Theory of Computer science". East West Press
3. K.L.P. Mishra, "Theory of computer Science", Prentice Hall of India Pvt. Ltd.

CSS – 226 BASIC ENVIRONMENTAL SCIENCE & ENGINEERING

Environmental Management, Resources and Legislation

Environmental disturbances, quantification of environmental issues, soil resources and their classification, equitable use of resources, natural resource management, food chain and trophic levels, environmental impacts of energy development, legislation.

Global Atmospheric Change

The atmosphere of earth, global temperature, greenhouse effect, radiative forcing of climate change, global warming potential, carbon cycle, carbon emissions from fossil fuels, regional impacts of temperature change, global initiatives

Physical, Chemical and Biological Processes

Particle dispersion, methods of expressing particle concentrations, stoichiometry, chemical equilibria, solubility of gases in water, carbonate system, organic chemistry, nuclear chemistry, nuclear fission and fusion, basic atmospheric properties, fundamentals of microbiology.

Population and Economic Growth

The nature of human population growth, population parameters, industrialisation, urbanisation, sustainable development, sustainable consumption, resettlement and rehabilitation issues, health and the environmental impacts.

Solid and Hazardous Waste Management

Integrated solid waste management, hazardous waste management, biomedical waste treatment technologies and disposal options, e-waste management, waste minimisation for sustainability, waste management – Indian scenario.

Pollution and Monitoring

Water resources, characteristics of water, water pollutants, oxygen demanding wastes, surface water quality, groundwater quality, water and wastewater treatment systems.

Air quality standards, emission standards, criteria pollutants, air pollution and meteorology, atmospheric dispersion, emission controls. Effect of noise on people, rating systems, community noise sources and criteria, traffic noise prediction, noise control.

References:

1. Mackenzie L. Davis and David A. Cornwell.2010. Introduction to Environmental Engineering, 4e. Tata McGraw-Hill Education Private Limited New Delhi.
2. Gilbert M. Masters.2007. Introduction to Environmental Engineering and Science Pearson Education. Dorling Kindersley (India) Pvt. Ltd. Delhi.
3. J. Glynn Henry and Gary W. Heinke.2004. Environmental Science and Engineering, Pearson Education (Singapore) Pte. Ltd.

CSD-311 MODELING AND SIMULATION

Fundamentals

Definition and reasons for simulation, Continuous (time-oriented) and discrete (event) systems, Modeling/programming simple deterministic systems, Rates and system dynamics.

Concepts in Simulation

Stochastic variables; discrete vs continuous probability, Monte Carlo Simulations; Monte Carlo methods, Normally distributed random numbers, Monte Carlo V/S Stochastic Simulations.

Queuing Models

Single server queuing system, introduction to arrival and departure time, flowcharts for arrival and departure routine. Event graphs of queuing model. Determining the events and variables, Event graphs for inventory model.

Random Numbers: Introduction to Random Numbers, Importance of Random Numbers in Simulation, Mid-Square random number generator, Residue method, Arithmetic Congruential generator, Testing Numbers for Randomness, Chi-Square Test.

Discrete Event System Simulation

Discrete events; representation of time; queues and servers; generation of arrival patterns; resource seizing; departures simulation of a telephone system and computer networks; simulating components of an operating system; delayed calls; modeling policies; priority queues; tasks; gathering statistics; counters and summary statistics; measuring utilization and occupancy; recording distributions and transit times.

Introduction to a Simulation Languages

Simulation in C++, GPSS/ MATLAB/Network Simulators.

Text and Reference Books

1. Law and Kelton, “Simulation Modeling and Analysis”, McGraw-Hill.
2. J. Banks, J. Carson and B. Nelson, “Discrete-Event System Simulation”, Prentice-Hall.
3. K.A. Dunning “Getting Started in GPSS”, Engineering Press, San Jose, CA.
4. P. Fishwick, “Simulation Model Design and Execution”, Prentice-Hall.

CSD-312 ANALYSIS & DESIGN OF ALGORITHMS

Algorithms Introduction

Algorithm Design paradigms- motivation, concept of algorithmic efficiency, run time analysis of algorithms, Asymptotic Notations.

Divide and Conquer approach

Structure of divide-and-conquer algorithms: sets and disjoint sets: Union and Find algorithms, quick sort, Finding the maximum and minimum, Quick Sort, Merge sort, Heap and heap sort.

Greedy Algorithms

Optimal storage on tapes, Knapsack problem, Job sequencing with deadlines, Minimum Spanning trees: Prim's algorithm & Kruskal's algorithm, Huffman codes.

Graph Algorithms

Representation of graphs, BFS, DFS, Topological sort, strongly connected components; single source shortest paths: Bellmen-Ford algorithm, Dijkstra's algorithm; All pairs shortest path: The Warshall's algorithm.

Dynamic programming

Overview, difference between dynamic programming and divide and conquer, Matrix chain multiplication, Traveling salesman Problem, longest Common sequence, 0/1 knapsack.

Backtracking

8-Queen Problem, Sum of subsets, graph coloring, Hamiltonian cycles.

Branch and bound

LC searching Bounding, FIFO branch and bound, LC branch and bound application: 0/1 Knapsack problem, Traveling Salesman Problem.

Computational Complexity

Complexity measures, Polynomial Vs nonpolynomial time complexity; NP-hard and NP-complete classes, examples.

Text and Reference Books

1. E. Horowitz and S. Sahni, "Fundamentals of Computer Algorithms", Galgotia.
2.T.H. Cormen, C.E.Leiserson, R.L. Rivest, "Introduction to Algorithms", MIT Press, Cambridge.
3. A.V. Aho, J.E. Hopcroft and J.D. Ullman, "The Design and Analysis of Computer Algorithms", Addison Wesley.

CSD-313 DATA BASE MANAGEMENT SYSTEM

Basic Concepts

Introduction to File and Database systems- Database system structure – concepts and architecture, date models, schemas & instances, DBMS architecture & data independence, database languages & interfaces, Data Model, ER model.

Relational Models

SQL – Data definition- Queries in SQL-relational model concepts, relational model constraints, relational algebra, SQL- a relational database language: date definition in SQL, view and queries in SQL, specifying constraints and indexes in SQL; relational database management systems-Updates, Views, Integrity and Security, Relational Database design, Functional dependences and Normalization for Relational Databases, normal forms based on primary keys, (1NF, 2NF, 3NF & BCNF), lossless join and dependency preserving decomposition, converting ER-diagrams into relations.

Data Storage and query Processing

Record storage and Primary file organization- Secondary storage Devices, Operations on Files, Heap File, Sorted Files, Hashing Techniques, Index Structure for files, Different types of Indexes- B-Tree - B+Tree, Query Processing.

Transaction Management

Transaction Processing, Need for Concurrency control, Desirable properties of Transaction, Schedule and Recoverability, Serializability and Schedules; Concurrency Control, Types of Locks, Two Phases locking, Deadlock, Time stamp based concurrency control , Recovery Techniques, Concepts- Immediate Update- Deferred Update, Shadow Paging.

Current Trends

Introduction to Distributed and parallel databases, Deductive Databases, Multimedia Databases, Real-Time Databases.

Text and Reference Books

1. B. Desai, “An introduction to database concepts”, Galgotia publications.
2. C.J.Date, “An introduction to database systems”, Addison Wesley.
3. Elmsari and Navathe, “Fundamentals of database systems”, Addison Wesley.
4. J.D.Ullman, “Principals of database systems”, Galgotia publications.
5. Abraham Silberschatz, Henry F. Korth and S. Sudarshan- “Database System Concepts”, McGraw-Hill
6. RamezElmasri and Shamkant B. Navathe, “Fundamental Database Systems”, Pearson Education,
7. Hector Garcia–Molina, Jeffrey D.Ullman and Jennifer Widom- “Database System Implementation”- Pearson Education
8. Peter Rob and Corlos Coronel- “Database System, Design, Implementation and Management”, Thompson Learning Course Technology

CSD-314 COMPILER DESIGN

Introduction to Compilers

Compiler and translators need of translators, structure of a compiler, lexical analysis, syntax Analysis.

Basic Parsing Techniques

Parsers, shift-reduce parsing, predictive parsing.

Automatic Construction of Efficient Parsers

LR parsers, canonical collection of LR(0) items, construction canonical LR parsing tables, construction LALR and SLR parsing tables using ambiguous grammars, an automatic parser generator, implementation of LR parsing tables, construction LALR sets of items.

Syntax-Directed Translation

Syntax directed translation schemes, implementation of syntax directed translation, intermediate code, postfix notation parse trees and syntax trees, three address code, quadruples and triples, translation of assignment statements, postfix translation with top down parser.

Symbol Tables

Contents of a table, data structures for symbol tables, representing scope information.

Error detection and recovery

Errors, lexical-phase errors, syntax-phase errors, semantic errors.

Introduction to Code optimization

The principal source of optimization, loop optimization, DAG representation of basic blocks, value numbers and algebraic laws, global data flow analysis.

Code Generation

Object programs, problems in code generation, machine model, simple code generator, register allocation and assignment, code generation from DAG's, peephole optimization.

Text and Reference Books

1. Alfred Aho, Ravi Sethi, Jeffrey D Ullman, "Compilers Principles, Techniques and Tools", Pearson Education
2. Allen I. Holub "Compiler Design in C", Prentice Hall of India
3. C. N. Fischer and R. J. LeBlanc, "Crafting a compiler with C", Benjamin Cummings
4. J.P. Bennet, "Introduction to Compiler Techniques", Tata McGraw-Hill
5. HenkAlblas and Albert Nymeyer, "Practice and Principles of Compiler Building with C", PHI
6. Kenneth C. Louden, "Compiler Construction: Principles and Practice", Thompson Learning

CSD-315 COMMUNICATION ENGINEERING

Introduction to Communications Systems

Communication process, sources of information, communication channels, base band and pass band signals, representation of signals and systems, switched communication systems.

Continuous-wave Modulation

Amplitude modulation (AM), frequency spectrum of the AM wave, representation of AM, power relations in the AM wave, AM detector, vestigial side-band modulation.

Angle Modulation

Frequency spectrum of Frequency Modulation (FM) and Phase Modulation, generation of FM (direct and indirect method), demodulation of FM signal.

Radio receiver

Tuned Radio-Frequency (TRF) receiver, Super heterodyne receiver.

Pulse Modulation

Sampling process, Pulse Amplitude Modulation (PAM), Time Division Multiplexing (TDM), Frequency Division Multiplexing (FDM), Pulse Width Modulation (PWM), Pulse Position Modulation (PPM).

Digital Modulation Techniques

Quantization process, Pulse Code Modulation (PCM), Differential Pulse Code Modulation (DPCM), Delta Modulation (DM), Adaptive Delta Modulation, Amplitude – Shift Keying (ASK), Frequency-Shift Keying (FSK), Phase-Shift Keying (PSK), QPSK.

Advanced Communication

Satellite communications, Earth station, CDMA.

Text and Reference Books

1. Electronic Communication Systems: George Kennedy
2. Communication Systems : Simon Haykin
3. An Introduction to Analog and Digital Communications: Haykin
4. Principles of Communication Systems: H. Taub and D.L. Schilling
5. Principles of Communication Engineering: Anokh Singh

CSD-320 COMPUTER NETWORKS

Introductory Concepts

Goals and Applications of Networks, LAN, WAN, MAN, Wireless network, Network software: Protocol hierarchies, design issues of layers, Interfaces and services. Reference Model: The OSI reference model, TCP/IP reference model, Example networks: Novell Netware, The ARPANET, The Internet, X-25 Networks, network standards.

Physical Layer

Fourier Analysis, Maximum data rate of a channel, Transmission media, Wireless transmission, Narrowband ISDN, Broadband ISDN and ATM, Virtual circuits, Circuit switching, Communication satellite.

Data Link Layer

Data link layer design issues, services provided to network layers, Framing, Error control, Flow control, Error detection and correction, Elementary data link protocols, An unrestricted Simplex protocol, A Simplex Stop-and-Wait protocol, Simplex Protocol for a noisy channel, Sliding Window protocols, A one-bit Sliding protocol, A protocol using go-back-N, A protocol using selective repeat, Protocol specification and verification, Example data link protocol-HDLC, PPP and SLIP.

Medium Access Sublayer

Channel Allocations, Static and dynamic allocation in LAN and MAN, Multiple Access protocols, ALOHA, Carrier Sense multiple access protocols, WDMA protocols, Wireless protocols, Collision free protocols, Limited contention protocols, IEEE standard 802.3 and Ethernet, IEEE standard 802.4, Token bus IEEE standard 802.5, Token Ring, Distributed Queue Dual bus, Logical link control, bridges, High speed LAN, Satellite networks.

Network Layer

Network Layer design issue, Routing algorithms, Congestion Control Algorithms, Internetworking.

Transport Layer

Transport services, Design issues, elements of transport protocols, simple transport protocols, Connection management, TCP, UDP.

Session, Presentation and Application Layer

Session Layer - Design issues, remote procedure call. Presentation Layer - Design issues, Data compression techniques, cryptography. Application Layer - File Transfer, Access and Management, Electronic mail, Virtual Terminals, Other applications, Example Networks - Internet and Public Networks.

Text and Reference Books

1. A.S. Tanenbaum, "Computer Networks", Prentice Hall of India.
2. J. Kurose and K.W. Ross, "Computer Networking: A Top-Down Approach Featuring the Internet", Addison-Wesley.
3. W. Stallings, "Data and Computer Communication", Prentice Hall of India.

CSD-321 SOFTWARE ENGINEERING

Introduction

Problem domain, software engineering challenges, software engineering approach.

Software Processes

Software process, characteristics of software process, software development process models, other processes.

Software Requirements analysis and specification

Software requirements, problem analysis, requirements specification, functional specification with use cases, validation, matrices.

Software Architecture

Role of software architect, architecture views, component and connector view, architecture style for C & C view, discussion and evaluating architectures.

Planning a software project

Effort estimation, project scheduling and staffing, software configuration management plan, quality assurance plan, risk management, project monitoring plan.

Function oriented design

Design principles, module level concepts, design notation and specification, structured design methodology, verification, metrics.

Object oriented design

OO concepts, design concept, Unified Modeling Language, design methodology, metrics.

Detailed Design, Software Measurements, metrics and Models

Detailed design and PDL, verification, Metrics and their scope, Qualities of a good Software metrics, classification of metrics, Cost estimation models COCOMO, Quality attributes, SQA, Quality Standards, ISO 9000 and CMM.

Coding

Programming principles and guidelines, coding process, refactoring, verification, metrics.

Testing

Testing fundamentals, black-box testing, white-box testing, testing process, defect analysis and prevention, metrics - reliability estimation.

CASE Tools

Types of CASE tools, advantages and components of CASE tools, Unified Modeling Language (UML)

Text and Reference Books

1. PankajJalote, "An integrated approach to software engineering", Narosa Publishing.
2. Pressman Roger R, "Software Engineering: A Practitioner's Approach", TMH.
3. Rajib Mall, "Fundamentals of Software Engineering", Pretence Hall of India.
4.Tom Pender "UML Bible", Wiley Dreamtech.
5. Ian Sommerville, "Software Engineering", Addison-Wesley.

CSD-322 ADVANCED DATABASE MANAGEMENT SYSTEM

Overview of database management
Traditional database models, relational model, relational languages, SQL and Embedded SQL.

Conceptual database design
Conceptual database design process, ER model, generalization, specialization and aggregation, conventions, ternary and higher order relationships and concept of cardinalities in such relationships.

Logical database design
Relational Database design and update anomalies, structures, guidelines for relational schema, normalization, dependencies, transformation of entity relationship model into relational schema.

Physical database design
Database performance, tables using operating system files, multi-table files and table fragmentation clustered table organization, page organization, indexing, B-Tree, B+ Tree, B-tree organizations, ISAM organization, clustered and non clustered indexes, hashing, static and dynamic hashing, buffer management, physical design features.

Query processing
Query processing stages, query Interpretation, query resource utilization, query execution, estimation of query processing cost, table scants, simple index access, fill factor, multiple index access, methods for join tables, (nested loop, merge join, hybrid join, multiple table join); structure of query optimizer, examples from one or two actual contemporary database management software.

Transaction Processing
Types of Failures of applications, transaction, properties, schedules and recoverability, serializability of schedules, levels of transaction, consistency, deadlocks, transaction performance, bench marking, transaction in contemporary database management systems.

Crash Recovery
Failure classification, recovery concepts based on deferred update, recovery concepts based on intermediate update, shadow paging, check points, on-line backup during database updates, case study from contemporary database management software.

Concurrency Control
Techniques based on time stamp ordering, multi-version techniques, optimistic techniques, multiple granularity, case studies Distributed Databases, distributed database concepts, architecture and design of distributed database, query processing, recovery, federated databases, asynchronous replication concepts, distributed database features in contemporary database management systems**.**

Client/Server Databases
Client/Server concepts, approach, Client/Server environments, characterization of Client/Server computing, application partitioning, the two-layer, and the Three layer architecture, Client/Server communication, APIs in Client/Server computing, middleware technology, application developments, design concepts, Client application development tools, and database servers.

Integrity, Security and Repositories
Needs for database integrity, integrity constraints, non-procedural integrity constraints, integrity constraints specifications in SQL, introduction to database security mechanism, security specification in SQL, system catalogues.

Emerging Database Trends
Object-Oriented databases, active databases, deductive databases, concept of next generation databases, data warehouses and executive information system, data mining, parallel query processing: multi-media databases.

Text Books

1. H Korth, ASilberschatz, "*Database System Concepts*", McGraw-Hill
2. R Elmasri, S Navathe, "*Fundamentals of database Systems*", Benjamin Cummings
3. Bipin Desai, "*An introduction to database Systems*", Galgotra Publications, West Publishing

Reference Books

1. Peter Rob, Carlos Coronel, "*Database Design and Implementation and Management*", Wadsworth Publishing Company
2. C J Date, "*An introduction to Database Systems, Volume I*", Addison-Wesley.

CSD-323 DIGITAL IMAGE PROCESSING

Introduction

Digital image representation, Fundamental steps in image processing, Elements of Digital Image processing systems, Elements of visual perception, Image model, Sampling and quantization, Relationship between pixels, Imaging geometry.

Image Enhancement

Enhancement by point processing, Sample intensity transformation, Histogram processing, Image subtraction, Image averaging, Spatial filtering, Smoothing filters, Sharpening filters, Frequency domain: Low-Pass, High-Pass, Homomorphic filtering.

Image Compression

Coding redundancy, Inter-pixel redundancy, fidelity criteria, Image compression models, Error-free compression, Variable length coding, Bit-plane coding, Loss-less predicative coding, Lossy compression, Image compression standards, Fractal Compression, Real-Time image transmission, JPEG and MPEG.

Image Segmentation

Detection of discontinuities, Edge linking and boundary detection, Thresholding, Region oriented segmentation, Use of motion in segmentation, Spatial techniques, Frequency domain techniques.

Spatial Operations and Transformations

Spatially dependent transform template and convolution, Window operations, 2- Dimensional geometric transformations.

Pattern Recognition

Classification and description, Structure of a pattern recognition system, feature extraction, Classifiers, Decision regions and boundaries, discriminate functions, Supervised and Unsupervised learning, PR-Approaches statistics, syntactic and neural.

Statistical Pattern Recognition

Statistical PR, Classifier Gaussian Model, Classifier performance, Risk and error, Maximum likelihood estimation, Bayesian parameter estimation approach, clustering for unsupervised learning and classifiers.

Text and Reference Books

1. R. Gonzalez and R. E. Wood, “Digital Image Processing”, Prentice Hall of India.
2. Andrian Low, “Introductory Computer Vision and Image Procession”, McGraw Hill CO.
3. Robert Schalkoff, “Pattern Recognition-Statistical, Structural and neural approach”. John Willey & Sons
4. W.K. Pratt, “Digital Image Processing”, McGraw Hill.
5. A. K. Jain, “Fundamentals of Image Processing”.

CSD-325 COMPUTATIONAL TOOLS AND TECHNIQUES

Study of Network simulation and analysis tools: NS2, NS3, OMNET++ and QUALNET. Study of Data mining tools: WEKA and CLUTO. Study of Image Processing tools: MATLAB and SCILAB.

References

1.www.cse.wustl.edu/~jain/cse567-08/ftp/simtools/index.html

2.www.cs.waikato.ac.nz/ml/weka/

3.glaros.dtc.umn.edu/gkhome/cluto/cluto/overview

4.www.mathworks.in/products/matlab/

5.www.scilab.org/

CSD-410 INFORMATION SECURITY

Introduction

Standards Organizations, Security Components OSI Security Architecture, Aspects of Security, Passive Attacks, Active Attacks, Security Services (X.800), Security Mechanism, Security Mechanisms (X.800), Services and Mechanisms Relationship, Model for Network Securit, Model for Network Access Security, Symmetric Cipher Model, Cryptography Classification, Cryptanalysis, Substitution: Other forms, Poly-alphabetic Substitution Ciphers, One-Time Pad, Transposition (Permutation) Ciphers, Product Ciphers.

Number Theory and Prime numbers

Groups, Rings, and Fields, Modular Arithmetic, Euclid's Algorithm, Finite Fields of the Form GF(p), Polynomial Arithmetic, Finite Fields of the Form GF(2n). Generation of large prime numbers, Prime factorization, Euler Totient Function ø(n), Euler's Theorem, Primality Test- Fermat's Little Theorem, Baillie-PSW, Solovay-Strassen, Miller Rabin Algorithm, AKS Algorithm, Cyclotomicprimality test, Elliptic Curve Primality Test, Prime Distribution, Chinese Remainder Theorem, Primitive Roots, Discrete Logarithms

Cryptographic Techniques

Perfect security, Feistel Cipher Structure, Block Cipher- DES, differential and Linear Cryptanalysis,Avalanche Effect , Double-DES, Triple-DES, Electronic Codebook Book (ECB), Cipher Block Chaining (CBC), Message Padding, Cipher Text Stealing (CTS), AES, International Data Encryption Algorithm (IDEA), Blowfish Algorithm, RC-x Algorithms, CAST-x Algorithms; Stream Cipher- Stream Modes of Operation-Cipher Feedback (CFB), Output Feedback (OFB), Counter (CTR), Storage Encryption, XTS-AES Mode, RC4; Pseudo number generation- Linear-Congruential Generators, Blum BlumShub Generator, Nonlinear Generators, RNGs used in Common Software Packages, Block Ciphers as PRNGs, ANSI X9.17 PRG, Hardware Random number generator, Attacks, Entropy Gathering Daemon (EGD), Intel Digital Random Number Generator (DRNG), RNG in Linux, Windows and iOS7.

Public-Key Cryptography and Message Authentication

The Key Distribution Problem, Public-Key Cryptosystems, The RSA Algorithm, The Key Management riddle, The Diffie-Hellman Key Exchange, Elliptic Curve Cryptography, Message Authentication, requirements and functions, Message Authentication Codes, Hash Functions, Birthday Problem, SHA-X, SHA-512 overview, KECCAK, sponge function, Authentication, Access control policies, The Message Digest (MD5) Algorithm, RIPEMD-x and HMAC fundamentals, Digital Signature basics, Authentication Protocols, The Digital Signature Standard, Kerberos Authentication scheme, The X.509 Directory Authentication scheme.

Security Protocols

Secure User Authentication, Mail security, PGP, database security, File system security, Program security, Memory security, Session security, SSH, Web security, Replay Attacks, Needham Schroeder Protocol, Denning's Modification, Corrected Protocol, One-Way Authentication for Email, IPSec, SSL, IEEE 802.11, Wired Equivalent Privacy (WEP)

Intrusion detection

Intrusion vs. Extrusion Detection, Examples of Intrusion, Categories of Intruders, Hacker Behavior Example, Criminal Enterprise Behavior, Insider Behavior Example, Intrusion Techniques, Password Guessing and Capture, Notification Alarms, Types of IDS, Sample Signatures, Anomaly Based IDS, Statistical Anomaly Detection, Audit Records, Rule-Based Intrusion Detection, Types of ID, Host vs. Network IDS, Honeypots

Text and Reference Books

1. William Stallings, "Cryptography and Network Security: Principles and Practice", Pearson Education.
2. D Stinson, "Cryptography: Theory and Practice", Chapman & Hall.
3. C. Kaufman, R. Perlman and M. Spenser, "Network Security", PHI.
4. S. Bellovin and W. Chesvick, "Internet Security and Firewalls", Addison-Wesley, Reading.
5. Trappe & Washington, "Introduction to Cryptography with Coding Theory", Prentice-Hall.
6. NIST standards

CSD-411 ADVANCED COMPUTER ARCHITECTURE

Introduction to System C

Introduction, Modules and Hierarchy, Processes, Ports and Signals, Data Types, Simulation and Debugging using SystemC.

Assessing and understanding Performance

Introduction, CPU Performance and its Factors, Evaluating Performance.

Instruction Set Principles and Examples (example of MIPS)

Introduction, Classifying Instruction Set Architectures, Memory Addressing, Type and Size of Operands, Operations in the Instruction Set, Instructions for Control Flow, Encoding an Instruction Set, Role of Compilers, MIPS Instruction Set Architecture.

The Processor: Datapath and Control

Introduction, Building a Datapath for Supporting the ISA, Single Cycle Implementation, Multi Cycle Implementation, Exceptions, Micro-programming, Hard-wired Control

Enhancing Performance with Pipelining

An Overview of Pipelining, Pipelined Datapath, Pipelined Control, Data Hazards and Forwarding, Data Hazards and Stalls, Control Hazards, Exception Handling.

Instruction Level Parallelism and its Exploitation

Instruction Level Parallelism: Concepts and Challenges, Basic Compiler Techniques for Exposing ILP, Reducing Branch Cost with Speculation, Overcoming Data Hazards with Dynamic Scheduling, Exploiting ILP Using Multiple Issue and Scheduling, Advanced Techniques for Instruction Delivery and Speculation.

Caches and Memory Hierarchy Design

Introduction, the Basics of Caches, Measuring and Improving Cache Performance, Basic Cache Optimizations, Virtual Memory, Memory Hierarchies, Scratch pad Memories.

Multiprocessors and Clusters

Introduction, Programming Multiprocessors, Multiprocessors Connected by a Single Bus, Multiprocessors Connected by a Network, Clusters, Network Topologies, Chip Multiprocessors and Multithreading.

Vector Processors

Basic Vector Architecture,Vector Length and Stride, Enhancing Vector Performance, Effectiveness of Compiler Vectorization.

Hardware and Software for VLIW and EPIC

Introduction, Statically Exploiting ILP, detecting and Enhancing Loop Level Parallelism, Scheduling and Structuring Code, Predicated Instructions, Compiler Speculation.

Storage Systems

Advanced Topics in Disk Storage, Real Faults and Failures, I/O Performance, Reliability, Measures and Benchmarks.

Text and Reference Books

1. David A Patterson & John L Hennessy, “Computer Organization & Design: A Harware/Software Interface”, Morgan Kaufmann Publishers.
2. John L Hennessy & David A Patterson, “Computer Architecture: A Quantitative Approach”, Morgan Kaufmann Publishers.

CSD-412 ADVANCED OPERATING SYSTEM

Overview of Advanced Operating Systems

Introduction, Functions of OS, Design approaches, Types of advance OS.

Architecture of Distributed OS

Introduction, Motivations, System Architecture Types, Distributed OS, Issues in distributed OS, Communication Networks and Primitives.

Interprpocess Communication

APIs for Internet Protocols, External Data Representations, Client-Server Communication, Group Communication, Distributed Objects

Distributed File Systems

Introduction, Architecture, Design Issues, Case Studies: Sun Network File System, Andrew File System.

Time and Global State

Physical and Logical Time, Internal and External Synchronization protocols like Cristian's Algorithm, Berkeley Algorithm, Network Time Protocol, Lamport's Logical Clocks, Vector Clocks, Casual Ordering of Message, Global State, Cuts of a Distributed Computation, Termination Detection.

Distributed Mutual Exclusion and Election

Simple and Multicast based Mutual Exclusion Algorithms: Centralized, Ring based, Ricart Agrawala's Algorithm, Maekawa's Algorithm, Election Algorithms: Ring based, Bully's Algorithm, Multicast Communication.

Text Book

1. G. Coulouris, J. Dollimore, and T. Kindberg, "Distributed Systems: Concepts and Design", Pearson Education.
2. M. Signal & N. Shivaratri, Advanced Concepts in Operating Systems: Distributed, Database and Multiprocessor Operating Systems, McGraw Hill International Edition.

Reference Book

3. R.K. Sinha, "Distributed Operating Systems", Prentice Hall

CSD-421 DATA WAREHOUSING AND DATA MINING

Introduction

Data warehousing Definition, usage and trends. DBMS vs data warehouse, Data marts, Metadata, Multidimensional data mode, Data cubes, Schemas for Multidimensional Database: stars, snowflakes and fact constellations.

Architecture

Data warehouse process & architecture, OLTP vs OLAP, ROLAP vs MOLAP, types of OLAP, servers, 3-Tier data warehouse architecture, distributed and virtual data warehouses, data warehouse manager.

Implementation

Data warehouse implementation, computation of data cubes, modeling OLAP data, OLAP queries manager, data warehouse back end tools, complex aggregation at multiple granularities, tuning and testing of data warehouse.

Data mining & tools

Data mining definition & task, KDD versus data mining, data mining techniques, tools and applications. Data mining query languages, data specification, specifying knowledge, hierarchy specification, pattern presentation & visualization specification, data mining languages and standardization of data mining. KDD Dataset.

Data mining techniques

Association rules, Clustering techniques, Decision tree knowledge discovery through Neural Networks & Genetic Algorithm, Rough Sets, Support Victor Machines and Fuzzy techniques.

Mining complex data objects

Spatial databases, Multimedia databases, Time series and Sequence data; mining Text Databases and mining Word Wide Web.

Text and Reference Books

1. Sam Anahory & Dennis Murray,"Data Warehousing in the Real World", Pearson.
2. Jiawei Han & Micheline Kamber, "Data Mining-Concepts & Techniques", Morgan Kaufmann.
3. Arun Pujari, "Data Mining Techniques".
4. Pieter Adriaans & Dolf Zantinge, "DataMining", Pearson
5. Alex Berson, "Data Warehousing, Data Mining and OLTP", McGraw Hill.
6. Mallach, "Data warehousing System", McGraw Hill.
7. W. H. Inman, "Building the Data Warehouse", John Wiley & Sons.
8. W. H Ionhman C. Klelly, "Developing the Data Warehouses", John Wiley & Sons.
9. W. H. Inman, C.L. Gassey, "Managing the Data Warehouses", John Wiley & Sons.

CSD- 422 MOBILE COMPUTING

Introduction

Challenges in mobile computing, coping with uncertainties, resource poorness, bandwidth, etc. Cellular architecture, co-channel interference, frequency reuse, capacity increase by cell splitting.

Medium Access Control

Motivation for a specialized MAC: Hidden and Exposed terminals. Near and Far terminals; SDMA, FDMA, TDMA: Fixed TDM, Classical Aloha, Slotted Aloha, Carrier sense multiple access, Demand assigned multiple access, PRMA packet reservation multiple access, Reservation TDMA, Multiple access with collision avoidance, Polling, Inhibit sense multiple access; CDMA: Spread Aloha multiple access.

Telecommunication Systems

GSM: Mobile services, System architecture, Radio interface, Protocols, Localization And Calling, Handover, Security, New data services; DECT: System architecture, Protocol architecture; TETRA, UMTS and IMT-2000: UMTS Basic architecture, UTRA FDD mode, UTRA TDD mode.

Wireless LAN

Infrared vs. Radio transmission, Infrastructure and Ad hoc Networks, IEEE 802.11: System architecture, Protocol architecture, Physical layer, Medium access control layer, MAC management, Future development.

HIPERLAN

Protocol architecture, Physical layer, Channel access control. Sublayer, Medium access control Sublayer, Information bases And Networking.

Bluetooth

User scenarios, Physical layer, MAC layer, Networking. Security, Link management.

Mobile Network Layer

Mobile IP: Goals, assumptions and requirements, Entities and Terminology, IP packet delivery, Agent advertisement and discovery, Registration, Tunneling and Encapsulation, Optimizations, Reverse tunneling, Ipv6; Dynamic host configuration protocol, Ad hoc networks: Routing.

Mobile Transport Layer

Traditional TCP: Congestion control, Slow start, Fast retransmit/fast recovery, Implications on mobility; Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission/timeout freezing, Selective retransmission, Transaction oriented TCP.

Data Dissemination and Management

Challenges, Data dissemination, Mobile data replication, Mobile data caching, Mobile cache maintenance, mobile web caching, caching in ad hoc networks.

Context Aware Computing

Ubiquitous computing, concept of context, context aware computing and applications, middleware support.

Mobile Middleware

Service discovery, adaptation, mobile agents.

Wireless security

Traditional security issues, mobile and wireless security issues, Problems in ad hoc networks.

Text and Reference Books

1. Frank Adelstein, S.K.S. Gupta, Golden G. Richard III and Loren Schwiebert, "Fundamentals of Mobile and Pervasive Computing", McGraw-Hill Professional.
2. Charles Perkins, "Ad hoc Networks", Addison Wesley.
3. David Taniar, "Mobile Computing: Concepts, Methodologies, Tools, and Applications".
4. Asoke. K Talukder, Roopa R. Yavagal, Asoke K. Talukder, "Mobile Computing".
5. J. Schiller, "Mobile Communications", Addison Wesley.

CSD-423 SOFTWARE PROJECT PLANNING

Project Evaluation and Planning

Activities in Software Project Management, Overview of Project Planning, Stepwise planning, contract management, Software processes and process models. Cost Benefit Analysis, Cash Flow Forecasting, Cost-Benefit Evaluation Techniques, Risk Evaluation. Project costing, COCOMO 2, Staffing pattern, Effect of schedule compression, Putnam's equation, Capers Jones estimating rules of thumb, Project Sequencing and Scheduling Activities, Scheduling resources, Critical path analysis, Network Planning, Risk Management, Nature and Types of Risks, Managing Risks, Hazard Identification, Hazard Analysis, Risk Planning and Control, PERT and Monte Carlo Simulation techniques.

Monitoring and Control

Collecting Data, Visualizing Progress, Cost Monitoring, review techniques, project termination review, Earned Value analysis, Change Control, Software Configuration Management (SCM), Managing Contracts, Types of Contracts, Stages In Contract Placement, Typical Terms of A Contract, Contract Management and Acceptance.

Quality Management and People Management

Introduction, Understanding Behavior, Organizational Behaviour, Selecting The Right Person For The Job, Motivation, The Oldman – Hackman Job Characteristics Model,Working in Groups, Organization and team structures, Decision Making, Leadership, Organizational Structures, Stress, Health And Safety. ISO and CMMI models, Testing, and Software reliability,test automation, Overview of project management tools.

Text Book

1. Bob Hughes, Mike Cotterell, "Software Project Management", Fifth Edition, Tata McGraw Hill, 2011.

References:

1. Royce, "Software Project Management", Pearson Education, 1999.

2. Robert K. Wysocki, Effective Software Project Management, Wiley, 2009.

CSE-413(a) WEB TECHNOLOGIES

Introduction

History of the Internet and World Wide Web, HTML 5 protocols, HTTP, SMTP, POP3, MIME, IMAP. Introduction to JAVA Scripts, Object Based Scripting for the web. Control Structures, Functions, Arrays, Objects.

Event Handling and CSS

Event Model – On check – On load –Onerror – Mouse related events – Form processing – Event Bubblers. CSS-Inline styles – Embedded Style Sheet – Linking External Style Sheets – Positioning of Elements-Drop Down Menus – Text shadows – Multiple Background Images

Multimedia

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

XML

Structure in Data – Name spaces – DTD – Vocabularies – DOM methods.

Servlets and JSP

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

Text and Reference Books

1. Deitel&Deitel, Goldberg, "Internet and world wide web – How to Program", Pearson Education Asia.
2. Paul Deitel , Harvey Deitel, Abbey Deitel ,"Internet and world wide web – How to Program", Prentice Hall

CSE-413(b) INFORMATION RETRIEVAL

Introduction

Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses, organization, representation, and access to information, use of codes, formats, and standards, data structures for unstructured data; design and maintenance of such databases, indexing and indexes, retrieval and classification schemes

Information Retrieval System Capabilities

Search, Browse, Miscellaneous, Cataloging and Indexing: Objectives, Indexing Process, Automatic Indexing, Information Extraction. Data Structures: Introduction, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Signature file structure, Hypertext data structure.

Automatic Indexing

Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing, Hypertext linkages, Document and Term Clustering: Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters

User Search Techniques

Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, Weighted searches of Boolean systems, Searching the Internet and hypertext, analysis, crowd sourcing search, construction and evaluation of search and navigation techniques; and search engines

Information Visualization

Introduction, Cognition and perception, Information visualization technologies.

Text Search Algorithms

Introduction, Software text search algorithms, Hardware text search systems.

Information System Evaluation

Introduction, Measures used in system evaluation, Measurement example – TREC results, Evaluation of Asian language text retrieval, question answering and text summarization, cross-language information retrieval

Query Expansion

Thesauri, Semantic Networks, Integrating Structured Data and Text

Text and Reference Books

1. Kowalski, Gerald, Mark T Maybury: Information Retrieval Systems: Theory and Implementation, Kluwer Academic Press,
2. Ian Witten, Marco Gori, Teresa Numerico, "Web Dragons: Inside the Myths of Search Engine Technology", Morgan Kauffman.
3. Christopher D. Manning, PrabhakarRaghavan and Hinrich Schütze, Introduction to Information Retrieval by Cambridge University Press.
4. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall,
5. Robert Korfhage, "Information Storage & Retieval", John Wiley & Sons.

CSE-413(c) CAD OF DIGITAL SYSTEMS

Introduction

Microelectronics, Semiconductor Technologies and Circuit Taxonomy, Microelectronic Design of Microelectronic Circuits, Computer Aided Synthesis and Optimization.

Background

Notation, Graphs, Combinatorial Optimization, Graph Optimization Problems and Algorithms, Boolean Algebra and Applications.

Hardware Modelling

Hardware Modeling Languages, Abstract Models, Compilation and Behavioral Optimization.

Architectural Synthesis

Circuit Specifications for Architectural Synthesis, Fundamental Architectural Synthesis Problems, Area and Performance Estimation, Strategies for Architectural Optimization, Data-Path Synthesis, Control Unit Synthesis, Synthesis of Pipelined Circuits.

Scheduling Algorithms

Model for Scheduling Problems, Scheduling without Resource Constraints, Scheduling with Resource Constraints, Scheduling Algorithms for Extended Sequencing Models, Scheduling Pipelined Circuits.

Resource Sharing and Binding

Algorithm, Implementation and Timing, Combination of Division and Square Root, Integer Square Root, Result Digit Selection, Reciprocal, Division, Reciprocal Square Root and Square Root by Iterative Approximation, Reciprocal, Division, Square Root.

Floating Point Representation, Algorithms and Implementations

Floating Point Representation, Roundoff Modes and Error Analysis, IEEE Standard 754, Floating Point Addition, Floating Point Multiplication, Floating Point Division and Square Root.

Function Evaluation

Argument Range Reduction, Correct Rounding and Monotonicity, Polynomial Approximations and Interpolations, Bipartite and Multipartite Table Method, Rational Approximation, Liner Convergence Method.

CORDIC Algorithm and Implementations

Rotation and Vectoring Modes, Convergence, Precision and Range, Compensation of Scaling Factor, Implementations, Extension to Hyperbolic and Linear Coordinates Redundant Addition and High Radix, Application Specific Variations.

Text and Reference Books

1. Giovanni De Micheli, “Synthesis and Optimization of Digital Circuits”, McGraw Hill Publishing Company.

CSE-413(d) ARTIFICIAL INTELLIGENCE

Introduction

Introduction to AI, AI techniques, level of model, criteria for success, Turing test

Problems, Problem Spaces &Search

Defining problem as a space, search, production system, problem characteristics, production system characteristics, issues in the design of search programs.

Intelligent agents

Reactive, deliberative, goal-driven, utility-driven, and learning agents Artificial Intelligence programming techniques

Problem-solving through Search

Forward and backward, state-space, blind, heuristic, problem-reduction, A, A*, AO*, minimax, alpha-beta cut off, constraint propagation, neural, stochastic, and evolutionary search algorithms, genetic algorithm, PSO.

Knowledge Representation and Reasoning

Ontologies, foundations of knowledge representation and reasoning, representing and reasoning about objects, relations, events, actions, time, and space; frame representation, semantic network, predicate logic, resolution, natural deduction, situation calculus, description logics, reasoning with defaults, reasoning about knowledge.

Representing and Reasoning with Uncertain Knowledge

Probability, connection to logic, independence, Bayes rule, bayesian networks, probabilistic inference

Machine Learning and Knowledge Acquisition

Learning from memorization, examples, explanation and exploration.Learning nearest neighbor, naive Bayes, and decision tree classifiers.

Text and Reference Books

1. Saroj Kaushik, "Artificial Intelligence", Cengage Learning India Pvt Ltd
2. N.J. Nilsson, "Principles of Artificial Intelligence", Narosa Publishing House.
3. E. Rich and Knight, "Artificial Intelligence", McGraw Hill International.
4. Stuart Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", Pearson Education / Prentice Hall of India.
5. Saroj Kaushik, "Logic and Prolog Programming", New Age International Pvt Ltd

CSE-414(a) MANAGEMENT INFORMATION SYSTEM

Information systems in the enterprise

Why information systems, perspectives on information systems, contemporary approaches to information systems, different types of systems in organizations

Systems from a functional perspective

The Digital Firm, Electronic Business and Electronic Commerce, Internet technology and the digital firm.

The wireless revolution

Business value of wireless networking, wireless transmission media and devices, cellular network standards and generations, wireless computer networks and internet access, M-commerce and Mobile computing, wireless technology in the enterprise.

Security and control

System vulnerability and abuse, business value of security and control, establishing a management framework for security and control, technologies and tools for security and control.

Enterprise applications and business process systems

What are enterprise systems, How an enterprise systems work, supply chain management systems, customer relationship management systems, enterprise integration trends.

Redesigning the organizations with information systems

Systems as planned organizational change, business process reengineering and process improvement, overview of system development, alternative systems building approaches traditional systems life cycle, prototyping, end-user development, application software package and outsourcing.

Managing change and international information systems

The importance of change management in information systems success and failure, managing implementation, the growth of international systems, organizing international information systems, managing global systems, technology issues and opportunities for global value chain.

Text and Reference Books

1. C. Laudon, Jane P. Laudon& VM Prasad Kenneth, "Management Information Systems", Pearson Education.
2. Effy Oz, Thomson ,"Management Information Systems".
3. M Henry C.Lucas, Jr., "Information Technology-Strategic Decision Making for Managers", John Wiley & Sons, Inc.
4. James A. Brien, "Introduction to Information Systems", TMH.
5. Jessup &Velacich, "Information Systems Today" , PHI.
6. Sadagopan, "Management Information Systems", PHI.

CSE-414(b) ADVANCED MICROPROCESSORS

The Intel x86 Family

Introduction, The Register Set, Data Formats, Addressing Modes, Instruction Set and Assembly Directives, Interrupt, Segmentation, Paging, Real and Virtual Mode Execution, Protection Mechanism, Task management, Example of Intel x86 Family.

The Motorola M68000 Family

Introduction, CPU Registers, Data Formats, Addressing Modes, Instruction Set and Assembly Directives, Memory Management, Instruction and Data caches, Exception Processing, Examples of Motorola M68000 Family.

The DEC Alpha AXP

Introduction, The Alpha AXP Architecture, Alpha AXP implementations.

The Power PC Family

Introduction, The Power PC Family Architecture, The Power PC Family 601, The IBM RS/600.

The Sun SPARC Family

Introduction, SPARC Architecture, TheSuperSPARC, Earlier SPARC Implementations.

The MIPS Rx000 Family

Introduction, MIPS Architecture, The MIPS R4000 and R4400, Earlier MIPS Implementations.

Text and Reference Books

1. Daniel Tabak, “Advanced Microprocessors”, McGraw Hill.
2. Barry.B.Brey, “The Intel Microprocessors”, Pearson Education.

CSE-414(c) PARALLEL ALGORITHMS

Review of sequential algorithms, Introduction to parallel algorithms and architectures: EREW, CREW, CRCW PRAMs and interconnection network models such as the mesh. Knowledge of how to efficiently sum, broadcast and search on these architectures. Parallel efficiency measures for parallel algorithms, e.g., time, speedup, cost (work), processor efficiency. Data Dependence Graph, Data Parallelism, Functional Parallelism, Pipelining and Data Clustering.

Parallelization of Algorithm

Parallel Programming Models, PVM, MPI Paradigms, Parallel Programming Language, Brent's Theorem, Simple parallel programs in MPI environments Parallel linear algebra routines, Loop optimizations, Implementation. Principal of Locality, Caches and Buffers. Massively Data Parallel Algorithms, Array notation, Fortran90 and HPC Fortran, Parallel and Vector C Code, Layout, Align, Replicate, Masking, Shifting, Spreading, Broadcasting, Forall Loops.

Basic Parallel Algorithmic Techniques

Pointer Jumping, Divide-and-Conquer, Partitioning, pipelining, Accelerated Cascading, Symmetry Breaking, Synchronization (Locked, Lock-free) Parallel Algorithms Data organization for shared/distributed memory , Min/Max,Sum Searching, Merging, Sorting, Parallel Sorting and Sorting Networks: Parallel Insertion Sort, Even-odd Merge Sort, Bitonic Merge Sort etc. Prefix operations , N-body problems, , Parallel algorithms on network, Addition of Matrices, Multiplication of Matrices.

Writing Parallel Programs GPU

Compute Architecture: Introduction to Graphics Processing Units (GPUs), CUDA programming model, Key principles, Threads and blocks, Language extensions, Attributes, Builtin types and variables, Kernel invocation operator, CUDA runtime API, Asynchronous execution, Handling runtime errors in CUDA, Querying GPU capabilities, CUDA, Memory organization in CUDA, Multi-Core CPU programming, Implementing basic data processing; Parallel reduction, Prefix sum (scan), CUDA implementation, CUDPP implementation, CUDA Streams, Concurrent kernels execution, Example: matrix multiplication, Example: Multi-GPU Async Copy ; Debugging: Principles and terminology, gdb, cuda-gdb, Nsight, CUDA (Visual) Profiler, cuda-memcheck ; Optimization Techniques: Understanding thread and blocks execution, Coalescing memory access, Shared memory bank conflicts, Optimizing CPU-GPU usage; OpenCL,, OpenCL host API, Developing and deploying OpenCL kernels, Comparison with CUDA, CUDA Libraries, CUBLAS, CUSPARSE, CUFFT, CURAND

Text and Reference Books

1. An Introduction to Parallel Algorithms by Joseph Jaja (Addison-Wesley Professional)
2. CUDA by Example: An Introduction to General-Purpose GPU Programming by Jason Sanders, Edward Kandrot
3. Programming Massively Parallel Processors: A Hands-on Approach by By David Kirk and Wen-meiHwu
4. Parallel Programaming in C with MPI and openMP by Michael J Quinn (McGraw Hill)
5. Crichlow, Introduction to Distributed and Parallel Computing, PHI.
6. S.G.Akl, The Design and Analysis of Parallel Algorithms, PHI.

CSE-414(d) SOFT COMPUTING

Neural Networks

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

Fuzzy Logic:

Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation. Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations. Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations. Fuzzy Logic: Classical Logic, Multivalued Logics, Fuzzy Propositions, Fuzzy Qualifiers, Linguistic Hedges.

Uncertainty based Information:

Information & Uncertainty, Nonspecificity of Fuzzy & Crisp Sets, Fuzziness of Fuzzy Sets.

Introduction of Neuro-Fuzzy Systems:

Architecture of Neuro Fuzzy Networks.

Application of Fuzzy Logic:

Medicine, Economics etc.

Genetic Algorithm:

An Overview, GA in problem solving, Implementation of GA.

Swarm Intelligence:

Ant Colony system, PSO system.

Text Books

1. Anderson J.A., “An Introduction to Neural Networks”, PHI,
2. Hertz J. Krogh, R.G. Palmer, “Introduction to the Theory of Neural Computation”, Addison-Wesley,
3. G.J. Klir& B. Yuan, “Fuzzy Sets & Fuzzy Logic”, PHI,
4. Melanie Mitchell , “An Introduction to Genetic Algorithm”, PHI,

Reference Book

1. Freeman J.A. & D.M. Skapura, “Neural Networks: Algorithms, Applications and Programming Techniques”, Addison Wesley

CSE-424(a) DISTRIBUTED SYSTEMS

Foundations

Characterization of DS, Examples of distributed systems, Resource sharing and the World Wide Web, Challenges.

System Models

Architectural models, Fundamental models.

Interprocess Communication

The API for the Internet protocols, characteristics of interprocess communication, Sockets, UDP datagram communication, TCP stream communication, External data representation and marshalling, Client-server communication, Group communication, IP multicast.

Distributed Objects and remote Invocation

Indirect Communication, Operating System Support, Distributed File Systems, Name Services.

Time and Global States

Clocks, events and process states, physical time and clocks, logical time and clocks, global states, distributed debugging.

Coordination and Agreement

Distributed mutual exclusion, elections, multicast communication, coordination agreement, consensus and related problems.

Text and Reference Books

1. G. Coulouris, J. Dollimore, and T. Kindberg, "Distributed Systems: Concepts and Design", Pearson Education.

2.Taunenbaum, "Distributed Systems: Principles and Paradigms", PHI.

3. M. Singhal & N. Shivaratri, "Advanced Concepts in Operating Systems", TMH.

CSE-424(b) AGENT BASED SYSTEMS

Introduction

Definitions of agency; properties of agents; agents and objects; comparison between agents and other softwares, agents and expert systems; agents and distributed systems; typical application areas for agent systems.

Agent Architectures

Reactive/deliberative/hybrid agents; BDI and practical reasoning agents; deductive reasoning agents, Rational Reasoning: decision-theoretic/game-theoretic foundations; bounded rationality; means-ends reasoning. the design of intelligent agents - reasoning agents (eg. AgentO), agents as reactive systems (eg. subsumption architecture); hybrid agents (eg. PRS); layered agents (eg. Interrap) a contemporary (Java-based) framework for programming agents (eg. the Jack language, the JAM! system).

Multi-Agent Systems

Designing multi agent society, Classifying multi-agent interactions - cooperative versus non-cooperative; zero-sum and other interactions; cooperation,- the Prisoner's dilema and Axelrod's experiments;

Interactions between self-interested agents

Auctions & voting systems: negotiation; Interactions between benevolent agents: cooperative distributed problem solving (CDPS), partial global planning; coherence and coordination; Interaction languages and protocols: speech acts, KQML/KIF, the FIPA framework.

Agent coordination

Distributed problem solving, planning and task sharing; teamwork and coalition formation; negotiation (game-theoretic/heuristic/argumentation-based); matchmaking and brokering. distributed search/distributed constraint satisfaction; multiagent learning; agent-oriented software engineering; trust/norms/institutions, organisational approaches.

Text and Reference Books

1. Michael J. Wooldridge. An Introduction to Multiagent Systems, John Wiley and Sons,
2. G. Weiss (ed.). Multiagent Systems: A Modern Approach to Distributed Artificial Intelligence, MIT Press,
3. Singh, M. and Huhns, M., “Readings in Agents”, Morgan Kaufmann,
4. Ferber, J., “Multi-Agent Systems”, Addison Wesley

CSE-424(c) RECONFIGURABLE COMPUTING

Hardware

General-Purpose FPGA Architecture, Reconfigurable Computing Devices, Reconfigurable Computing Systems, Reconfiguration Management.

Software

Computer Models and System Architectures, Hardware Description Languages (SystemC), Compilation for Reconfigurable Computing Machines, Streaming Models, SIMD/Vector, OS/Runtime Systems, Technology Mapping, Placement, General-purpose/FPGA, Datapath, Constructive, Routing, Retimin, Bitstream Generation, Fast Mapping.

Application Development

Evaluating and Optimizing problems for FPGA implementations, Instance-specific design, Constant Propagation & Partial Evaluation, Precision Analysis & Floating Point, Distributed Arithmetic, CORDIC, Task allocation: FPGA vs. CPU partitioning.

Case Studies

Image Processing, Variable Precision, Algorithm Alteration: SPIHT Compression, Run-time reconfiguration: Automatic Target Recognition, Problem-specific circuitry: SAT Solving, Multi-FPGA Systems: Logic Emulation, Floating Point, FDTD, Genetic Evolution, Packet Filtering (Networking application), Active Pages (Memory centric).

Theoretical Underpinnings and Future Directions

Theoretical Underpinnings, Metrics and Analysis, Defect and Fault Tolerance, Reconfigurable Computing and Nanotechnology.

Text and Reference Books

1. Scott Hauck and Andre DeHon, “Reconfigurable Computing: The Theory & Practice of FPGA Based Computation”, Morgan Kaufmann Publishers.

CSE-424(d) MOBILE DATABASES

Mobile Database:

Introduction, Fully Connected Information Space, Types of Mobility.

Fundamentals of Database Technology:

Conventional Database Architecture, Database Processing, Serialization of Transaction, Advanced Transaction Model.

Concurrency Control Mechanism:

Introduction, ways of locking data items. The Phantom Problem, Multigranularity locking, Heuristics approach in locking scheme, Non locking based schemes.

Data Processing and Mobility:

Introduction, Effect of mobility on the management of data, Data Categorization, Location dependent data distribution.

Transaction management in Mobile Database systems:

Mobile Database systems, Transaction execution in MDS, Mobile Transaction Model, Execution model on ACID transaction framework, pre-write transaction execution model, data consistency in intermittent connectivity.

Mobile database Recovery:

Introduction, Log Management in Mobile Database systems, Mobile database recovery scheme.

Books and References

1. Kumar Vijay, " Mobile Database Systems". John Willy & Sons.
2. Research Publication
3. Technical Documants.

CSE-425(a) ADVANCE COMPUTER NETWORKS

Introduction:

Overview of computer networks, seven-layer architecture, TCP/IP suite of protocols, etc. MAC protocols for high-speed LANS, MANs, and wireless LANs. (For example, FDDI, DQDB, HIPPI, Gigabit Ethernet, Wireless ethernet, etc.)Fast access technologies. (For example, ADSL, Cable Modem, etc.)

IPv6:

Why IPv6, basic protcol, extensions and options, support for QoS, security, etc., neighbour discovery, auto-configuration, routing. Changes to other protocols.Application Programming Interface for IPv6. 6bone.

Mobility in networks:

Mobile IP. Security related issues. IP Multicasting.Multicast routing protocols, adderss assignments, session discovery, etc.TCP extensions for high-speed networks, transaction-oriented applications.Other new options in TCP.

Network security at various layers:

Secure-HTTP, SSL, ESP, Authentication header, Keydistributionprotocols.Digital signatures, digital certificates.

Books and References

1. W. R. Stevens. TCP/IP Illustrated, Volume 1: The protocols, Addison Wesley, 1994.
2. G. R. Wright. TCP/IP Illustrated, Volume 2: The Implementation, Addison Wesley,1995.
3. W. R. Stevens. TCP/IP Illustrated, Volume 3: TCP for Transactions, HTTP, NNTP, andthe Unix Domain Protocols, Addison Wesley, 1996.
4. R. Handel, M. N. Huber, and S. Schroeder. ATM Networks: Concepts, Protocols,Applications, Addison Wesley, 1998.
5. W. Stallings. Cryptography and Network Security: Principles and Practice, 2nd Edition,Prentice Hall, 1998.
6. C. E. Perkins, B. Woolf, and S. R. Alpert. Mobile IP: Design Principles and Practices,Addison Wesley, 1997.

CSE-425(b) EMBEDDED SYSTEMS

Introduction to Embedded Systems

Architecture of Embedded Systems

Hardware Architecture, Software Architecture, Communication Software, Development/Testing Tools

Programming for Embedded Systems

The Process of Embedded System Development

Design Trade-offs, Hardware Software co-design, Implementation, Integration and Testing Hardware Platforms, Communication Interfaces

Embedded/Real-time Operating Systems Concepts

Representative Embedded Systems, Programming in RT-Linux Embedded Database Application Mobile Java Applications Embedded Software Development on 8051 Micro-controller Platform

DSP-based Embedded Systems

Implementation of Embedded Systems with VHDL, FPGA and CPLD Embedded Systems Applications using Strong ARM Platform

Text Books

1. Embedded/Real-time Systems: Concepts, Design and Programming – Dr.K.V.K.K.Prasad, Dreamtech press.
2. Proramming for Embedded Systems – Dreamtech Software team, Willey - dreamtech

CSE-425(c) PROGRAMMING LANGUAGE SECURITY

Introduction

Security Concepts, language-based techniques to provide security for executing code, the advantages of language based security, security principles and properties, memory and type safety, encapsulation and access control, certifying compilers and their verification methods, security types and information flow, and applying programming language-inspired techniques to enforce security in the semantic-web based languages. Secure Coding Standard for C., C++ and Java.

Strings

String Characteristics, Common String Manipulation Errors, String Vulnerabilities, Process Memory Organization, Stack Smashing, Code Injection, Arc Injection, Mitigation Strategies, Notable Vulnerabilities.

Pointer Subterfuge

Data Locations, Function Pointers, Data Pointers, Modifying the Instruction Pointer, Global Offset Table, The .dtors Section, Virtual Pointers, The at_exit() and on_exit() Functions, The longjmp() Function, Exception Handling, Mitigation Strategies

Dynamic Memory Management

Dynamic Memory Management, Common Dynamic Memory Management Errors, Doug Lea's Memory Allocator, RtlHeap, Mitigation Strategies, Notable Vulnerabilities.

Integer Security

Integers, Integer Conversions, Integer Error Conditions, Integer Operations, Vulnerabilities, Nonexceptional Integer Logic Errors, Mitigation Strategies, Notable Vulnerabilities.

Formatted Output

Variadic Functions, Formatted Output Functions, Exploiting Formatted Output Functions, Stack Randomization, Mitigation Strategies, Notable Vulnerabilities.

File management

Concurrency, Time of Check, Time of Use, Files as Locks and File Locking, File System Exploits, Mitigation Strategies.

Security standards for Java

Security, Declarations and Initialization, Expressions, Scope, Integers, Floating Point, Object Orientation, Input Output, Concurrency, Methods, Exceptional Behavior, Miscellaneous, The Void, Java References

Recommended Practices

Secure Software Development Principles, Systems Quality Requirements Engineering, Threat Modeling, Use/Misuse Cases, Architecture and Design, Off-the-Shelf Software, Compiler Checks, Input Validation, Data Sanitization, Static Analysis, Quality Assurance, Memory Permissions, Defense in Depth, TSP-Secure, Verification , password.

Text and Reference Books

1. Robert C. Seacord, Secure Coding in C and C++.Addison-Wesley.
2. The CERT C Secure Coding Standard.
3. John Viega and Gary McGraw. Building Secure Software: How to Avoid Security Problems the Right Way. Addison-Wesley.
4. David A. Wheeler. Secure Programming for Linux and Unix HOWTO.
5. Gary McGraw. Software Security: Building Security In. Addison-Wesley.
6. Keith Brown, The .NET Developer's Guide to Windows Security (Microsoft .NET Development Series)
7. Mark G. Graff and Kenneth R. van Wyk, Secure Coding Principles and Practices, O'Reilly.
8. Blakley, Bob et al. *Security Design Patterns*. The Open Group.
9. McConnell, Steve. *Code Complete*, Microsoft Press.

CSE-425(d) WIRELESS SENSOR NETWORKS

Sensor networks overview:

Introduction, applications, design issues, requirements.Sensor node architecture.

Network architecture:

Optimization goals, evaluation metrics, network design principles. Sensor network operating systems and brief introduction to sensor network programming.

Network protocols:

MAC protocols and energy efficiency.

Routing protocols:

Data centric, hierarchical, location-based, energy efficient routing etc. Sensor deployment, scheduling and coverage issues, self configuration and topology control.Querying, data collection and processing, collaborative information processing and group connectivity.Target tracking, localization and identity management.Power management.Security and privacy.

Books and References:

1. Feng Zhao, Leonidas Guibas "Wireless Sensor Networks-An Information Processing Approach". Morgan Kauffman.
2. Research Publications
3. Technical documents

CSO-316 DATA STRUCTURE

Introduction

Data types, data structures, abstract data types, the running time of a program, the running time and storage cost of algorithms, complexity, asymptotic complexity, big O notation, obtaining the complexity of an algorithm.

Linked Lists

Singly linked lists, Linked stacks and queues, operations on Polynomials, Doubly Linked Lists, Circularly Linked Lists, Operations on linked lists- Insertion, deletion and traversal, dynamic storage management – Garbage collection and compaction.

Trees

Basic terminology, General Trees, Binary Trees, Tree Traversing: inorder, preorder and postorder traversal, building a binary search tree, Operations on Binary Trees - Expression Manipulations - Symbol Table construction, Height Balanced Trees(AVL), B-trees, B+ -trees.

Graphs

Basic definitions, representations of directed and undirected graphs, the single-source shortest path problem, the all-pair shortest path problem, traversals of directed and undirected graphs, directed acyclic graphs, strong components, minimum cost spanning tress, articulation points and biconnected components, graph matching.

Sorting and Searching Techniques

Bubble sorting, Insertion sort, Selection sort, Shell sort, Merge sort, Heap and Heap sort, Quick sort, Radix sort and Bucket sort, Address calculation, Sequential searching, Binary Searching, Index searching, Hash table methods.

Text and Reference Books

6. J.P. Tremblay and P.G. Sorenson, “An Introduction to Data Structures with applications”, Tata McGraw Hill.
7. S.Sahni, “Data structures, Algorithms ad Applications in C++”, WCB/McGraw Hill.
8. Aho ,Ullman and Hopcroft, “ Data Structures and Algorithms”.
9. Y. Langsam, M. J. Augenstein and A. M. Tenenbaum, “Data Structures using C”, Pearson Education
10. Richard F. Gilberg, Behrouz A. Forouzan, “Data Structures – A Pseudocode Approach with C”, Thomson Brooks / COLE

CSO-324 COMPUTER GRAPHICS

Introduction to Computer Graphics

Overview of Graphics Systems, Display Devices, Hard copy Devices. Interactive Input Devices, Display Processors, The Graphical Kernel System, Output Primitives, Line drawing algorithms, Circle Generation algorithms, Character Generation.

Raster Scan Graphics

Line Drawing Algorithms, Circle Generation, General Function Rasterization, Scan Conversion- Generation of the display, Image Compression, Polygon Filling, Fundamentals of Antialiasing.

Two-Dimensional Geometric Transformation & Viewing

Basic Transformation, Translation, Rotation, Scaling, Other Transformation Reflection, Shear, Transformation functions, Window to viewport co-ordinate transformation, Clipping Operations, Point Clipping, Line Clipping, Polygon Clipping.

Three- Dimensional Concepts & Object Representations

Three Dimensional Display Methods, Parallel Projection, Perspective Projection, Translation, Rotation, Scaling, Composite Transformation, Three dimensional Transformation function, Polygon Surfaces, Curved Lines and surfaces, Bezier Curves and surfaces, B-Spline Curves and surfaces.

Graphics hardware

Display technology, random scan, raster scan display processing, input devices for interaction.

Visible Lines and Visible Surfaces

Visual Realism, Hidden line and hidden surface removal: depth buffer algorithm, geometric computations, scan line coherence algorithms, area coherence algorithms, priority algorithm, shading and color models, Modeling methods.

Rendering

A simple illumination model, Transparency, Refraction effects in transparent materials, Simple Transparency Models, Z-Buffer Transparency, Shadows, Texture.

Text and Reference Books

1. D.F. Rogers, “Procedural Elements for Computer Graphics”, McGraw Hill.
2. Hearn and Baker, “Computer Graphics”, PHI.
3. S. Harrington, “Computer Graphics - A programming approach”, McGraw Hill.
4. D.F. Rogers, “Mathematical Elements for Computer Graphics”, McGraw Hill.