8th semester

HUMAN COMPUTER INTERACTION USER INTERFACE DESIGN

Section A

Developments in technology: Workstation Environment e.g. Screens, keyboards, pointing devices. Other I/O devices (e.g. speech), related processing and storage requirements.

Developments in HCI: Virtual machines, command line input (command sets), menu selection and the methods of selection, graphical interfaces, speech, screen design for intensive data entry, intelligent HCIs, virtual personas (engaging with computer within a virtual reality), concept of "look and feel".

Section B

Development in the concept of 'the user': Range of users (e.g. hypertext, event driven systems, use of multimedia). Modeling techniques, implication of new developments on user interfaces, implication of developments on hardware (storage, processing requirements etc.)

Applications: Range of Applications, selection of HCI's for specific applications.

Psychological Considerations: Memory (long and sort-term), reasoning, perception, cognition and use of metaphors and the consequence on the design of HCI.

Section C

Health and Safety Consideration: Ergonomics ad the surrounding environment e.g. lighting, seating, RSI, legal implications.

Information Consideration: Necessity for information- rich environment, examples of systems (e.g. share trading rooms or combat environments).

HCIO Support for less common environments: Identification of applications (e.g. Remote interaction using virtual environments, real time simulations (flight simulators), high – speed interactive interfaces (games), special needs (implications for color blind, partially sighted, blind, Physically incapacitated, slow learners), analysis of implication of an HCI selection.

Modeling the interface: Mapping the system functionality to the conceptual model, grouping of the tasks into logical sets.

Analysis: Task Analysis e.g., storyboarding, user needs analysis, evaluation of HCI complexity.

Design: Rules and heuristics for good HCI design, review of proprietary examples, context sensitive help, online help/ documentation design tools.

Books: -

1. Human Computer Interaction in the New Millennium; John M. Carrol, Editor, Addison Wesley
2. Human Computer Interaction: Issues and Challenges; Qiyang Chen, Montclair State University, USA; Idea Group Publishing

8th semester

SECURITY OF INFORMATION SYSTEMS / INTERNET SECURITY

Section A

Basic Encryption and Decryption: Terminology and Background: Encryption, Decryption and Cryptosystems, Plain Text and Cipher Text, Encryption algorithms, Cryptanalysis.
Introduction to Cliphers: Monoalphabetic substitutions such as the Caesar Cipher, Cryptanalysis of Monoalphabetic ciphers such as Vigenere Tableaux, Cryptanalysis of Polyalphabetic Ciphers, Perfect substitution Cipher such as the Vernam Cipher, Stream and Block Cipher, Characteristics of 'Good' Ciphers: Shannon Characteristics, Confusion and Diffusion, Information Theoretic Tests, Unicity Distance.

Section B

Secure Encryption systems: Hard Problems: Complexity: NP – Complete problems, Characteristics of NP- Complete Problems, The Meaning of NP- Completeness and Cryptography.
Properties of Arithmetic Operations: Inverses, Primes, Greatest Common Divisor, Euclidean algorithm, Modular Arithmetic, Properties of Modular Arithmetic, Computing the inverse, Fermat's Theorem, algorithm for computing inverses, random number generation
Public key(Asymmetric key) Encryption Systems: Concept and Characteristics of Public Key Encryption system, Introduction to Merkle-Hellman Knapsacks, rivest – Shamir-Adlman (RSA) Encryption in detail, introduction to Digital Signature Algorithms, The Digital Signature Standard (DSA).

Section C

Secure Secret Key (Symmetric) Systems: The Data Encryption Standard (DES), Analyzing and Strengthening of DES, Key Escrow and Clipper, Introduction to Advance Encryption Standard (AES)

Section D

Applied Cryptography, protocols and Practice: Key Management Protocols: Solving Key Distribution Problem, Diffie – Hellman Algorithm, Key Exchange with public Key Cryptography.
Public Key Infrastructure (PKI): Concept of digital Certificate, Certificate Authorities and it's roles, X509 Structure of Digital Certificate, Types of public Key Infrastructure. Legal Issues: Copyrights, Patents, Trade Secrets, Computer Crime, Cryptography and the Law, Operating System, Database and program Security.

Section D

Operating System Security: Security policies, Models of Security, Security Features of Ordinary Operating System, Security features of Trusted Operating Systems.
Database Security: Security requirements of Database, reliability and integrity, Protection of Sensitive Data, Inference problems: direct and Indirect Attacks
Program Security: Kinds of Malicious Code, How viruses Attach and Gain Control, Homes for Viruses, Virus signatures, Preventing Virus Infection, Trapdoors, Convert Channels, Control Against program Threats, Java Mobile codes.
Network Security

Books: -

1. " Security in Computing (Second Edition)", Charles P.Pfleeger, 1996, Prentice Hall International, Inc.
2. "Applied Cryptography protocols, Algorithms, and Source Code in C (Second Edition)", Bruce Schneier, 1995, John Willey & Sons. Inc.
3. "Security Technologies for the world wide web", Rolf Oppliger, Artech House, Inc.
4. "Digital Certificates Applied Internet Security", Jallo Feghhi and peter Williams Addison Wesley Longman Inc.

8th semester

DATA WAREHOUSE AND DATA MINING

Section A

Data ware housing 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.
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.

Section B

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 techniques, tools and applications

Section C

Data mining techniques: Association rules, Clustering techniques, Decision tree knowledge discovery through neural Networks & Generic Algorithm, Rough Sets, Support Victor Machines and Fuzzy techniques.

Section D

Mining Complex data objects, Spatial databases, Multimedia databases, Time series and sequence data; mining text Databases and mining World Wide Web.

Books:

1. Data warehousing in Real World; Sam Anahory & Dennis Murray; 1997, Pearson
2. Data Mining – Concepts & Techniques; Jiawei Han & Micheline Kamber – 2001, Morgan kaufmann.

8th semester

8th semester

PROJECT-II / INDUSTRIAL TRAINING

Instructions for paper setter / Candidates

(i) Project evaluation will consist of three parts:

Evaluation or the Project report along with source code in a CD in the required format by an external examiner 40% marks. Continuous Evaluation by the internal examiner 30% marks.

(ii) Viva voce examination (20% marks)

(iii) Software evaluation with test run (10% marks)

Viva-voce examination will be related to the project executed by the candidate during the course of semester.

Aim of the project

Project is one of the culmination points of the learning process, which puts to test the acquired ability of the candidate to independently take charge of the project or system development. The effort should be made to open up a window of opportunity with the industry the project can proceed in three steps using software engineering methodology

1. Preparation of required document
2. Preparation of Design Document
3. Writing of Code and its testing with demonstration cases.
4. An effort should be made by the institute faculty to liaison with the industry and conduct three reviews to meet the dead lines and satisfactory completion of the project.

Following format for documentation for the project be followed:

A. Forwarding Page

1. Title of the Project
2. Objectives.
3. Definitions of Key Term
   - Approach to Problem solving
   - Limitations. If any
4. Output Generated
5. Details of Hardware platform used
6. Details of software Tools used
7. Implementation Issues (Clearly defining the area of Application)
8. Miscellaneous
9. Signature of Candidate & date

8th semester

B. Recommended Chapters/sections (Not Mandatory but only Guidelines)

1. Microscopic Summary
2. Details of candidate and Supervisor along with certificate of
   - -Original work;
   - -Assistance. If any;
   - -Credits;

3. Aims and Objectives
4. Approach to project and Time Frame
5. Project Design Description with Appendices to cover
   - Flow Charts/ Data Flow diagram- Macro/ Micro Level
   - Source Code; If any
   - Hardware platform
   - Software tools;
   - Security Measures
   - Quality Assurance
   - Auditability
6. Test Date and Result

Study of writing and presentation must follow the guidelines for effective3 technical writing. Times for submission.

Project must be submitted by the day of last paper in semester end examination Seminar/ Viva a comprehensive seminar/ viva-voce should be conducted as part of evaluation.

At the time of seminar/ viva-voce the industry guide/ supervisor may be invited.

8th semester

PROJECT SEMINAR

Instructions for paper setter / Candidates

This Seminar / Viva will be conducted on the project done by the candidate.

At the time of seminar / viva-voce the industry guide / supervisor be invited.

8th semester

OPEN ELECTIVE-II

8th semester

PROFESSIONAL ISSUES IN IT

Section A

Legal Issues: Introduction to legal concepts, Basic outline of Criminal and Civil Laws, Concepts relating to laws of Contract and Commercial Law, substantive Legal Issues, intellectual property issues, Cyber crime, Data protection principles and implications of the European Union Data protection Directive, Confidentially and privacy, Intellectual property rights, copyrights and Industrial Property, patents, trade Marks and laws relating to designs. Software protection and privacy, Dealing with copyright, Originality, Exception to Copyright infringement, Employees and freelance programs, devices to overcome protection Software Licensing, Methods of Licensing, Copyright and electronic publishing, copyright problems posed by electronic publishing.

Section B

Multimedia, Licensing and related issues: protection of Databases, Trade Marks and passing off, Internet related issues, Contract issues and Law, Basic understanding of the Types of Agreements in large Computerization projects – Implementation Agreements, License Agreements, Maintenance Agreements etc., Enforcements issues, dispute resolution, arbitration, legislation action.

Section C

Other Professional Issues: Duties of a Professional, Duties to Client, Duties to employer, Duties to profession, Duties to society, Accountability for quality, timeliness and use of resources, human relationships and change management Avoiding computer misuse, Hacking unauthorized access and types of Computer Crime, Introduction of Viruses, Fraud and types of Computer Fraud, Implications arising from the Draft computers crimes Act (Sri lanka).

Section D

Public interest and social implications, Environmental protection, health and safety issues, Privacy, Ethics and Codes of Professional conduct, the need for professional ethics, characteristics of professions, Integrity & Honesty, competence, professional development, judgment, knowledge of law, relationsstandards, independence. Acting with responsibility, professional skill, comply with law, confidently, due care, contribute towards advancements of human welfare.

Books: -

1. Professional Issues in Software Engineering (2nd Edition.) Bott. F et al., 1995, UCL Press.
2. (Eds), The Responsible Software Engineer: Selected Readings in IT Professionalism, Myers C., Hall t. and Pitt D., 1997, springer
3. BCS Code of conduct: http://www.bcs.org/docs/01100/1194/pdg/codeofc.pdf
4. BCS Code of Practice: http://www.bcs.org/docs/01100/1194/Cop.htm

8th semester

VLSI TECHNOLOGY

Section A

Crystal Growth: MGS, EGS, Czochralspi crystal puller, Silicon shaping, Wafer preparation, Epitaxy: Vapour Expitaxial Layer evaluation Molecular Beam Epitaxy. Oxidation: Thermal Oxidation Kinetics, Oxidation techniques, Oxide Properties, Oxidation induced Defects, Lithography: Photolithography, e-beam lithography, X ray Lithography

Section B

Reactive Plasma Etching: Plasma Properties, Feature Size control and antisotropic etching , Plasma etching techniques and equipment , Di-electric and Poly-Silicon Film Deposition Processes for Poly-Si, SiO_2, SiO_3N_4; Plasma assisted Depositions.

Section C

Diffusion: A qualitative view of atomic diffusion in Solids, diffusion mechanisms, fick's one dimensional diffusion equation, constant source and limited source diffusion, diffusion of Grp3 and 5 impurities in silicon impurity sources, diffusion apparatus, Characterization of diffused layers. Ion Implantation Equipment Annealing

Section D

Metallization: Metallization applications, choices, Physical Vapour deposition. Sputtcring,
Metallization Problems. Assembly & Packaging: package types, Design considerations, Package fabrication technologies, future trends. Isolation techniques: Bipolar IC fabrication process sequence. N MOS IC fabrication process Sequence.

Books: -

1. VLSI Technology, S.M. Sze,1998, MGH
2. VLSI Fabrication Principles, S.K. Ghandhi

8th semester

COMPUTER AIDED FINE ARTS

Section A

Painting and Drawing Software applications: Drawing Software: Illustration applications
(vector graphics), painting applications (bitmapped graphics) Drawing devices: Digitizing tablet, pressure sensitive stylus, mouse, touch screen.
Collect and present examples of the use of digital panting and drawing in contemporary sources.
Use drawing and painting software applications creatively to present a range of work.

Section B

Image Manipulation: Software Applications: Any software which will have features like distortion, adjust colour range, contrast, palettes and an range of tools with which to paint and adjust images files.
Digities: Digital photography, scan, digitize.
Object: found objects, natural objects, domestic tools.
Image: Photographs, found images, own visual work, hand written text, word-processed text.Digitize a range of objects and images in an appropriate file format for further development Manipulate and present scanned images in a range of way

Section C

Typographic design: Font design software: any software that will enable experimentation with Bitmapped fonts, postscript fonts, and True type fonts.
Typographic Design Software: any software that will enable students to experiment with fonts and font design using a range of tools. Investigate the potential of digital typography Produce a range of work showing the creative use of typography, Combine typography with
image in innovative ways.
Desk Top publishing and Text Editors: Text Editing Software:
Proprietary word processing applications with automated routines e.g. word count, spell checker, formatting styles, font styles,
header and footers. Design a range of page layouts using traditional methods, Prepare digital layot grid with common page elements, Prepare image, graphic and text files for the use in page
layout, Format document and check for accuracy, and present in an appropriate format for print.

Books: -

1. B. Saraswati, Computerizing Cultures, New Age International Publishers, New Delhi.

8th semester

QUANTUM COMPUTERS

Section A

Theory of Computation: Effective procedures and Computability, Finite State Machines, Turing Machines, Universal Turing Machines and the halting problem, Computability.

Section B

Coding and Information theory: Computing and Communication Theory, Error Detecting and Correcting Codes, Shamon's Theorem, The Geometry of Massage space, Data Compression and Information, Information Theory, Coding Techniques, Analogue Signal Transmission.

Section C

Reversible Computation and Thermodynamics of Computing: The physics of Information reversible computation and thermodynamics of Computing, Computation : Energy Cost versus Speed, The General Reversible Computer, the Billard Ball Computer, Quantum Computation
Quantum Mechanical Computers: Computation with a reversible Machine and A Quantum Mechanical Computer, Imperfections and Irreversible Free Energy, Loss, Simplifying the implementation.

Section D

Bit vs. qubit, shor's quantum algorithm of efficient computation for finding period of a periodic function, quantum mechanical operators and discrete fourier transforms, Digital logic gates vs. quantum logic gates; (C, N, F and CCN gate); One qubit rotation, A_j Transformation, B_{jk} transformation, Link between quantum dynamics of Schrodinger equation and unitary transformations describing qlogic gates. Physical realization of quantum computation.

Books: -

R.P. Feynman, Feynman Lectures on Computation, Pengnin Books (1996).