CS 601 COMPILER CONSTRUCTION

Module 1

Compiler: Introduction – Analysis of the source program – phases of a compiler – Compiler construction tools – Lexical analysis – Role of the lexical analyser – Specification of tokens – Recognition of tokens – Lexical analyser generators.

Module 2

Syntax Analysis – Role of the parser – Context free grammars – Top-down parsing – Bottom-up parsing – Operator precedence parsing – LR parsers (SLR, Canonical LR, LALR) – Parser generators.

Module 3

Syntax-directed translation – Syntax-directed definitions – S-attributed definition – L-attributed definition – Top-down and bottom-up translation – Type checking – Type systems – Specification of a type checker. Run time environment – Source language issues – Storage organization – Storage allocation strategies – Access to nonlocal names – Parameter passing – Symbol tables.

Module 4

Intermediate code generation – Intermediate languages – Declaration – Assignment Statement – Boolean expression – Procedure calls - Code optimisation – Introduction – Sources of optimisation – Introduction to data flow analysis. Code generator – Issues in the design of a code generator, the target machine, A simple code generator.

Text Books:

1. Alfred V. Aho, Ravi Sethi & Jeffrey. D. Ullman, “Compilers Principles, Techniques & Tools”.

References :

1. Kenneth.C.Louden, Compiler Construction:Principles And Practice, Thomson Learning, India
2. Keith D. Cooper & Linda Torczon, Engineering a Compiler, Elsevier, New Delhi.
3. S.S. Muchnick, Harcourt Asra, Advanced Compiler Design implementation, Morgan Kaufman, 1997
4. Modern Compiler Implementation in C , Cambridge Uty. Press 1997.
5. Alan Holub, Compiler Design in C, PHI
6. Kenneth C. Louden, Compiler Construction, Principle and Practice, Thomson Books

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

CS/EE 602 DIGITAL SIGNAL PROCESSING

Module 1

Introduction to signals & systems- Discrete time signals and systems- Properties of discrete systems-linearity, time invariance-causality-stability-convolution-difference equation representation of discrete systems -The Z transform-properties of Z transform-the inverse z transform-System Transfer function.

Module 2

Frequency domain representation of discrete time signals. Discrete Fourier series(DFS)-properties Discrete Time Fourier Transform (DTFT) properties, Discrete Fourier Transform(DFT) properties& Fast Fourier Transform(FFT) Decimation in Time & Decimation in Frequency algorithms.

Module 3

FIR digital Filters: Transfer function. Generalized Difference equation representation. Concept of windowing. Non Recursive realization structures-direct (Tapped delay line structure) –cascade realization- Liner phase realization.

IIR Digital Filters : - Transfer function. Difference equation representation. Recursive Realizations Direct form I , Direct form II –Cascade Realization-Parallel realization – Comparison of IIR & FIR filters in terms of computational complexity, memory requirement, hardware complexity, stability .

Module 4

Finite word length effects in digital filters- fixed point arithmetic -Floating point arithmetic- Block floating point arithmetic - Truncation-Rounding - Quantization error in analog to digital conversion-Limit cycles. General DSP architecture- features _ On chip subsystems- memory organization-Addressing modes- Instruction types - TMS320C54X fixed point processor- TMS320C4X floating point processor

Applications of DSP

Text:

1. P.Ramesh Babu: Digital signal Processing,SCITEC Pub., 3rd ed
2. Sanjit K. Mithra, : " Digital Signal Processing", Tata Mc- Graw Hill

References:

1. John G Proakis & Dimitris G Manolakis : "Digital Signal Processing", PHI, New Delhi
2. Oppenheim & Ronald W Schafer : "Digital Signal Processing", Prentice Hall India
3. Steven W. Smith, Digital Signal Processing-A practical guide for Engineers and Scientists , Elsivier India Pvt.Ltd, 2006
4. Avatar Singh, Digital Signal Processing Implementations, Edition 1

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

CS/IT 603 OPERATING SYSTEMS

Module I

Introduction to Operating Systems. Processes - Interprocess Communication - Race Conditions - Critical Sections – Mutual Exclusion - Busy Waiting - Sleep And Wakeup - Semaphores - Event Counters - Monitors - Message Passing. Process Scheduling - Round Robin Scheduling - Priority scheduling -multiple queues - Shortest Job First - Guaranteed scheduling - Two- level scheduling.

Module II

Memory management. Multiprogramming. Multiprogramming and memory usage - Swapping - multiprogramming with fixed and variable partitions - Memory management with bit maps, linked lists, Buddy system - allocation of swap space. Virtual memory - paging and page tables, associative memory - inverted page tables. Page replacement algorithms.

Module III

File systems and I/O files. Directories - File system implementation - security and protection mechanisms.

Principles of I/O hardware - I/O devices - device controllers - DMA. Principles of I/O software - interrupt handlers - device drivers - Disk scheduling - clocks and terminals.

I/O Buffering - RAID- Disk Cache.

Module IV

Deadlock - conditions for deadlock. Deadlock detection and recovery. Deadlock avoidance - resource trajectories - safe and unsafe states - bankers algorithm. Deadlock prevention. Two phase locking – non-resource deadlocks - starvation.

Case Study: UNIX / LINUX operating system

Text Book

1. William Stallings, "Operating systems", Pearson Education, Fifth edition
2. D.M.Dhamdhere, "Operating Systems", 2nd Edition, Tata McGraw-Hill

Reference

1. Garry Nutt, "Operating Systems – A Modern perspective ", Third Edition, Pearson Education
2. Andrew S. Tanenbaum, "Modern Operating Systems", Prentice Hall
3. Bach, M.J., "Design of UNIX Operating System", Prentice Hall
4. Charles Crowley, "Operating systems – A Design Oriented Approach", Tata McGrawhill, 1997
5. Michel Palmer "Guide o Operating Systems", Vikas Thomson Learning Publishing, NewDelhi

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
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CS /IT 604 ANALYSIS AND DESIGN OF ALGORITHMS

Module 1

Analyzing Algorithms and problems. Classifying functions by their asymptotic growth rate. Recursive procedures. Recurrence equations - Substitution Method, Changing variables, Recursion Tree, Master Theorem. Design Techniques- Divide and Conquer, Dynamic Programming, Greedy, Backtracking

Module 2

Analysis of searching and sorting. Insertion sort, Quick sort, Merge sort and Heap sort. Binomial Heaps and Fibonacci Heaps, Lower bounds for sorting by comparison of keys. Comparison of sorting algorithms. Amortized Time Analysis. Red-Black Trees – Insertion & Deletion.

Module 3

Graphs and graph traversals. Strongly connected components of a Directed graph. Biconnected components of an undirected graph.
Transitive closure of a Binary relation. Warshalls algorithm for Transitive closure. All pair shortest path in graphs. Dynamic programming. Constructing optimal binary search trees.

Module 4

Complexity Theory - Introduction. P and NP. NP-Complete problems. Approximation algorithms. Bin packing, Graph coloring. Traveling salesperson Problem.

Text Books:

1. T. H. Cormen, C. E. Lieserson, R. L. Rivest, Introduction to Algorithms, Prentice Hall India,2004
2. Allen Van Gelder, Sara Baase, "Computer Algorithms - Introduction to Design and Analysis", 3rd Edition,2004

References:

1. Anany Levitin, "Introduction to the design and analysis of algorithms", Pearson Education
2. A.V.Aho, J.E.Hopcroft and J.D. Ullman, "The Design and Analysis of Computer Algorithms", Addison Wesley Publishing House, Reading, MA
3. E Horowitz and S Sahni, "Fundamentals of Computer Algorithms", Computer Science Press, Rockville
4. Jeffrey H.Kingston, "Algorithms and Data Structures - Design, Correctness and Analysis ", Addison Wesley, Singapore, 1990
5. Knuth, "Art of Computer Programming Vol II, Sorting and Searching,", Prentice Hall

Type of questions for University Examination
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CS/EB/EC/EI 605 CONTROL SYSTEMS ENGINEERING

Module 1

Basic idea of control systems and their classification - differential equations of systems - linear approximation - Laplace transform and transfer function of linear system - Model of physical system (Electrical, mechanical and electromechanical)- block diagram - signal flow graph - Mason's gain formula.

Module 2

Time domain analysis - Representation of deterministic signals - First order system response - S-plane root location and transient response - impulse and step response of second order systems - performance - characteristics in the time domain - effects of derivative and integral control - steady state response - error constant - generalised definition of error coefficients - concepts of stability - Routh - Hurwitz criterion.

Module 3

Frequency domain analysis - frequency response - Bode plot, Polar plot, Nicol's chart - closed loop frequency response and frequency domain performance characteristics. Stability in frequency domain. Nyquist criterion.

Module 4

Root locus method - basic theory and properties of root loci - procedure for the construction of root loci - complete root locus diagram. Design and compensation of feed back control system: approaches to compensation - cascade compensation networks and their design in the frequency domain - simple design in S-plane.

Text Book:

1. Ogata K: " Modern Control Engineering", Prentice Hall/Pearson,2002

References:

1. Dorf: Morden Communication Systems ,Pearson Education
2. Franklin: Feed back Control Systems, Pearson Education,1994
3. Kuo B. C: "Automatic Control System", Prentice Hall, 1991
4. Nagoor Kani: Control Systems, R B P,2002
5. Ogata: Discrete Time Control Systems ,Pearson Education,1987
6. Nagarath & Gopal: " Control System Engineering", Wiley Eastern,1991
7. Ramkayan: Control Engineerng, Vikas Publications
8. M N Bandyopadhyaya: Control Theory ,PHI
9. Glad: Control Theory, Vikas Thomson Publications

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
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CS/IT 606 COMPUTER NETWORKS

Module 1

Evolution of Computer Networks

Types of Networks: Broadcast and Point-to-point, LAN, MAN, WAN, Wireless networks. Protocols & Standardization, ISO/OSI Reference model, TCP/IP Reference Model.

Application Layer

Application layer protocols:-WWW and HTTP, FTP, DNS, SMTP, SNMP, RPC, P2P File sharing, Domain Name system (DNS)

Module 2

Transport layer and *Network Layer*

Transport Layer Services, Relationship with Network Layer, Relationship with Application Layer, Multiplexing and De multiplexing, UDP, TCP: Header ,Segment Structure, Services, Connection establishment and termination, Flow control and window size advertising, TCP time out and re-transmission, Congestion Control, TCP Fairness, Delay Modeling.

Network layer Services, Datagram and Virtual circuit services, IP datagram format and Types of Services, Datagram encapsulation and Fragmentation, Reassembly and fragmentation

Module 3

Routing and Datalink Layer

Routing: Link state routing, distant vector routing, hierarchical routing, multicast routing, Data link layer services: Error detect and correction techniques, Elementary Data link layer protocols, sliding window protocols, HDLC ,Multiple access protocols, TDM, FDM, CDMA Random access protocols: ALOHA, CSMA,CSMA/CD,CSMA/CA. Circuit and Packet Switching, Virtual Circuits, Switching Technology for LAN, Ethernet switches, Virtual LAN

Module 4

Physical Layer, High speed Networks and Network programming

Physical Layer services, Transmission media, Data encoding schemes. ISDN, BISDN, Frame relay, Fast Ethernet and Gigabit Ethernet, FDDI, SONET .NETBIOS programming, TCT/IP and Socket programming. Network Performance: Analytical Approaches-Network Traffic Monitoring-simulations

Text Book:

1. Youlu Zheng and Shakil Akhtar, *Networks for Computer Scientist and Engineers,* Oxford University Press,2006
2. James F. Kurose and Keith W. Ross, Computer Networking – *A Top-Down Approach Featuring the Internet,2*/e Pearson Education ,2003

References:

1 S. Keshav, *An Engineering Approach to Computer Networki*ng, Pearson education ,2002
2 F. Halsall, *Data Communication, Computer Networks and Open Syste*ms, Addison Wesley, 1996
3 Andrew S. Tanenbaum, *Computer Networks* , 4/e, Pearson education, 2003
4 Behrouz A. Fourouzan ,*Data Communications and Networking,* 2/e Tat McGrawhill,2000
5 Leon-Garcia and I. Widjaja, *Communication Networ*ks, Tata McGraw Hill, 2000
6 Bertsekas and Gallagar , *Data Networ*ks, 2/e, PHI, 1992
7 Douglas E Comer ,Computer Networks and Internet's, 2/e Pearson Education,2004
5. Gallo, Computer Communication and Networking Technologies, Thomson Learning

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

CS 607 SYSTEMS PROGRAMMING AND HARDWARE LAB

1. Identification of components/cards and PC assembling from components
2. Assembly language program for implementing arithmetic operations
3. Assembly Language programs for time and date manipulation.
4. Assembly Language programs for display /video manipulation
5. Assembly Language program for equipment status
6. Implementation of a file manager using DOS/BIOS interrupts
7. TSR (Terminate and Stay Resident) Programming
8. ADC interface
9 .Stepper Motor interface using DAC
10. Parallel Interface: Printer and HEX keyboard.
11. Serial Interface: PC to PC serial interface using null modem

Note: Programs can be implemented using MASM /TASM

References:

1. H. P. Messmer, *The Indispensable PC Hardware Boo*k, 3/e, Addison Wesley, 1997
2. S. J. Bigelow, *Troubleshooting, Maintaining, and Repairing PC*s, 2/e, Tata McGraw Hill, New Delhi, 1999
3. Douglas V. Hall, *Microprocessors and Interfacin*g, 2/e, Tata McGraw Hill, 1988
4. Ytha Yu and Charles Marut , *Assembly Language Programming and Organisation of IBM PC,* International Edition , McGrawhill Inc , 1992
6. Barry B. Brey , *The Intel Microprocessors 8086 to Pentium 4- Architecture Programming and Interfacing*, 6/e Pearson Education ,2003

Note: 50% Marks is earmarked for continuous evaluation and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50% marks separately for the two components to be eligible for a pass in that subject.

CS 608 MINI PROJECT

The students are expected to develop an application using a standard DBMS package. They have to do a proper system study and prepare SRS and design documents.

Each batch comprising of 3 to5 students shall design. Each student shall submit a project report at the end of the semester. The project report should contain the design and engineering documentation including the Bill of Materials and test results. Product has to be demonstrated for its full design specifications. Innovative design concepts, reliability considerations and aesthetics / ergonomic aspects taken care of in the project shall be given due weight.

Guidelines for evaluation:

i) Attendance and Regularity	10
ii) Work knowledge and Involvement	30
iii) End-Semester presentation & Oral examination	20
iv) Level of completion and demonstration of functionality/specifications	25
v) Project Report	15
Total	100 marks

***Note**: External projects and R&D projects need not be encouraged at this level. Points (i) & (ii) to be evaluated by the project guide & co-ordinator and the rest by the final evaluation team comprising of 3 teachers including the project guide.*