4th Semester

COMPUTER ARCHITECTURE

SECTION – A

Fundamental of Computer Design : Introduction, Measuring and Reporting Performance,
Quantitative principles of Computer design, The Concept of Memory Hierarchy.
Instruction Set Principles and Examples: Classifying Instruction Set Architectures; Memory
Addressing; Operations in the Instruction Set, Type and Size of Operands, Encoding an
instruction set, The DLX Architecture.

SECTION – B

Pipelining: What is Pipelining? The Basic Pipeline for DLX, the major hurdle of pipelining-
pipeline hazards, What makes pipelining hard to implement? The MIPS R4000 pipeline.
Advanced Pipelining and Instruction – Level Parallelism : Instruction – level parallelism:
Concepts and Challenges, Overcoming Data Hazards with Dynamic Scheduling, Reducing
Branch Penalties with Dynamic Hardware prediction, Taking advantage of more ILP with
multiple issue, Compiler support for exploiting ILP.

SECTION – C

Memory Hierarchy Design : Introduction ,The concept of Cache memory, reducing cache
misses, Reducing Cache miss penalty, Reducing Hit Time Main Memory, Virtual Memory, and
memory protection.
Storage systems : Type of storage devices, Buses-connecting I/O Devices to CPU/Memory, I/O
Performance Measures, Reliability, Availability and RAID, UNIX File system performance.

SECTION – D

Interconnection Networks: A simple network, connecting the interconnection network to the
computer, interconnection network media, connecting more than two computers, practical issues
for commercial interconnection networks, examples of interconnection networks.

4th Semester

Books:

1. Computer Architecture A Quantitative Approach, John L. Hennessy & David A. Patterson, 2nd Edition, Harcourt Asia Pte. Ltd., 1996.
2. Computer Architecture & Organisation, Mc Graw Hill, 3rd Edition, John Hayes, 1998.
3. Computer System Architecture PHI, 3rd edition, M.Morris Mano.
4.Computer Architecture and Parallel Processing, McGraw Hill Book Company, Hwang and Briggs.
5. Advanced Computer Architecture: Parallelism, Scalability, Programmability, Kai Hwang, McHill, Inc. 1993.

4th Semester

OPERATING SYSTEM CONCEPTS

Section A

What is an Operation System? Simple Batch Systems; Multiprogrammed Batched Systems; Time-Sharing System; Personal-Computer systems; Parallel System; Distributed System; Real-Time Operating Systems. System Components System Calls, System Programs; System Structure; Virtual Machines.

Process concept: Process Scheduling; Operation on processes, Interprocess Communication ,CPU Scheduling fundamental concepts, Scheduling criteria; Scheduling Algorithms; Multi-processor Scheduling; Real Time Scheduling. Threads: Overview; Multithreading

Section B

Deadlock: System Model; Deadlock Characterization, Methods of Handling Deadlock, deadlock Prevention; Deadlock Avoidance; Deadlock Detection, Recovery from deadlock; Combined approach to deadlock handling

Protection: Goals of protection; Domain of protection; Access matrix and its implementation; Revocation of Access Right; Capability- Based Systems; Language Based Protection.

Security: The Security Problem; Authentication; One Time passwords program Threats, System Threats; Threat Monitoring; Encryption and decryption; Computer-Security Classification; An Example Security Model: windows NT

Section C

Memory Management: Logical Versus Physical Address Space, Swapping, Contiguous Allocation; Paging; Segmentation; Segmentation with paging.

Secondary Storage Structure: Disk Structure; Disk Scheduling; Disk Management; Swap-space management; Disk Reliability; Stable-Storage Implementation.

Section D

File System Interface: File Concept; Access Methods; Directory Structure; Protection; Consistency Semantics;

File System Implementation: File System Structure; Allocation Methods, Free Space Management Directory Implementation; Efficiency and Performance; Recovery.

Books:

1. Abrahanm Silberschatz, Peter Baer Galvin, " Operating System Concepts " John Wiley & Sons, Inc., Vth Eduction, 2000.
2. Detail H. M. "An Introduction to Operating System" Addison Wesley Publising Co., 1984

4th Semester

DISCRETE MATHEMETICS & LOGIC DESIGN

Section A

Mathematic Logic: Statements and Notation, Connectives; Negation; Conjunction; Disjunction; Statement Formulas and Truth Tables; Logical Capabilities of programming Languages; Conditional and Biconditional; Well formed Formulas; Tautologies; Equivalence of Formulas; Duality Law; Tautological Implications; Formulas with distinct Truth Tables; Functionally Complete sets of connectives; other connectives; Two state devices and Statement logic; Normal forms; principal disjunctive normal forms; principal conjunctive normal form; ordering and Uniqueness of Normal Forms; Completely parenthesized Infix Notation and Polish Notation; The Theory of Interference for the statement calculus; Validity using Truth Table; Rules of Inference; Consistency of Premises and Indirect Method Of Proof; Automatic Theory Proving; The Predicate Calculus; predicates; The Statement Function, variables and Quantifiers; Predicate Formulas; Free and Bound Variables; The Universe of Discourse; Inference Theory of the Predicate Calculus, Valid Formulas and Equivalences; Some Valid Formulas over Finite Universes; Special Valid Formulas Involving Quantifiers; Theory of Inference for the Predicate Calculus; Formula Involving More Than One Quantifier.

Section B

Permutations, Combinations, and Discrete Probability: Introduction, The Rules of Sum and product; permutations; Combinations; Generation of permutations and combinations, Discrete probability, Information and Mutual Information.

Graphs and Planner Graphs: Introduction, Basic Terminology, Multigraphs and Weighted Graphs, Paths and Circuits; Shortest paths in Weighted Graphs, Eulerian paths and circuits;
Hamiltonian paths and circuits, The Traveling Salesperson problem; Factors of Graph; planar Graph.
Trees and cut-sets: Trees, Rooted Trees, path, Lengths in Rooted trees; prefix codes; Binary search trees; Spanning Trees and cut-sets; Minimum Spanning Trees; Transport Networks.

Section D

Recurrence Relations and Recursive Algorithms: Introduction; Recurrence Relations; Linear Recurrence Relations with constant coefficients; Homogeneous Solutions; Particular Solutions;
total Solutions; solution by the Method of Generating Functions; Sorting Algorithms; Matrix Multiplication Algorithms.
Groups and Rings: Introduction, Groups, Subgroups; Generators and evaluation of Poers; Cosets and Lagrange's Theorem; permutation groups and Burnside's theorem; Codes and Group codes; Isomorphisms and Automorphisms; Homomorphisms

4th Semester

Books:

1. J.P. Trembley and R. Manohar, "Discrete mathematics Structures with Applications to Computer Science", (TaTa McGraw-Hill, 1997)

2. C.L.Liu, " Elements of Discrete Mathematics", 2nd Edition (TaTa McGraw-Hill, 1985)

DIGITAL COMMUNICATION

4th Semester

Section A

Analog to Digital Conversion: Noisy communication channels, the sampling theorem, low pass signals and band pass signals, pulse amplitude modulation, channels bandwidth for a PAM signal. Pulse amplitude modulation, sampling, signal recovery an holding, Quantization of signal, Quantization error, pulse code modulation (PCM), Delta modulation, adaptive data modulation.

Section B

Digital Modulation Techniques: Binary Phase shift keying, Differential Phase shift keying, Differential encoded PSK, quadrature PSK, Quadrature Amplitude shift keying (QSK) Binary frequency shift keying.

Section C

Data Transmission: A baseband signal receiver, probability of error, the optimum filter, white noise- the matched filter, probability of error of the matched filter, coherent reception: correlation, correlation receiver for Q.PSK.

Section D

Noise in Pulse Code and Delta Modulation system: PCM transmission, Calculation of Quantization noise, the O/P signal power, the effect of thermal noise, O/P signal to noise ratio in PCM, Delta modulation, Quantization noise in Delta modulation, the O/P signal to quantization noise ratio in delta modulation, O/P signal to noise ratio in delta modulation.

Computer Communication System: Introduction, types of networks, Design features of computer communication network, Examples of Digital communication: ISDN, LAN, pocket radio and satellite, ATM, etc.

Books:

1. Taub and Schilling, Principles of Communication systems (East West Press)
2. John R. Freer, Principles of communication an Network

SYSTEM ANLYSIS & DESIGN

4th Semester

SECTION- A

Introduction To System (Overview): Definition of System, Common types of systems, Natural systems, Man made system, Automated systems, General systems principles

System Development Life Cycle: phase 1: System Planning, phase 2: System Analysis, phase 3: Systems Design, phase 4: Systems Implementation, phase 5: Systems operation and support

PHASE 1: System Planning

Preliminary Investigation: Objectives and steps, Evaluation of system request, Evaluation of projects, Overview of Feasibility, Operational Feasibility, Economic Feasibility, Organizational Chart, Review current documentation

Feasibility and Cost Analysis Tools: Classification of Costs and Benefits, Cost Benefit Analysis (Payback analysis, ROI & Present value analysis)

Section-B

PHASE2: Systems Analysis

Determining Requirements: Role and requirement of system analysis, system requirements, Users requirements, Technical requirements, Interviews, Other fact finding techniques, Recording and facts

Analyzing Requirements: Structured System Analysis, Functional Diagram, Data Flow Diagrams, Entity relationship diagrams, Identifying attributes, Data Dictionary: Documenting the data elements, data flows, data stores, processes, external entities, records and reports

Section-C

PHASE 3: Systems Design: Introduction to output design, Types of Output and information delivery, Designing printed reports Designing screen outputs Designing other outputs, Tools and Techniques of design

PHASE 4: System Implementation

Application Development: Documentation review and application design, coding and testing the application.

Documentation: Program documentation, System documentation, Operations documentation and user documentation.

Phase 5: System Operation and Support

Overview: Systems support and maintenance activities

Support Activities : User training and assistance , maintenance activities , Corrective maintenance, Adaptive maintenance , Perfective maintenance.

Managing systems operation and support: Maintenance team, Configuration management, managing system performance.

Books

1. Element of System Analysis, Marvin Gore, John Stubbe. Galgotia Book

Source. 1994
2. Systems Analysis and design Methods. Whitten, Bently and Barlow. Galgotia Publication,1995
3. System Analysis and Design, Elias M. Awad. Galgotia publication, 1995.
4. System analysis and Design, P.S.Grover, BPB Publication, 1994
5. System analysis and Design, Harry Edwards. McGraw Hill International Ed., 1995
6. Introduction to System analysis and Design I.T. Hawryszkiewyez, Prentice Hill of India, 1994

OPERATING SYSTEM LAB(WINDOWS NT)

4th Semester

Instructions for paper setter / Candidates

Laboratory examination will consist of two parts:

1. Performing a practical examination assigned by the examiner. (25 marks)
2. Viva-voce examination. (25 marks)

Viva-voce examination will be related to the practical performed/projects executed by the candidate related to the paper during the course of the semester.

CASE STUDIES on the following operating system to be done in consultation with the faculty incharge for the course:

1. Singal User System :MS-DOS and Windows98
2. Network Operating System: Windows 2000/Windows NT
3. Multiuser System :Unix/Linux
4. Virtual Machine Operating System
   a) Comparative feature of operating system –if possible segment the work into 2 to 8
   above. (A group of 2 or 3 students work on each area and prepare a report and present it
   as seminar to the group. The activity requires 20 hrs of work for each student.
   b) Implementation of command – text & icon.
   Identification of command – text/icon.
   Executing the command
   Return of control to CLI (Command Language interpreter).
   c) Process management: Simulation various scheduling algorithm.

Memory management: CBI package on virtual memory, cache memory page replacement algorithm
File system and protection: Implementation for documents.
Virus and vaccines, computer security
Use application level command, close, spell check or integrate, differentiate, Mat Mult, plot, evaluate

Note:- Record of the case studies to be presented as a project both electronically and hard copy for
evaluation in groups of three students. Students will have to present seminars based on their case studies.

OPERATING SYSTEM LAB (UNIX/LINUX LAB)

Instructions for paper setter / Candidates

4th Semester

Laboratory examination will consist of two parts:

1. Performing a practical examination assigned by the examiner. (25 marks)
2. Viva-voce examination. (25 marks)

Viva-voce examination will be related to the practical performed/projects executed by the candidate
related to the paper during the course of the semester

List of Practical:

1. Study the Linux operating system and implement various commands and shell scripting.
2. Implement the process synchronization using semaphores.
3. Write the program to mount the various devices (i.e. floppy, CD-Rom etc)
4. Write a program do the following thing…
    a) Find the attribute of file.
    b) To change the attribute of file.
    c) Create the directory.
    d) Delete the directory.
    e) Create the file.
    f) Delete the file.
    g) Find the size of Hard Disk, RAM, and VRAM, cache.
5. Implement the various scheduling algorithm (preemptive and non-preemptive).
6. Implement the various page replacement algorithms.
7. Simulate the various memory allocation methods….
    a) Paging.
    b) Segmentation.
    c) Virtual memory.
    d) Paged Segmentation.
    e) Protection and sharing.
8. Design TSR.
9. Implement various programs for virus and vaccine.

DIGITAL COMMUNICATION LAB

4th Semester

Instructions for paper setter / Candidates

Laboratory examination will consist of two parts:

1. Performing a practical examination assigned by the examiner. (25 marks)
2. Viva-voce examination. (25 marks)

Viva-voce examination will be related to the practical performed/projects executed by the candidate related to the paper during the course of the semester

List of Experiments: -

1. To study Digital to Analog Conversion.
2. To study analog to Digital Conversion
3. To study amplitude modulation
4. To study frequency modulation
5. To study sampling and reconstruction for TDM-PAM
6. To study and generate TDM-Pulse Amplitude modulation
7. To study Pulse cod modulation (PCM)
8. To study delta modulation & dimod. Techniques
9. To study adaptive data modulation and demodulation technique.
10. To study FSK
11. To study PSK, QPSK modulation techniques
12. To study QASK.
13. Optical Fibre Bared Experiments (any 3)
14. To study PCM-TCM
15. To study TDM-PAM