

Annexure No.	31 R
SCAA Dated	29.02.2008

BHARATHIAR UNIVERSITY, COIMBATORE – 641 046
M. Sc INFORMATION TECHNOLOGY (Colleges)

PAPER II - Subject Title : ADVANCED COMPUTER ARCHITECTURE
(for the candidates admitted during 2008-09 batch and onwards)

Course Number:

Subject Description

This Course presents the Advanced Computer Architecture emphasizing parallel processing, solving problems in parallel and SIMD processors.

Goals

To enable the students to learn the parallel processing and SIMD arrays.

Objectives

On successful completion of the course the students should have:

- Understood the trends and principles of parallel processing in computers.
- Gained problem solving skills using parallel algorithms.

Contents

UNIT I

Introduction to parallel processing – Trends towards parallel processing – Parallelism in uniprocessor Systems – Parallel Computer structures – Architectural Classification schemes – Flynn’ Classification – Feng’s Classification – Handler’s Classification – Parallel Processing Applications

UNIT II

Solving Problems in Parallel: Utilizing Temporal Parallelism – Utilizing Data Parallelism – Comparison of Temporal and Data Parallel Processing – Data parallel processing with specialized Processor – Inter-task Dependency. Instructional Level Parallel Processing – Pipelining of Processing Elements – Delays in Pipeline Execution – Difficulties in Pipelining

UNIT III

Principles Linear Pipelining – Classification of Pipeline Processors – General Pipeline and Reservation tables – Arithmetic Pipeline – Design Examples – Data Buffering and Busing structure – Internal forwarding and Register Tagging – Hazard Detection and Resolution – Job sequencing and Collision prevention – Vector processing requirements – Characteristics – Pipelined Vector Processing methods

UNIT IV

SIMD Array Processors – Organization – Masking and Data routing – Inter PE communications – SIMD Interconnection Networks – Static Vs Dynamic – Mesh connected Illiac – Cube interconnection network – Shuffle-Exchange and Omega networks - Multiprocessor Architecture and programming Functional structures – interconnection Networks.

UNIT V

Parallel Algorithms: Models of computation – Analysis of Parallel Algorithms
Prefix Computation – Sorting – Searching – Matrix Operations.

REFERENCE BOOKS

1. Kai Hwang, Faye A. Briggs, “Computer Architecture and Parallel Processing” Mc Graw – Hill Book Company, 1985.
2. V. Rajaraman, C. Siva Ram Murthy, “Parallel Computers Architectures and Programming”, PHI, 2003.
3. Kai Hwang, “Advanced Computer Architecture –Parallelism, Scalability, Programmability”, TataMcgraw Hill, 2001.
4. Michael J. Quinn, “Parallel Computing Theory and Practice”, TMCH, Second Edition, 2002.
5. Barry Wilkinson, Micheal Allen, “Parallel Programming: Techniques and Applications”, Prentice Hall, 1999.

PAPER V Subject Title: INFORMATION CODING TECHNIQUES (for the candidates admitted during 2008-09 batch and onwards)

Number of Credits: 4

Subject Description:

This course presents the Information Entropy Fundamentals, Data and Voice Coding, error control coding and encryption coding techniques

Goal:

To enable the students to learn the fundamentals of information coding techniques

Objectives:

On successful completion of the course the students should have:

- Understood the Information Entropy Fundamentals.
- Learnt various coding techniques

UNIT I

INFORMATION ENTROPY FUNDAMENTALS: Introduction, Information and Uncertainty, what is ‘information’, information – properties, amount of information, entropy, Shannon’s Theorem, Entropy coding – Shannon Fano coding, Huffman coding

UNIT II

DATA AND VOICE CODING: arithmetic codes, voice coding, PCM, Delta modulation, adaptive delta modulation, linear predictive coding, differential PCM, coding speech at low bit rate, silence coding, sub-band coding

UNIT III

AUDIO AND VIDEO CODING: Introduction, Linear predictive coding principles, perpetual coding, MPEG Audio coder, MPEG video standards, MIDI

UNIT IV

ERROR CONTROL CODING: Introduction – rationale, types of codes, discrete memory less, examples, methods of error control, types of errors, Important term definitions; Linear block codes – Hamming codes, syndrome decoding, other linear block codes; cyclic codes, convolution coding

UNIT V

PRINCIPLES OF DATA COMPRESSION: Basic principles, lossless/lossy, entropy coding, source encoding, Compression of Text – Static Huffman coding, dynamic HC, Arithmetic coding, L-Z coding, Compression of Image – GIF, TIFF, Digitized documents, JPEG

REFERENCES:

1. J.S. Chitode – “Information coding techniques” Technical Publications , Pune, Jan 2006.
Viterbi – “Information Theory and Coding” , Tata McGrawHill publications