Krantiguru Shyamji Krishna Verma Kachchh University, Bhuj
Master of Science (Computer Applications & Information Technology)
Semester: III

Paper Code: CECS307	Total Credit : 4
Title of Paper: Advanced Computer Architecture	Total Marks : 70
	Time : 3 Hrs

Unit	Description	Weighting
I	Fundamentals of Computer design: Instruction set principles and examples- classifying instruction set - memory addressing- type and size of operands - addressing modes for signal processing-operations in the instruction set- instructions for control flow- encoding an instruction set. Overview of Parallel Processing and Pipelining Processing Necessity of high performance, Constraints of conventional architecture, Parallelism in uniprocessor system, Evolution of parallel processors, Architectural Classification, Applications of parallel processing	20%
II	Parallel Computer methods: Multiprocessor and multi computers – Shared-Memory multiprocessors, Distributed-Memory Multiprocessors. Multi-vector and SIMD computers. PRAM and VLSI models - Architectural development tracks - Multiple-Processor Tracks, Multi-vector and SIMD Tracks, Multi-threaded and Dataflow Tracks. Program and Network properties: Conditions of parallelism - Program partitioning and scheduling - Program flow mechanism - System interconnect architecture. Principles of Scalable Performance: Performance metrics and measures - Speedup performance laws - Scalability analysis and approaches	20%
III	Processors and Memory Hierarchy: Advanced processor technology - Super scalar and vector processors - Memory hierarchy technology - Virtual memory technology. Bus, Cache and Shared Memory: Bus System-Cache memory organizations-Shared memory organization-Sequential and weak consistency models.	20%
IV	Instruction level Parallelism & Data Parallel Architectures: Instruction level parallelism (ILP)- over coming data hazards-reducing branch costs –high performance instruction delivery-hardware based speculation- limitation of ILP - ILP software approach- compiler techniques- static branch protection- VLIW approach- H.W support for more ILP at compile time- H.W verses S.W solutions - SIMD Architectures – Associative and Neural Architectures – Data-Parallel Pipelined and Systolic Architectures – Vector Architectures	20%
V	Multiprocessors and Thread level parallelism: Multi-threaded Architectures, Distributed Memory MIMD Architectures, Shared Memory Architectures. Architecture of Multi-threaded processors, Latency hiding techniques, Principles of multithreading, Issues and solutions. Synchronization and Multiprocessing modes – Shared-Variable program structures, Message Passing program development, Mapping programs onto Multicomputers	20%
Basic Text & Reference Books :-		
1.	Dezso Sima, Terence Fountain, Peter Kacsuk, "Advanced Computer Architectures – A Design Space approach", Pearson Education, 2009	
2.	Kai Hwang, "Advanced Computer Architecture – Parallelism, Scalability, Programmability", Tata McGraw-Hill, 2008	
3.	John L. Hennessey and David A. Patterson, "Computer architecture – A quantitative approach", Morgan Kaufmann / Elsevier Publishers, 5th Edition	

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<tr><td rowspan="2">I</td><td>Q.1 (A) Answer the Following.
(Definitions, Blanks, Full Forms, True/False, Match the Following)</td><td>06</td><td rowspan="2">14</td></tr>
<tr><td>Q.1 (B) Medium / Long Questions. (With Internal Option)</td><td>08</td></tr>
<tr><td rowspan="2">II</td><td>Q.2 (A) Answer the Following.
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<tr><td>Q.2 (B) Medium / Long Questions. (With Internal Option)</td><td>08</td></tr>
<tr><td rowspan="2">III</td><td>Q.3 (A) Short / Medium Questions (With Internal Option)</td><td>06</td><td rowspan="2">14</td></tr>
<tr><td>Q.3 (B) Medium / Long Questions based on Table Designing.
 (With Internal Option)</td><td>08</td></tr>
<tr><td rowspan="2">IV</td><td>Q.4 (A) Short / Medium Questions (With Internal Option)</td><td>06</td><td rowspan="2">14</td></tr>
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