

Roll No .....

**MCSE - 103**  
**M.E./M.Tech., I Semester**  
 Examination, June 2014  
**Advanced Computer Architecture**  
*Time : Three Hours*

*Maximum Marks : 70**Note :* Attempt one question from each unit.**Unit - I**

1. a) The execution of an object code on a 400-MHz processor contains  $2 \times 10^6$  instructions. The program consists of four major types of instructions. The instruction mix and the number of cycles (CPI) needed for each instruction type are given below based on the result of a program trace :

Instruction type	CPI	Instruction mix
Arithmetic & logic	1	60%
Load/store with cache hit	2	18%
Branch	4	12%
Memory reference with cache miss	8	10%

- i) Calculate the average CPI when the program is executed on a uniprocessor with above results.  
 ii) Calculate the MIPS rate.
- b) Compare control flow data flow and reduction computers in terms of the program flow mechanism used

2. a) Explain Flynn's classification of computer architecture.
- b) Discuss the concept of Branch handling techniques and effect of branching and derive the performance degradation factor.

### Unit - II

3. a) Determine the data dependencies in the same and adjacent iterations of the given Do loop.

Do 10 j = 1, n

A(j + 1) = B(j - 1) + c(j)

B(j) = A(j) + k

C(j) = B(j) - 1

10 continue

- b) Explain internal data forwarding and possible hazards between read and write operations with respect to mechanism for instruction pipeline.
4. a) Explain the implements two models of SIMD computers
  - b) Briefly explain how to overcome data hazards with dynamic scheduling using Tomasulo's approach.

### Unit - III

5. a) Differentiate between structural parallelism and instruction level parallelism
- b) Explain the search algorithm in parallel computing

6. a) Explain multiprocessing in MIMD mode and multiprocessing in MPMD mode.
- b) Discuss the language features to exploit parallelism.

### Unit - IV

7. a) Discuss the multiprocessor scheduling strategies
  - b) Explain process synchronization mechanism in multiprocessor environment.
8. a) Distinguish between synchronized parallel and asynchronous parallel algorithms.
  - b) Explain deadlock prevention and avoidance strategies in multiprocessing environment.

### Unit - V

9. a) State and prove Amdahl's law
- b) Define the following terms for various system interconnect architectures.
  - i) Node degree.
  - ii) Network diameter.
  - iii) Bisection bandwidth
  - iv) Symmetry in networks.

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10. Write short notes on the following
  - a) Scheduling and load balancing in multiprocessor
  - b) Vector processor
  - c) Cache coherence protocols
  - d) Shared memory multiprocessors