



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/M.TECH (CSE)/SEM-2/MCSE-201/2013  
2013**

**ADVANCED COMPUTER ARCHITECTURE**

Time Allotted : 3 Hours

Full Marks : 70

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words  
as far as practicable.*

**GROUP – A**

Answer any *seven* questions.  $7 \times 2 = 14$

1. a) Discuss different control strategies used in Inter-PE communication.
- b) What is prefetch buffer ?
- c) What do you mean by relative address mode ?
- d) Write down the routing functions for hypercube network.
- e) What do you mean by strictly non-blocking network ?
- f) What are the differences between omega and hypercube network ?

30196 (M.Tech.)

[ Turn over



- g) What are the functions used in a switch box ?
- h) What is internal forwarding ?
- i) What do you mean by register tagging ?
- j) Find out the efficiency and throughput of a pipeline.

**GROUP - B**

Answer any *four* questions.

4 × 14 = 56

2. Consider the 3-stage pipelined processor specified by the following reservation table :

		Time →							
		1	2	3	4	5	6	7	8
Stages ↓	S1	X					X		X
	S2		X		X				
	S3			X		X		X	

- a) List the set of forbidden and permissible latencies and initial collision vector.
- b) Draw a state transition diagram showing all possible initial sequences ( cycles ) without causing a collision in the pipeline.
- c) List all the simple cycles and greedy cycles from the state diagram.
- d) What is the MAL of this pipeline ?

3 + 7 + 2 + 2



3. a) Describe different types of solutions for control hazard used in pipelining.  
b) Explain RAW, WAW, WAR. 8 + 6
4. a) Describe the characteristics of RISC.  
b) Discuss about Overlapped Register Window with a suitable block diagram.  
c) Discuss the design aspects of Arithmetic Pipeline. 3 + 6 + 5
5. a) Explain the characteristics of a switch box in MIN.  
b) Explain perfect shuffle, inverse perfect shuffle and the exchange function used in Multistage Omega network for  $N = 8$ .  
c) Write down the need for routing and masking functions in SIMD system.  
d) Write down the routing function for mesh network. 4 + 6 + 2 + 2
6. a) Discuss the routing functions used in a Barrel shifter.  
b) Show the connectivity of a Barrel shifter for  $N = 16$ .  
c) Derive the effective pipeline throughput considering the effect of branching. 4 + 7 + 3
7. a) Design an  $O(n^2)$  algorithm for SIMD matrix multiplication.  
b) Draw the design diagram for  $2^3 \times 2^3$  delta network. 7 + 7



8. a) Briefly describe high-order interleaving using suitable block diagram.
- b) What are the effects of banking in achieving fault tolerance and bandwidth in an interleaved memory organization.
- c) Design a Baseline network for  $N = 8$ . 5 + 4 + 5

=====