ADCA / MCA (III Year)

Term-End Examination

June, 2008

CS-12 : COMPUTER ARCHITECTURE

Time : 3 hours   Maximum Marks : 75

Note :   Question number 1 is **compulsory**. Answer any **three** questions from the rest.

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1. (a) Consider the following program statements :   10

   S1 : Load R1, 1024

   S2 : Load R2, M(10)

   S3 : Add R1, R2

   S4 : Store M(1024), R1

   S5 : Store M(R2), 1024

   where (R_i) means the content of register R_i and Memory (10) contains 64 initially.

   Draw a dependency graph to show all the dependencies among the above program segments. Also, are there any resource dependencies if only one copy of each functional unit is available in the CPU ?

   (b) Discuss Flynn's classification of computers. Give an example wherever it exists.   10

   (c) Describe the concepts of superscalar and super pipeline design.   10

2. Explain the four types of communication patterns in multicomputer networks. **15**

3. (a) How can the throughput of a pipelined processor be further improved with internal data forwarding among multiple functional units ? **5**

   (b) Explain the following terms associated with cache design : **10**

      (i) Write-through versus Write-back caches

      (ii) Private caches versus Shared caches

4. Consider the following interleaved memory design for a main memory system with 16 memory modules. Each module is assumed to have a capacity of 1 MB. The machine is byte addressable.

   Design : 4-way interleaving with four memory banks

   (i) Specify the address formats for the above memory organization.

   (ii) Determine the maximum memory bandwidth obtained if only one memory module fails in the above memory organization. **15**

5. Explain the following terms related to shared-variable programming on multiprocessors : **15**

   (i) Multiprogramming

   (ii) Multiprocessing in MIMD mode

   (iii) Multiprocessing in MPMD mode

   (iv) Multitasking

   (v) Multithreading