Eighth Semester Examination – 2008

COMPUTER ORGANIZATION

Full Marks – 70

Time : 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest.*

The figures in the right-hand margin indicate marks.

1. Answer the following questions :   2 × 10

   (a) What is the difference between computer architecture and computer organization ?

   (b) List down the various ways of achieving parallelism in a uniprocessor system.

   (c) What is the difference between C-access and S-access memory organization ?

   (d) What is the difference between control and data flow computers ?

   (e) What do you understand by speed up of a parallel computer ?

   (f) What is the advantage of multiport memory interconnection compared to crossbar interconnection ?

   (g) What is the difference between instruction and data pipelining ?

   (h) Write at least four differences between Illiac-IV and the BSP systems.

   (i) Write the difference between a tightly coupled system and a loosly coupled parallel system.

   (j) Why associative memories are faster ?

2. (a) Draw and explain the block diagram for a computer system showing various functional units along with the control and data flow direction from each unit to other unit.   5

   (b) Explain the use of following standard I/O interfaces in a computer system.   5

      (i) PCI

      (ii) USB

      (iii) SCSI

      (iv) Ethernet.

3. (a) Explain with examples Fenges and Handlers Classification of parallel computers. How these are different from FLYNN's classification? 4

   (b) Give and explain the operation of a pipelined normalized floating point adder. 6

4. Explain the organization of a computer with share memory. Show the initial data assignment and discuss the data routing for multiplying two $n \times n$ matrices in $O(n^2)$ time using on SIMD computer with n PEs. Can you reduce the complexity to $O(n\log_2 n)$. 10

5. What is the effect of branching on the performance of a pipelined computer? If 100 instructions are processed in a 4-stage pipeline, what is the average number of instructions processed per instruction cycle given that the probability of a conditional branch instruction is 0.2 and that of the branch being successful is 0.6? Derive the expression used. 10

6. Give and explain an SIMD algorithm for finding the sum S(k) of the first k components in a vector for k varying from 0 to n-1. Show the masking and data routing steps for executing this algorithm in an SIMD machine of n PEs. What is the complexity of the algorithm? 10

7. What program feature justifies the use of cache memory in a computer system? With a neat flow chart explain the cache operation for a fetch. Assume the use of memory system with paged segments. List the advantages and disadvantages of using virtual addresses directly to address the cache. 10

8. Differentiate between each of the following: 2.5×4

   (a) Paging vs. Segmentation

   (b) Static vs. dynamic DFCs

   (c) Master slave OS vs. Floating Supervisory Control

   (d) Score boarding and Register Windowing.

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