[Total No. of Questions - 9] [Total No. of Pri d Pages - 3]
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B. Tech 7th Semester Examination

Advanced Computer Architecture (NS)

CS-412/IT-414

Time : 3 Hours **Max. Marks : 100**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the question in section E. Use of non-programmable calculator is allowed.

SECTION - A

1. (a) What are dynamic networks? What are the characteristics of access time in such networks? What is Multistage Interconnection Network? (10)

   (b) What do you understand by the term grain size? How does grain packing improve the performance? (10)

2. (a) Explain the principle of superscalar processors with the help of timing diagram. (10)

   (b) Derive a relation for speedup of the superscalar machine over the base machine as a function of its degree, number of instructions and pipeline stages. (10)

SECTION - B

3. Compare superscalar and VLIW processors in detail. Discuss how multiple instruction issue is handled in superscalar processors. (20)

4. (a) Define Amdahl's law. Derive an expression for CPU clock as a function of instruction count, clocks per instruction and clock cycle time. (10)

   (b) What are the merits and demerits of multiport memory? Show a block diagram of a system connecting processors and the multiport memories. (10)

SECTION - C

5. What is meant by cache-coherency? Explain with the help of a suitable example. State any three techniques to reduce cache miss. How does two-level cache increase performance? Derive the formula for average access time in a three-level cache? (20)

6. (a) What is a vector processor? What are the properties of vector instructions? How are the two important issues like Vector Length and Stride tackled? (15)

   (B) Explain the snooping, with respect to cache coherence protocols. (5)

SECTION - D

7. (a) What are message passing systems? Differentiate between asynchronous and synchronous message passing. (10)

   (b) Explain various parallel programming models. (10)

8. Write a note on the following:

   (i) Heterogeneous processing

   (ii) Semaphores and its applications

   (iii) Parallel programming software tools (20)

SECTION - E

9. (a) What are the characteristics of SIMD architecture?

   (b) What factors determine the performance of vector processors?

   (c) Give format of the VLIW instruction.

   (d) How RISC architecture attempts to reduce execution time?

   (e) How is performance of the processors improved by using the superscalar architecture?

   (f) What are the fundamental issues in parallel processing?

   (g) Distinguish between multiprocessors and multicomputer.

   (h) What are the factors affecting the performance of interconnection networks?

   (i) Discuss various applications of VLIW architecture.

   (j) Discuss the applications benefit from multicore?

(2×10=20)