MCA/D-21   **24166**

COMPUTER ARCHITECTURE AND PARALLEL PROCESSING

Paper–MCA-20-31

Time Allowed : 3 Hours]   [Maximum Marks : 75

Note : Attempt **five** questions in all, selecting **one** question from each Unit. Question No. **1** is compulsory. All questions carry equal marks.

Compulsory Question

1. Answer the following questions in brief: 5×3=15

   (i) Explain the relationships between programming languages and parallel architectures.

   (ii) What are data parallel architectures? Explain in brief.

   (iii) Define different metrics used to measure the performance of interconnection networks.

   (iv) Differentiate between write-invalidate and write-update cache coherence policies.

   (v) Discuss the emergence of superscalar processors in brief.

UNIT-I

2. (a) What is instruction level parallelism? Explain data dependencies among instructions with suitable examples.   8

   (b) What is instruction pipeline? Discuss performance measures of pipeline processing.   7

3. (a) What is VLIW architecture? Explain its working with suitable diagram.   7

   (b) What is loop scheduling used in ILP processors? Explain with an example.   8

UNIT-II

4. (a) What is shelved issue? How is it different from blocking issue? Discuss different types of shelving buffers. 8

   (b) Differentiate between aligned issue and unaligned issue with suitable diagram. 7

5. (a) Discuss different static prediction schemes used in branch handling. 7

   (b) What are branch penalties? Discuss schemes to reduce them. 8

UNIT-III

6. (a) What is UMA model? What are limitations of UMA model? How are these overcome by NUMA model? Explain with suitable diagram. 8

   (b) What is distributed MIMD architecture? Explain its characteristics and working with suitable diagram. 7

7. What are direct interconnection networks? Explain chordal ring of degree three, barrel shifter and hypercube of degree four with suitable diagram. 15

UNIT-IV

8. (a) What are locked, pended and split transaction buses? Compare their read bandwidths. 7

   (b) What is butterfly network? Explain the working of 8×8 butterfly network with suitable diagram. 8

9. (a) Define possible states of blocks in caches for snoopy protocol. Also define commands to be performed at various read/write, hit/miss actions. 8

   (b) What is full-map directory scheme? What are its limitations? How are these overcome by limited directory scheme. 7