Roll No. ..... Total No. of Pages : 3

MCA/D11 4562

Computer Architecture and Parallel Processing

Paper : MCA-503

Time : Three Hours] [Maximum Marks : 80

Note :– Attempt **FIVE** questions in all. Question No.1 is compulsory. Attempt **FOUR** more questions, selecting **ONE** question from each Unit.

1. Answer the following questions in brief :

   (a) What are the limitations of sign-magnitude addition and subtraction algorithm ?

   (b) Define microoperation, microinstruction and microprogram.

   (c) Explain the relationship between computer architecture and programming language.

   (d) What is granularity ? How is it related to levels of parallelism ?

   (e) Distinguish between in-order and out-of-order issue in superscalar processors.

   (f) What is branch penalty ? Explain any two ways in brief to reduce them.

   (g) What is barrel shifter ? Draw the diagram of 8 node barrel shifter interconnection network.

   (h) What is split transaction bus ? How is it better than pended bus ?

   8×3=24

UNIT–I

2. (a) Derive an algorithm in flowchart form for non-restoring method of fixed-point binary division. Also describe the necessary hardware needed to implement this algorithm. 7

   (b) Derive an algorithm in flowchart form for multiplying two floating-point binary numbers. 7

3. (a) What is hardwired control ? Discuss one-hot method of hardwired control design. 7

   (b) What are vertical and horizontal microinstructions ? Discuss the pros and cons of each. 7

UNIT–II

4. (a) What is computational model ? Compare von Neumann, object-based and applicative computational models. 7

   (b) Explain the following parallel architectures in brief : vector, array and systolic. 7

5. (a) What is pipeline processing ? Explain data hazardous in pipeline processing. 7

   (b) Explain global scheduling technique used in ILP processors. 7

UNIT–III

6. Differentiate between the following :

   (a) Processor consistency and memory consistency 4

   (b) Blocking issue and shelved issue 4

   (c) VLIW and Superscalar processor. 6

7. (a) What is speculative branch processing ? Discuss dynamic branch prediction schemes. 7

(b) Explain different techniques for early detect of branches. 7

UNIT—IV

8. (a) What is multicomputer ? How is it different from NUMA model ? Explain. 7

(b) Explain the characteristics of Star, Chordal ring of degree 3 and 2D Torus interconnection networks. 7

9. (a) What are multi-stage dynamic interconnection network ? Explain construction and working of 8×8 omega network. 7

(b) What is cache coherence problem ? Discuss snoopy cache coherence protocol. 7