

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?

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Contd.

#### 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. <http://www.kuonline.in> 7
5. (a) What is pipeline processing? Explain data hazards 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 8x8 omega network. 7  
(b) What is cache coherence problem? Discuss snoopy cache coherence protocol. 7