Code : 105205

2012 (A)

COMPUTER ARCHITECTURE

Time : 3 hours *Full Marks* : 70

Instructions :

(i) The marks are indicated in the right-hand margin.

*(ii) There are **TEN** questions in this paper.*

*(iii) Attempt any **FIVE** questions.*

1. *(a)* Draw and explain the flowchart for floating-point addition and subtraction. 6

(b) Perform multiplication for the following 6-bit numbers using Booth's algorithm :

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Show each step clearly indicating the Booth recoding. 4

(c) Write a program to evaluate the arithmetic statement $Y := (A + B) * (C + D)$ using three-address, two-address, one-address instructions. 4

2. *(a)* With the help of a diagram, clearly explain the functioning of a micro-programmed control unit. 6

(b) Explain the variety of techniques available for sequencing of micro-instructions based on the format of the address information in the micro-instruction. 8

3. *(a)* What is virtual memory? Why is it necessary to implement virtual memory? 4

(b) What are the different types of mapping techniques used in the usage of cache memory? Explain. 10

4. *(a)* Explain memory hierarchy with neat diagram. 4

(b) Explain the working of page translation mechanism. 6

(c) A virtual memory system has an address of 8 k words, a memory space of 4 k words, and page and block sizes of 1 k word. The following page reference changes occur during a given time interval :

4 2 0 1 2 6 1 4 0 1 0 2 3 5 7

Determine the four pages that are resident in main memory after each page reference change if the replacement algorithm used are *(i)* FIFO and *(ii)* LRU. 4

5. *(a)* What is pipelining? Explain pipeline processing with an example. 4

(b) Explain the basic structure of pipeline processor. 4

(c) Explain each stream of the Flynn's classification with an example. 6

6. *(a)* Define array processor. Explain SIMD array processor organization in detail. 8

(b) What are the different interconnection structures used in multiprocessor? Explain about multistage, crossbar switch. 6

7. *(a)* List some data transfer instructions and explain with example. 8

(b) Briefly explain about program control transfer instructions. 6

8. *(a)* What are the different modes of data transfer? Explain each mode in detail. 4

(b) What is direct memory access? Explain the working of DMA with a block diagram. 10

9. *(a)* Explain pipeline for floating-point addition and subtraction. 10

(b) Write a short note on vector processing. 4

10. Write short notes on any *three* of the following : 14

(a) Instruction format

(b) Paging

(c) Control memory

(d) Multiprocessor systems

(e) Instruction pipeline

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