Code : 051402

B.Tech 4th Semester Exam., 2014

COMPUTER ARCHITECTURE

Time : 3 hours *Full Marks* : 70

Instructions :

(i) All questions carry equal marks.

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

*(iii) Attempt **FIVE** questions in all.*

*(iv) Question No. **1** is compulsory.*

1. Answer any *seven* of the following questions :

(a) Registers R1 and R2 of a computer contain the decimal values 1200 and 4600. What is the effective address of the memory operand in each of the following instructions?

(i) Load 20(R1), R5

(ii) Add –(R2), R5

(b) What is the use of condition code register?

(c) What do you mean by end-around carry correction?

(d) Discuss the role of Booth algorithm in the design of fast multipliers.

(e) Why is the wait-for-memory-function-completed step needed when reading from or writing to the main memory?

(f) Write the sequence of control steps required for three-bus structure for the following instruction :

Add R4, R5, R6

(g) Define locality of reference.

(h) Give the features of a ROM cell.

(i) What is the difference between a subroutine and an interrupt service routine?

(j) Define bus arbitration.

2. *(a)* Explain the Flynn's classification of computer system architecture.

(b) Explain MIPS and MFLOPS.

3. A program runs on a 10 GHz CPU with the instruction mix and corresponding clock cycle count 20 as given in the table :

Instruction type	*Clock cycle count*	*Instruction count*
Control transfer	5	5000
Data transfer	4	4000
Floating point	2	2000
Integer	1	1000

Determine the following :

(a) CPI

(b) Execution time

(c) MIPS rate for program

4. (a) Explain fetch decode execution cycle.

(b) Differentiate between hardwired programmed control and microprogrammed control.

5. (a) Explain stack-based architecture of a CPU with the help of a diagram.

(b) List registers of a non-pipelined CPU. Explain the purpose of each register.

6. (a) Differentiate between expansion and extension of memory.

(b) Describe organization of a typical RAM chip. Differentiate between static RAM chip and dynamic RAM chip.

7. (a) Explain swapping. Why is it used in memory management?

(b) Explain virtual memory. Explain the role of logical as well as physical address.

8. Explain the use of DMA controllers in a computer system with a neat diagram.

9. Explain handshake protocol. Depict clearly how it controls data transfer during an input operation.

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