Tribhuvan University
Institute of Science and Technology
2072

Bachelor Level/ Second Year/ Third Semester/ Science
Computer Science and Information Technology (CSc. 201)
(Computer Architecture)
Full Marks: 80 | Pass Marks: 32 | Time: 3 hours.

Candidates are required to give their answer in their own words as far as practicable.
The figures in the margin indicate full marks.

Long Questions:
Attempt any two questions. (2×10=20)

1. Explain address mapping using pages. A virtual memory system has an address space of 8K words, a memory space of 4K words, and page and block sizes of 1K words The following page reference changes occur during a given time interval. (Only page changes are listed. If the same page is referenced again, it is not listed twice).

    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 is (a) FIFO (b) LRU

2. Why do computers need input-output interface? Explain the sequence of operations carried out during CPU-IOP communication with the help of suitable flowchart.

3. What is a microprogram sequencer? With block diagram, explain the working of microprogram sequencer.

Short Questions:
Answer any ten questions: (10x6=60)

4. Differentiate between address space and memory space. An address space is specified 24 bits and the corresponding memory space by 16 bits. If a page consists of 2K words, how many pages and blocks are there in the system?

5. What do you mean by interrupt? Draw and explain the flowchart for interrupt cycle.

6. Explain with an example, how effective address is calculated in different types of addressing modes.

7. What the difference is between isolated and memory mapped I/O? What are the different types of I/O commands.

8. Show the memory organization (1024 bytes) of a compute with four 128x8 RAM Chips and 512x8 ROM Chip. How many address lines are required to access memory?

9. Show the step-by-step multiplication process using booth's algorithm, when +14 is multiplied by -14. Assume 5-bit registers that hold signed numbers.

10. Briefly explain fixed-point representation of numbers. What is the signed magnitude, 1's complement and 2's complement of -9?

11. Explain about the basic computer instruction format. When instruction set is said to be complete.

12. Explain Overlapped register windows with suitable example.

13. Example the process of overflow detection with both signed and unsigned numbers.

14. Define selective-set, selective-complement, selective-clear, mask, insert and clear operation with an example.

15. Write short notes on the following.
    a) Integer representation
    b) Subroutines