



Name :

Roll No. :

Invigilator's Signature :

CS/B.TECH/IT(OLD)/EEE(OLD)/SEM-4/CS-404/2013

2013

COMPUTER ORGANIZATION AND ARCHITECTURE

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

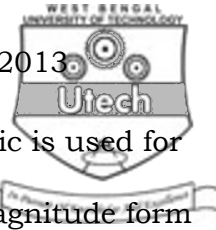
GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :

10 × 1 = 10

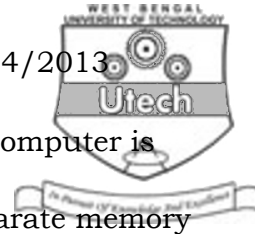
- i) With 2's complement representation, the range of values that can be represented on the data bus of an 8-bit microprocessor is given by
- a) – 128 to + 127 b) – 128 to + 128
- c) – 127 to + 128 d) – 256 to + 128.



- ii) Booth's algorithm for computer arithmetic is used for
- a) multiplication of number in sign magnitude form
 - b) multiplication of number in 2's complement form
 - c) division of number in sign magnitude form
 - d) division of number in 2's complement form.
- iii) Micro instructions are kept in
- a) main memory
 - b) control store
 - c) cache
 - d) none of these.
- iv) What is the 2's complement representation of 24 in a 16-bit microprocessor ?
- a) 0000 0000 0001 1000
 - b) 1111 1111 1110 1000
 - c) 1111 1111 1110 0111
 - d) 0001 0001 1111 0011.
- v) Associative memory is a
- a) pointer addressable memory
 - b) very cheap memory
 - c) content addressable memory
 - d) slow memory.



- vi) The principle of locality justifies the use of
- a) interrupts
 - b) polling
 - c) DMA
 - d) cache memory.
- vii) In a microprocessor the address of the next instruction to be executed is stored in
- a) Stack pointer
 - b) Address latch
 - c) Program counter
 - d) General purpose register.
- viii) A system has 48-bit virtual address, 36-bit physical address and 123 MB memory. How many virtual and physical pages can the address spaces support ?
- a) $2^{36}, 2^{34}$
 - b) $2^{12}, 2^{36}$
 - c) $2^{24}, 2^{34}$
 - d) $2^{34}, 2^{36}$.



- ix) The basic principle of von Neumann computer is
- a) storing program and data in separate memory
 - b) using pipeline concept
 - c) storing program and data in same memory
 - d) using a large number of registers.
- x) Physical memory, broken down into groups of equal size, is called
- a) Page
 - b) Tag
 - c) Block
 - d) Index.
- xi) A page fault
- a) is an access to a page not currently in memory
 - b) is an error in a specific page
 - c) occurs when a program access a page memory
 - d) none of these.
- xii) The mode field determines
- a) the type of addressing
 - b) the type of operand
 - c) the type of arithmetic or logic operation
 - d) the type of instruction format.



GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. What is virtual memory ? Why is it called virtual ? Write the advantages of virtual memory.
3. What is meant by parallel processing ? What is the basic objective of parallel processing ?
4. What do you mean by instruction cycle, machine cycle and T-states ?
5. Distinguish between vectored interrupt and non-vectored interrupt.
6. Compare RISC with CISC.
7. What is Operating System ? What are the different roles of an Operating System ?
8. What do you mean by memory ? Explain the Hierarchy / Pyramid of memory. $2 + 3$

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

9.
 - a) What is pipelining ?
 - b) What are speedup, throughput and efficiency of a pipelined architecture ?
 - c) Describe pipeline hazards.
 - d) Compare between centralized and distributed architectures. Which is the best architecture among them and why ? $2 + 3 + 5 + 3 + 2$



10. a) What is meant by DMA ? Why is it useful ? Briefly explain with suitable diagram the DMA operation in association with CPU.
- b) Draw the schematic diagram for daisy chain polling arrangement in case of vectored interrupt for three devices. 2 + 2 + 6 + 5
11. a) Discuss the principle of carry look ahead adder. Design a 4-bit CLA adder and estimate the speed enhancement with respect to ripple carry adder.
- b) Briefly state the relative advantages and disadvantages of parallel adder over serial adder.
- c) $X = [A + B] \times C$
- Write down the zero address, one address, three address instructions for the expression. 4 + 3 + 2 + 6
12. Write short notes on any *three* of the following : 3 × 5
- Page replacement policies
 - Vector process and their use
 - Interrupt servicing with priority interrupts
 - Architecture of I/O Processor
 - CAM
 - EPROM.



13. Explain Flynn's classification for multi-process system.

Discuss the advantage of vector processing over scalar processing. Explain the daisy chain that is used for bus arbitration in multiprocessor system.

6 + 4 + 5

14. Write down the flowchart of 2's complement multiplication (Booth's Multiplication) Multiply +14 with (- 13) using 5-bit Booth's multiplier.

6 + 9

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