

Invigilator's Signature :

COMPUTER ORGANIZATION

Full Marks : 70

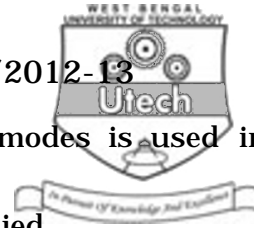
*Candidates are required to give their answers in their own words
as far as practicable.*

(Multiple Choice Type Questions)

- $$10 \times 1 = 10$$

- i) Maximum number of directly addressable locations in the memory of a processor having 10 bits wide control bus, 20 bits address bus and 8 bit data bus is
- a) 1 K b) 2 K
c) 1 M d) None of these.
- ii) 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 + 128
c) - 127 to ≠ 128 d) 0 - 255.

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- iii) Which of the following addressing modes is used in instruction RAL
 - a) Immediate
 - b) Implied
 - c) Direct
 - d) Register.
- iv) The principle of locality justifies the use of
 - a) Interrupts
 - b) polling
 - c) DMA
 - d) Cache memory.
- v) Periodic refreshing is needed
 - a) SRAM
 - b) DRAM
 - c) ROM
 - d) EPROM.
- vi) Subtractor can be implemented using
 - a) adder
 - b) complement
 - c) both (a) and (b)
 - d) none of these.
- vii) Physical memory broken down into groups of equal size is called
 - a) page
 - b) tag
 - c) block / frame
 - d) index.
- viii) Bi-directional buses use
 - a) Tri-state buffers
 - b) Two tri-state buffers in cascade
 - c) Two back to back connected tri-state buffer in parallel
 - d) two back to back connected buffers.
- ix) Micro Instruction are kept in
 - a) Main memory
 - b) Control memory
 - c) Cache memory
 - d) None of these.
- x) Instruction cycle is
 - a) fetch-decode-execution
 - b) decode-fetch-execute
 - c) fetch-execution-decode
 - d) none of these.

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**GROUP - B****(Short Answer Type Questions)**Answer any *three* of the following. $3 \times 5 = 15$

2. a) Explain the difference among three-address, two address, one address and zero address instruction for the equation $X = (A + B) * C$.
b) Explain Base-Index Addressing with proper example.
 $(4 + 1) = 5$
3. A disk drive has 20 sectors/track, 4000 bytes/sector, 8 surfaces all together. Outer diameter of the disk is 12 cm and inner diameter is 4 cm. Inner-track space is 0.1 mm. What is the no. of tracks, storage capacity of the disk drive and data transfer rate there from each surface ? The disk rotates at 3600 rpm.
4. What is a Von Neumann architecture ? What is Von Neumann bottleneck ?
 $(3 + 2) = 5$
5. What do you mean by Stack memory.

GROUP - C**(Long Answer Type Questions)**Answer any *three* of the following. $3 \times 15 = 45$

6. a) Draw a diagram for digital computer.
b) What is bus ? Draw and describe the bus architecture for a digital computer.
c) What are difference between Serial and Parallel transmission ?
 $4 + 7 + 4$
7. a) Explain Booth's algorithm for multiplication of signed 2's complement number in flow chart.
b) Apply Booth's algorithm to multiply the two numbers $(6)_{10}$ and $(-9)_{10}$. Assume the multiplicand and multiplier to be 5 bits each.

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- c) Explain the relative advantages & disadvantages of parallel adder over serial adder.
- d) What is virtual memory ? $5 + 4 + 4 + 2$
8. a) What is Cache memory ? Why is it needed ?
- b) Explain the Write-through and Write-back mechanism ?
- c) Given the following, determine the size of the sub fields (in bits) in the address for Direct Mapping, associative and Set associative mapping cache schemes :
- We have 256 MB main memory and 1 MB cache memory.
- The address space of this processor is 256 MB.
- The block size is 128 bytes.
- There are 8 blocks in a cache set.
- d) A three-level memory system having cache access time of 5 nsec and disk access time of 40 nsec, has a cache hit ratio of 0.96 and main memory hit ratio of 0.9. What should be the main memory access time to achieve an overall access time of 16 nsec ? $(2 + 1) + 2 + 5 + 5)$
9. a) What are the different types of DMA controllers and how do they differ in their functioning ?
- b) What is instruction cycle ? Draw time diagram for memory read operation.
- c) How does work polling ? $(7 + (1 + 4) + 3)$
10. Write short notes on any *three* of the following : $3 \times 5 = 15$
- Addressing modes
 - Bus organization using tristate buffer
 - Paging
 - Microinstruction.

