

C0-R4.B4 : COMPUTER SYSTEM ARCHITECTURE**NOTE :**

1. Answer question 1 and any FOUR from questions 2 to 7.
2. Parts of the same question should be answered together and in the same sequence.

Total Time : 3 Hours**Total Marks : 100**

1. (a) What is the significance of 2's complement in computer architecture ? Represent the 2's complement values 1101011 and 0101101 in decimal.
 (b) What is the benefit of using biased representation for the exponent portion of a floating-point number ? Represent the number (−24.75), as a floating-point binary number with 32 bits having exponent of 8 bits.
 (c) What is the difference between memory-mapped I/O and isolated I/O ? List the advantages and disadvantages of memory-mapped I/O over isolated I/O.
 (d) Explain the differences between hardwired control and micro-programmed control.
 (e) Compare and contrast three types of instructions in computers : Register-to-Register, Register-to-memory, and memory-to-memory.
 (f) What is the significance of addressing modes ? Differentiate between direct and indirect addressing modes.
 (g) An 8-bit register contains the signed binary value 10011100. What is the register value after arithmetic shift right ? Starting from the initial number 10011100, determine the register value after an arithmetic shift left, and state whether there is an overflow. (7x4)
2. (a) Differentiate between asynchronous data transfer and synchronous data transfer.
 (b) Discuss different phases of an instruction cycle.
 (c) Discuss the major Characteristics of CISC and RISC architectures. (6+6+6)
3. (a) What is cache memory ? Discuss the various procedures used for transformation of data from main memory to cache memory.
 (b) Explain the process of direct memory access with the help of a block diagram.
 (c) A two-way set-associative cache has lines of 8 bytes and a total size of 8 kB. The 32-MB main memory is byte addressable. Show the format of main memory addresses. (7+7+4)
4. (a) Explain branch instruction, Subroutine call and Interrupt.
 (b) DMA is transferring characters to the processor, from a device transmitting at 8800 bits per second. Assume DMA is using cycle stealing, If the Processor needs access to main memory once every microsecond, find how much percentage will the processor be slowed down due to DMA activity ?
 (c) Discuss the various techniques used for performing I/O operations. (6+6+6)

5. (a) Briefly explain symbolic address, memory-reference instruction (MRI), non-memory-reference instruction (non-MRI) and pseudo instruction in perspective of assembly language program.
- (b) Write an assembly language program for the arithmetic operation $83 - (-23)$.
- (c) What is the significance of memory management hardware ? Explain the functions of basic components of a memory management unit. (6+6+6)
6. (a) Describe Flynn's classification of multi-processor computer architectures.
- (b) Distinguish between centralized and distributed shared memory architectures.
- (c) What are the differences among sequential access, direct access, and random access ? (6+6+6)
7. Write short notes on the following :
- (a) Booth Multiplication
- (b) Instruction pipelining
- (c) Serial communication and parallel communication (6+6+6)

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