

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

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

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

1.
  - (a) Microprocessor executes instruction to solve the problem. Give the example of zero-address, one-address, two-address & three-address instruction.
  - (b) Differentiate between Complex Instruction Set Computer (CISC) & Reduced Instruction Set Computer (RISC) characteristics.
  - (c) Convert the following arithmetic expressions from infix to reverse polish notation :
    - (i)  $A + B * C$
    - (ii)  $A * (B + C)$
    - (iii)  $(A + B) * (C + D)$
    - (iv)  $(A + B) * [C * (D + E) + F]$
  - (d) What is meant by addressing mode ? Explain immediate, register & implicit addressing mode.
  - (e) The initial value of 8 bit register R is 10100010. What is the value of register R after each operation of logical shift left, circular shift right, logical shift right and circular shift left.
  - (f) Draw hardware implementation for signed-magnitude addition & subtraction.
  - (g) Write down the differences between serial communication and parallel communication. (7x4)
2.
  - (a) By drawing flowchart, write algorithm of Booth Multiplication. Show step by step multiplication process of following values.  
Multiplier : (-13), Multiplicand : (-9)
  - (b) What is Direct Memory Access (DMA) ? Draw the block diagram DMA Controller & explain it in detail. (10+8)
3.
  - (a) What is interrupt ? Explain types of interrupts.
  - (b) Draw block diagram of general register organization of computer. Write down steps of control unit to perform  $R1 \leftarrow R2 + R3$  operation.
  - (c) Write an assembly language program to multiply two unsigned number. (6+6+6)
4.
  - (a) Draw & explain block diagram of an asynchronous communication interface.
  - (b) Draw the diagram to show relation between the memory array and external registers in an associative memory having 4 words. Each word contain 3 cells. (10+8)

5. (a) Draw a space-time diagram for a six-segment pipeline showing the time it takes to process eight tasks.  
 (b) By using diagram, explain 4-bit adder-subtractor.  
 (c) What is the difference between branch instruction, subroutine call and interrupt ? (6+6+6)
  
6. (a) Draw block diagram of an 8-bit ALU with a 4-bit status register. Explain functionality of each bit of status register.  
 (b) What are the differences between isolated I/O and memory-mapped I/O ? What are the advantages and disadvantages of each ?  
 (c) Explain following architectures :  
     (i) SISD  
     (ii) SIMD  
     (iii) MIMD (6+6+6)
  
7. (a) Draw diagram of memory connection to CPU for 4 RAM (128 X 8 each) & 1 ROM (128 X 8). Use Address line number 8 & 9 to select RAM (00 - RAM1, 01 - RAM2, 10 - RAM3, 11-RAM4) & Address line number 10 to select RAM/ROM (0 - RAM, 1 - ROM). Address line numbers 11 to 16 should be 0. Also write the starting address & ending address of each RAM & ROM.  
 (b) What is instruction pipeline ? How it speedup execution of instruction ? Draw & explain flowchart of four segment instruction pipeline. (10+8)

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