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)   Provide the significance of following registers in CPU.

          PC, AR, IR, AC

    (b)   There is major speed mismatch exist between processor and peripherals. How does microprocessor communicate with slower peripherals ?

    (c)   What is circular shift and arithmetic shift ?

    (d)   What are the sequences of operations required for memory read and write ?

    (e)   How does microprocessor differentiate whether instruction is register, memory or I/O reference instruction ?

    (f)   Differentiate between Complex Instruction Set Computer (CISC) and Reduced Instruction Set Computer (RISC) architecture.

    (g)   What is direct addressing and indirect addressing mode ? How many memory references are required in direct address and indirect address ?

                                                                                          (7×4)

2. (a)   What is instruction pipelining ? What are the problems associated with it ?

    (b)   What are the general characteristics of Distributed Shared Memory (DSM) ? Write down the advantages and disadvantages of DSM.

    (c)   Draw and explain block diagram of general register organization of computer. How the control word is created for R1 ← R2 + R3 Operation ?

                                                                                          (6+6+6)

3. (a)   An interrupt is a signal to the processor emitted by hardware or software indicating an event that needs immediate attention. How does microprocessor handle interrupts ? Draw Flowchart of interrupt handling.

    (b)   During execution of instruction, the way the operands are chosen depends on addressing mode of instruction. Which are the modes of addressing ? Specify effective address of operand for each addressing mode.

                                                                                          (9+9)

---

4. (a) Booth's Multiplication is an algorithm that multiplies two signed binary numbers in two's complement notation. Draw and Explain, flowchart of Booth Multiplication.

   (b) In a typical computer, path must be provided to transfer information from one register to another. Draw the combinational circuit that transfers data from one register to another register using (i) Multiplexer (ii) Tristate buffer for 4-bit register.

   (9+9)

5. (a) What is the use of Associative Memory ? Explain hardware architecture of associative memory.

   (b) Draw Common Bus system diagram and explain procedure of transferring data from memory M using address stored in AR register to AC register. **(9+9)**

6. (a) Write an assembly language program to multiply two positive numbers. (Numbers are 13_{10}, 10_{10})

   (b) Instruction Set Completeness (ISC) is a set of sufficient number of instructions to support various operations. List operations which fulfills criteria of ISC.

   (c) Draw and explain flowchart for Instruction execution cycle. **(9+3+6)**

7. (a) DMA stands for Direct Memory Access. What are the modes of operation of data transfer ? How data is transferred between DMA and Processor ?

   (b) What is handshaking ? Explain source initiated transfer using handshaking.

   (c) List and explain shift micro-operations. Draw circuit for shift micro-operation.

   (6+6+6)

- o O o -