

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.

Time: 3 Hours

Total Marks: 100

1.
 - a) Perform following arithmetic operation using 2's complement integers.
 - i) $35 + (-10)$
 - ii) $20 - (-4)$
 - b) Write down the classification of computer according to Flynn.
 - c) What is instruction pipeline? What are the problems associated with Instruction pipeline?
 - d) What is direct addressing and indirect addressing mode? How many memory references are required in direct address and indirect address?
 - e) Starting from the initial value of $R=11010010$, find out the sequence of values in R after logical shift left, circular shift right, logical shift right and circular shift left.
 - f) What are the four phases of instruction execution?
 - g) Compare: Centralized and Distributed Shared Memory Architecture.

(7x4)

2.
 - a) What are the sequences of operations required for Memory read and write?
 - b) List and explain Shift micro-operations.
 - c) Draw Arithmetic circuit for following function table.

Select			Input Y	Output $D = A + Y + C_{in}$	Microoperation
S_1	S_0	C_{in}			
0	0	0	B	$D = A + B$	Add
0	0	1	B	$D = A + B + 1$	Add with carry
0	1	0	\overline{B}	$D = A + \overline{B}$	Subtract with borrow
0	1	1	\overline{B}	$D = A + \overline{B} + 1$	Subtract
1	0	0	0	$D = A$	Transfer A
1	0	1	0	$D = A + 1$	Increment A
1	1	0	1	$D = A - 1$	Decrement A
1	1	1	1	$D = A$	Transfer A

(4+6+8)

3.
 - a) Write a short Note on DMA.
 - b) Write down the characteristics of CISC and RISC architecture.
 - c) What are the basic difference between branch instruction, Subroutine call and Interrupt?

(6+6+6)

4.
 - a) Explain SISD, SIMD and MIMD architecture.
 - b) Differentiate between Auxiliary and Associative memory.

(9+9)

5.

- a) By taking suitable subroutine assembly language program, explain what is subroutine?
- b) Draw Common Bus System diagram and explain procedure of transferring data from memory M using address location AR to register AC.

(8+10)

6.

- a) Compare and contrast 1's complement and 2's complement representation of integer numbers.
- b) Provide the significance of following registers in CPU.
PC, AR, DR, IR, INPR, AC
- c) Draw and explain block diagram of General Register Organization of Computer. How the control word is created for $R1 \leftarrow R2 + R3$ Operation.

(5+6+7)

7.

- a) Explain Various Addressing modes of Basic Computer.
- b) Write an assembly language program to multiply two positive numbers. (Numbers are 13_{10} , 10_{10}).
- c) What are the phases of instruction cycle? What are the micro-operations associated with first two phases? By drawing common bus system, explain micro-operations of first two phases.

(6+6+6)