

2023(May)
BCA 2nd Semester

BCA203: Computer System Architecture (NEW)

Full Marks: 75

Pass Mark:30

Time: 3 hours

PART-A (All questions are compulsory)

[10x1]

1. Write true or false for the following:

- (i) In Boolean Algebra, the theorem $a + a = a$ is known as absorption theorem.
- (ii) In the half adder, the sum is represented by OR gate.
- (iii) The two's complement of 1111111111 is 1.
- (iv) ADD R,A,B is an example of two address instruction.
- (v) During MA transfer, the CPU is busy and controlling the memory buses.
- (vi) The value of stack pointer always points to the last item in the stack.
- (vii) The memory unit that communicates directly with the CPU is called auxiliary memory.
- (viii) The reverse polish notation of $(A*B)+(C*D)$ is $+AB*CD*$
- (ix) Cache is the slowest memory.
- (x) The multiplication of two floating point numbers requires that we multiply the mantissa and add the exponent.

PART-B (Answer any five questions)

[5x2]

2. (i) Draw the diagram of JK Flip Flop and also write its characteristic table.
- (ii) Write the similarity and difference between MUX and decoder.
- (iii) Convert $(C7BD)_{16}$ INTO Octal number.
- (iv) Construct a bus system for four registers.
- (v) Write the list of registers for the basic computer system.
- (vi) What are the three types of CPU organisation?
- (vii) Write the difference between strobe and handshaking in an asynchronous data transfer.

PART-C (Answer any five questions)

[5x5]

3. (i) Simplify the given Boolean expression using k-map
- $$Y = F(A, B, C, D) = \sum m(7, 9, 10, 11, 12, 13, 14, 15) + \sum d(0, 2, 6)$$
- (ii) Explain fixed point signed numbers representation with an example.
- (iii) Draw a flowchart of multiply operation and multiplication of signed-2's complement numbers.
- (iv) Explain CPU-IOP communication.
- (v) Explain four segment instruction CPU pipelining with flowchart and timing.
- (vi) Draw the diagram and function table for Arithmetic logic shift unit.
- (vii) Write short notes on Cache memory and Virtual memory.

PART-D (Answer any three questions)

[3x10]

4. (a) Explain full adder circuit with circuit diagram. [4]
- (b) Design a 2 of 4 decoder circuit and draw the circuit. [2]
- (c) Design a 4 to 1 MUX circuit and draw its circuit and write the output equation. [4]
5. (a) Explain each phases of an instruction cycle with a flowchart. [10]
6. (a) What is addressing mode? Why do computers use addressing mode technique? [1+2]
- (b) Write the general format of an instruction with mode field. Explain register-indirect mode, indirect address mode and base register addressing mode. [1+6]
7. Write short notes of the following: [5+5]
- (a) RISC and CISC
- (b) DMA