

MORADABAD INSTITUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Subject: Computer Organization & Architecture (KCS-302)

Session: 2019-20

Semester/ Branch: 3rd / CS

Assignment-1

Section: A, B, C

1. Convert the followings
 $(100100)_2 = (?)_{10}$
 $(235.41)_7 = (?)_{13}$
2. Perform the following operation on signed numbers using 2's complement method:
 $(56)_{10} + (-27)_{10}$
3. Show the bit configuration of 24 bit register when its contents represent the decimal equivalent of 195 in BCD.
4. Discuss self-complementing BCD code. Represent decimal number 6,248 in:
 - a. BCD
 - b. Excess-3 code
 - c. 2421 code
5. What is the radix of the numbers if the solution to the quadratic equation $x^2 - 10x + 31 = 0$ is $x = 5$ and $x = 8$?
6. What is multiplexer? Give some applications of multiplexer.

Or

Draw the circuit diagram of D Flip-Flop.

7. Explain: Serial Bus Arbitration or Parallel Bus Arbitration.
8. Define Bus system? Explain the architecture of Bus system.
9. What is asynchronous data transfer? Explain
10. Explain the interconnections between processor and memory.

Or

Write the function of Registers: (i) PC (ii) IR (iii) MAR (iv) MDR

11. Draw a diagram for Bus System with Multiplexers or Using Tri-state Buffers.
12. A digital computer has a common bus system for 16 registers of 32 bits each. The bus is constructed with multiplexers.
 - a. How many selection inputs are there in each multiplexer?
 - b. What size of multiplexers are needed?
 - c. How many multiplexers are there in the bus?
13. What are different micro - operations? Write their names also.
14. Represent the following conditional control statement by two register transfer statements with control functions
$$\text{If } (P = 1) \text{ then } (R1 \leftarrow R2) \text{ else if } (Q = 1) \text{ then } R1 \leftarrow R3$$
15. Consider the following register transfer statements for two 4-bit registers R1 and R2.
 $xT: R1 \leftarrow R1 + R2$
 $x'T: R1 \leftarrow R2$

Draw a diagram showing hardware implementation of two statements.

16. Draw a block diagram showing the hardware implementation of the register transfers

$T0: R5 \leftarrow R0$

$T1: R5 \leftarrow R1$

$$T2: R5 \leftarrow R2$$

$$T3: R5 \leftarrow R3$$

The required transfers are dictated by four mutual exclusive timing variable T0 to T3.

17. Design an Arithmetic circuit with one variable S and two n bit data inputs A and B. The circuits generate the following four arithmetic operations in conjunction with the input carry C_{in} . Draw the logic diagram for the first two stages

S	$C_{in}=0$	$C_{in}=1$
0	$D = A + B$	$D = A + 1$
1	$D = A - 1$	$D = A + \bar{B} + 1$

18. Design a digital circuit that performs the four logic operations of exclusive-OR, exclusive-NOR, NOR and NAND. Use two selection variables. Show the logic diagram of one typical stage.
19. Register A holds the 8-bit binary **11011001**. Determine the B operand and the logic micro-operation to be performed in order to change the value in A to
- 01101101**
 - 11111101**
20. Give the hardware implementation of following operations;-
- Selective set
 - Selective complement
21. Starting from an initial value of R = **11011101**, determine the sequence of binary values in R after a logical shift-left, followed by a circular shift-right, followed by a logical shift right and circular shift-left.
22. What is general register organization?
23. Specify the Control word that must be applied to the processor to implement the following micro-operation
- $R1 \leftarrow R2 + R3$
 - $R4 \leftarrow R4$
 - $R5 \leftarrow R5 - 1$
 - $R6 \leftarrow shl R1$
 - $R7 \leftarrow input$
24. What is stack organization? Compare register stack and memory stack.
25. Let SP = **000000** in the stack. How many items are there in the stack if:
- FULL = 1 and EMPTY = 0
 - FULL = 0 and EMPTY = 1
26. Convert the following arithmetic expressions from infix to reverse polish notation.
- $A * B + C * D + E * F$
 - $A + B * [C * D + E * (F + G)]$
 - $\frac{A * [B + C * (D + E)]}{F * (G + H)}$
27. Convert the following arithmetic expressions from reverse Polish notation to infix notation.
- $ABCDE + * - /$
 - $ABC * / D - EF / +$

28. Convert the following numerical arithmetic expression into reverse Polish notation and show the stack operations for evaluating the numerical result.

$$(3 + 4)[10(2 + 6) + 8]$$

Instructions

1. Draw diagrams only wherever it is applicable.
2. In theoretical question, give definitions only or summarize in points.
3. Submit all the questions in separate assignment notebook.
4. Last date to submit assignment is 16th Sep 2019.
5. Kindly go through each and every question for externals.

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B119

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