June 20, 2024

Logic Design – Quiz I

I. Short Answer

1. What are the main components of low-level computer architecture, and how do they interact to perform computing tasks? Use a specific example to illustrate their interaction.
2. Explain the concept of quantum computing and how it differs from classical computing.
3. Explain how discrete information is represented in digital systems using binary code. How does this representation enable the efficient processing and storage of data?

II. Fill in the blanks with the correct word or words

4. Conversion from decimal to binary requires repeated division by _____.
5. In the BCD code, each _____ is converted to its four-bit binary equivalent
6. The _____ code has the characteristic that only one bit changes in going from one step to the next.
7. The _____ code is the common alphanumeric code used in computer systems.
8. A string of eight bits is called a _____
9. The device most commonly used for holding data is _____

III. Workout

10. Using 7 bits, write the number $(-43)_{10}$ in i) signed magnitude, ii) signed 1's complement and iii) signed 2's complement representations.
11. Convert the decimal number (47.0625) to binary, octal and hexadecimal.
12. Find the diminished radix and the radix complement of (i) $(10000)_{10}$ (ii) $(510640)_8$ (iii) $(F2C20)_{16}$
13. i) $(847)_{10}$ = ($)_{BCD}$
    ii) $(395)_{10}$ = ($)_{Excess\text{-}3}$
    iii) $(638)_{10}$ = ($)_{2421}$

14. Express the following numbers in decimal:

    a. $(1100110.110)_2$

    b. $(743.50)_8$

15. Convert the following binary number to Octal and to Hexadecimal: $(1011001.1011001)_2$

16. Convert the following **Hexadecimal** number to **Octal**: $(6F9E1A.5C2B)_{16}$

17. Perform the **BCD** addition of 882 + 831.

18. Convert decimal 6514 in ASCII codes. For ASCII, an even parity bit is to be appended at the left.

19. Derive the truth table for 2-input AND and OR functions and show their logic symbols.

20. Convert the following decimal numbers **60** and **34** to binary using the signed 2's complement representation and enough digits to accommodate numbers. Then perform the binary equivalent of **(-60) + (-34).**