ASSIGNMENT NO 1

Q.1 Imagine you're building a simple computer system for educational purposes. This computer will be used to perform basic calculations and store simple data. Then, explain all the necessary building blocks which are required to build such a computer which perform basic calculations and store simple data.

OR

Q.1. Imagine you're explaining computer organization to a friend who is new to the concept. How would you describe the role of necessary building blocks of computer organization in this context?

OR

Q.1 You're tasked with designing a basic calculator using the principles of computer organization. Describe how you would use different block which are required to perform simple calculation.

Q.2. Imagine you're a programmer working on a scientific simulation software for a space agency. The software is responsible for calculating the trajectory of a spacecraft as it approaches a distant planet. Accurate calculations are crucial to ensure the spacecraft's safe landing on the planet's surface. You realized that Regular fixed-point arithmetic won't calculate velocity of the space craft because it can't handle such a dynamic range effectively. This is where IEEE floating-point representation comes into play. For example, when dealing with the spacecraft's velocity, you come across a value like +85.125 m/s. Using IEEE 64 bit floating-point representation, to represent this number.

Q.3. Imagine you're a computer scientist working on developing a system to calculate the net profit or loss of a retail business. The business deals with both positive profits and negative losses. To represent financial transactions, you're using a 4-bit signed binary representation,

Scenario: The retail business had the following transactions for a day:

1.   The business made a profit of rupees 7.

2.   Later in the day, there was a of rupees 3.

3.   There was another profit of rupees 6.

4.   Finally, a substantial loss of rupees 9 was incurred.

You need to accurately calculate the net profit or loss using signed binary arithmetic.

Question:

a) Represent each of the four transactions using 4-bit signed binary representation. Indicate the sign bit and the remaining bits for each transaction.

b) Calculate the net profit or loss for the day by performing signed binary addition on these representations. Provide the binary representation of the result. Take into account overflow and carry/borrow considerations.