Ex 1.

In RISC-V assembly language, the R-format instructions are used to perform register-to-register operations. These instructions include fields like funct3 and funct7, which play key roles in specifying the operation to be executed.

**- funct3 field:** Helps differentiate between groups of operations or specific variations of instructions.

For e.g. ADD instruction and SUB instruction both have the same funct3 value (0x0)

**- funct7 field:** Provides all variations of a group of operations.

Ex 2.

(Assuming SB-instructions are B-instructions)

The differences between these two groups of instruction are:

1. Purpose

**- S-format:** Used for store instructions (e.g., sw, sb, sh). These instructions write data from a register into memory.

**- SB-format:** Used for branch instructions (e.g., beq, bne, blt). These instructions perform conditional branches based on comparisons between register values.

2. Layout

- The opcode, funct3, rs1, rs2 are the same. However,

- **The S-format** imm field will be divided into 2 parts. The first 5 bits (imm[4:0]) will be in 7th bit to 11th bit, while the remaining 7 bits (imm[11:5]) will be in 25th bit to 31st bit.

**- The SB-format** imm field will also be divided into 2 parts. However, the bits are divided into 2 groups, imm[4:1|11] and imm[12|10:5]. The position of these two groups in the machine code is the same.