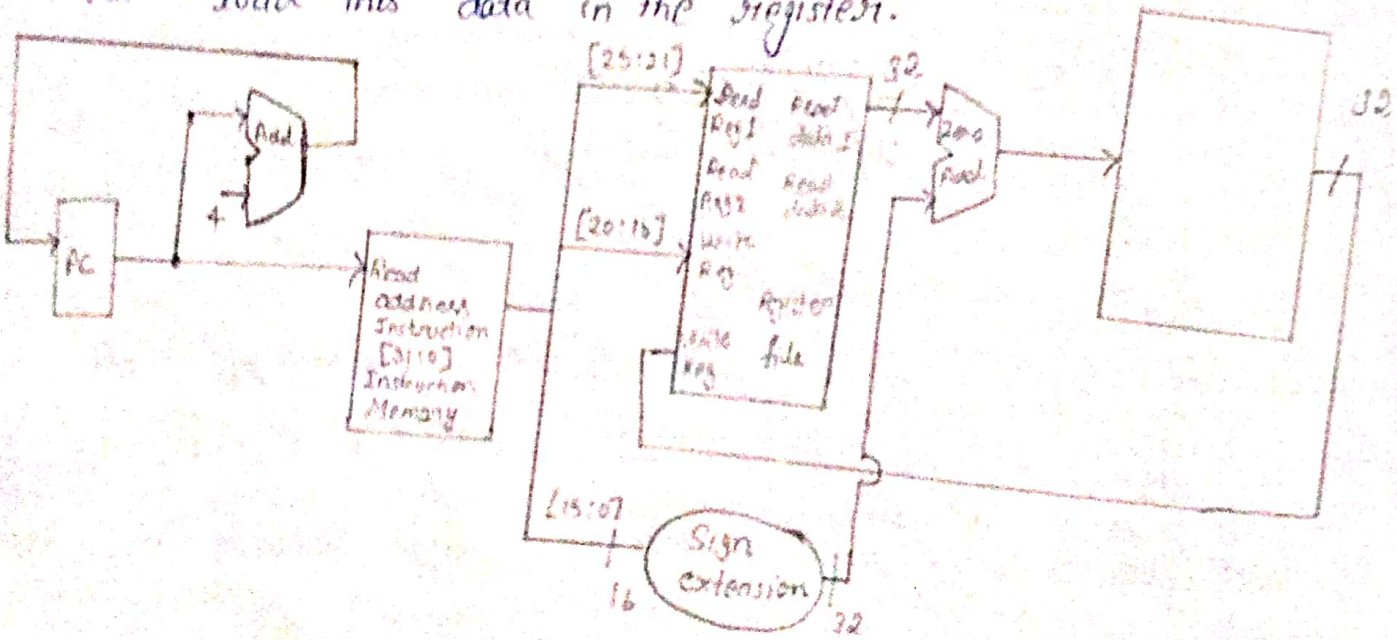
Date - 31/08/23

Assignment - 7

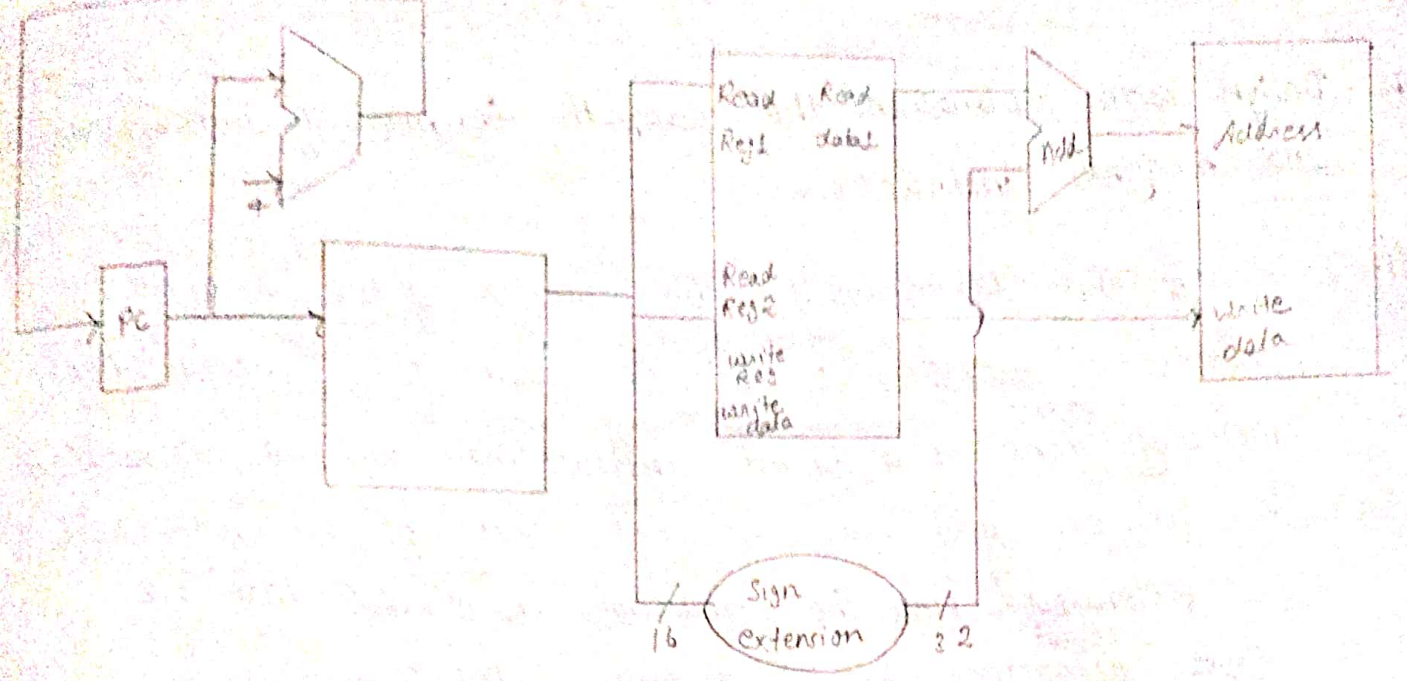
Q1. Design with explanation the datapath of lw instruction.

Ans. For load word instruction (eg. lw $s0, 10($s1)), there is two address for the register, one representing read register and another representing write register. These two addresses are given to the register file and one 32-bit data is read from the register file and fed to ALU. The remaining 16 bit data which is contained in the instruction is extended to 32-bit data and fed to the ALU for calculation of address in the data memory. It is given back to the register file load this data in the register.



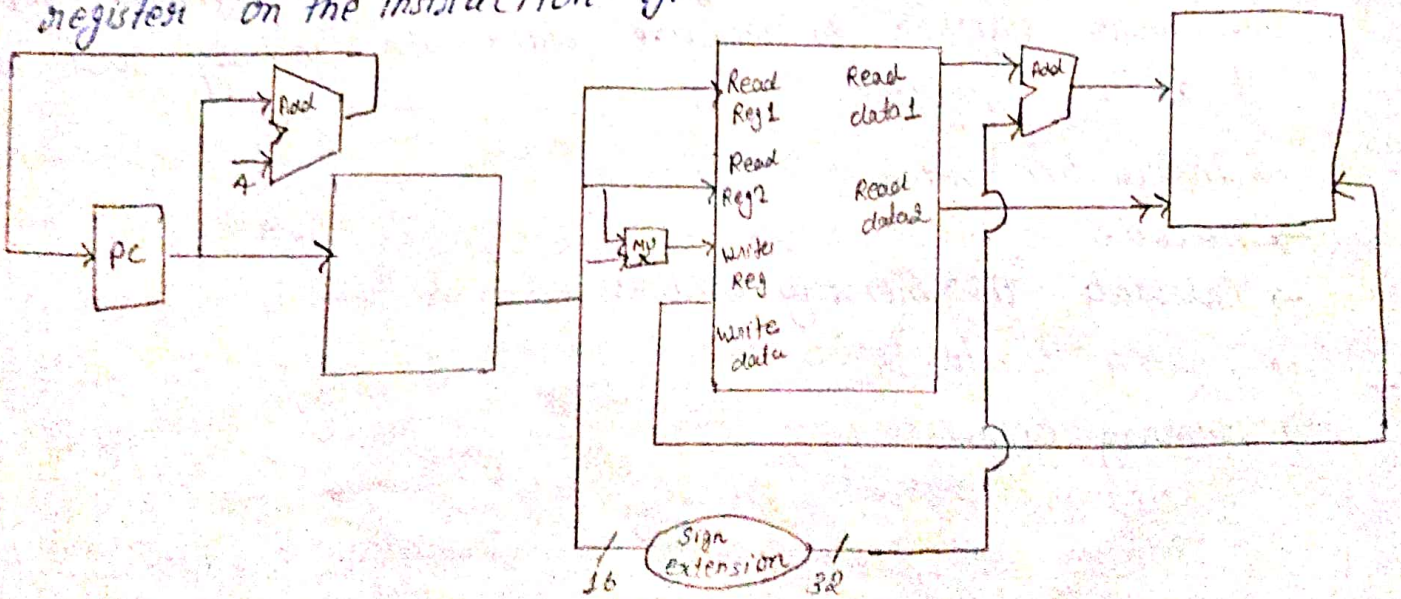
Q2. Design with explanation the datapath of sw instruction

Let us consider the datapath design for store word instruction (eg: sw $s0, 10($s1)). Here, address of two register is given one address representing the data to be read from the register file and this data will be written in the data memory, other register address along with the 16-bit no. which is extended to 32-bit no. are added together to provide the address of the data memory where the data is to be stored.



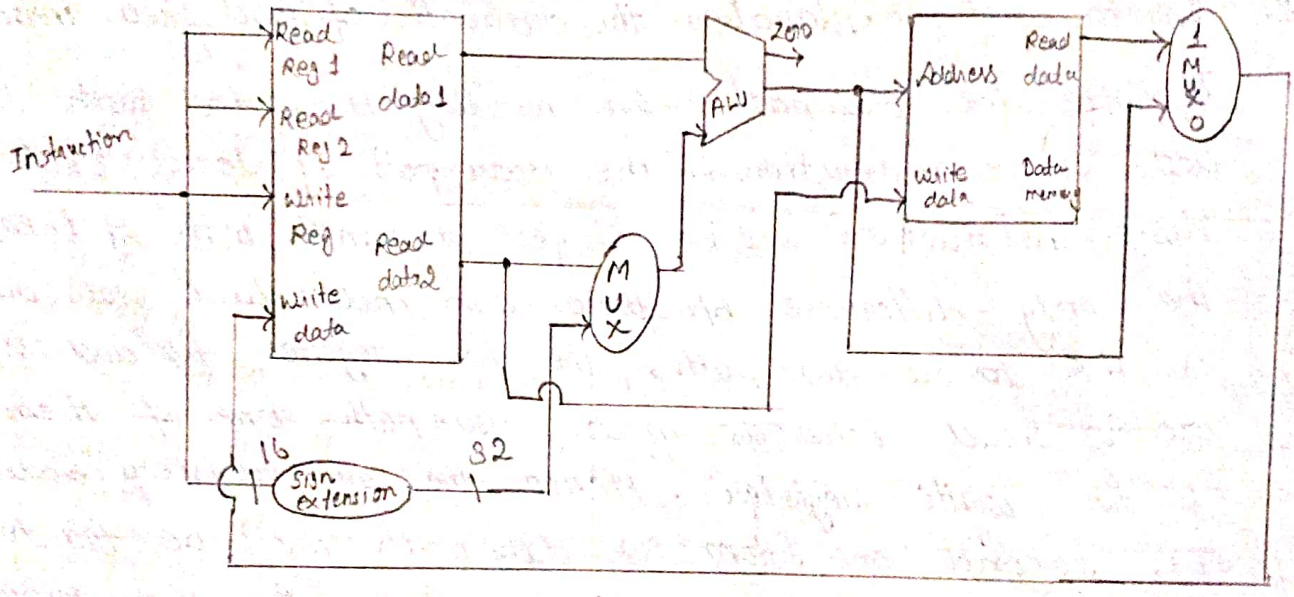
Q5. Design with explanation the datapath of load store instructions.

Ans. To design the datapath for handling the ~~data~~ both load and store instruction, the data path of load and store instruction will be merged to handle both of them. The only difference b/w these two individual data path is the lw sw data path, the two registers file address are for read whereas in lw data path one of them is for write register. Hence the two register address i.e, second one from sw data path must be fed to a multiplexer. So, that one is selected for the rigid register on the instruction type.



Q4. Design with explanation the datapath for memory instructions and R-type instruction.

Ans/. Here, The PC provides the address of the R-type instruction which is fetched from the instructions memory which is a 32-bit instruction and the instruction is decoded and the different field of the instruction is extended. Here the instruction is divided into six part according to the R-type instructions.



The datapath for memory instruction involves several components that work together to retrieve data for memory and write it to a register.

→ Instruction fetch.
→ Decode
→ Calculate the memory address
→ Register write.
→ Memory access.