Question 1 (Basic MIPS Implementation-4.1,4.2,4.3):

Construct the simple datapath for the core MIPS architecture by combining the elements required by different instructions classes (R-type, I-type). Test you datapath for the following instructions and write down the name of the components that get used by each of the instructions respectively.

1. add
2. AND
3. beq
4. lw
5. sw
6. OR
7. Slt
8. Sub

Question 2 (Basic MIPS Control-4.4):

Consider Figure 4.17 (Simple datapath with Control unit). It has two control units, the main control and the ALU control. The input to the main control is the 6-bit OpCode field form the instruction. The output consists of several 1-bit and one 2-bit signals. The input to the ALU control is the 2-bit output (ALUOp) form the main control. This ALUOp along with the 6-bit function field from the instruction (if exist) identifies the **operation control** of the ALU.

1. For the following instructions identify the output bits that required to set (1) and does not require to set (0).
2. Also identify the operation controls.
3. The instruction set for the above two questions are: add, sub, AND, OR, slt, beg, j, lw, sw

Question 3 (MIPS Pipeline-4.5):

For each code sequence below, state whether it must stall, can avoid stalls using only forwarding, or can execute without stalling or forwarding:

Sequence 1	Sequence 2
lw $t0,0($t0)	add $t1,$t0,$t0
add $t1,$t0,$t0	addi $t2,$t0,#5
	addi $t4,$t1,#5