1. Can you tell at least 5 common rules of assembly language?

   Five common rules of assembly language include:

   - Syntax: Follow specific syntax for instructions and operands.
   - Labels: Use labels to define locations for instructions and data.
   - Operands: Ensure operands match the expected types and formats.
   - Comments: Use comments to annotate and explain code.
   - Directives: Use directives to control the assembly process and memory allocation.

2. Explain 3 major fields in an instruction: the operation field, the address field and the mode field

   Operation Field: Specifies the operation to be performed.
   Address Field: Contains the address of the operand or data.
   Mode Field: Indicates the addressing mode or how the address should be interpreted.

3. Explain types of micro-operations(Register transfer, Shift, Logic, Arithmetic) with examples.

   Arithmetic Micro-Operations: Perform basic arithmetic operations like addition and subtraction.

   ```
   Ex: MOV AL, 5 ;
      ADD AL, 10 ;
   ```

   Logic Micro-Operations: Perform logical operations such as AND, OR, and NOT.

   ```
   Ex: MOV AL, 0xF0 ;
       MOV BL, 0x0F ;
       AND AL, BL    ;
   ```

   Shift Micro-Operations: Shift the bits of a register left or right.

   ```
   Ex: MOV AL, 0x01 ;
       SHL AL, 1     ;
   ```

   Transfer Micro-Operations: Move data from one register to another.

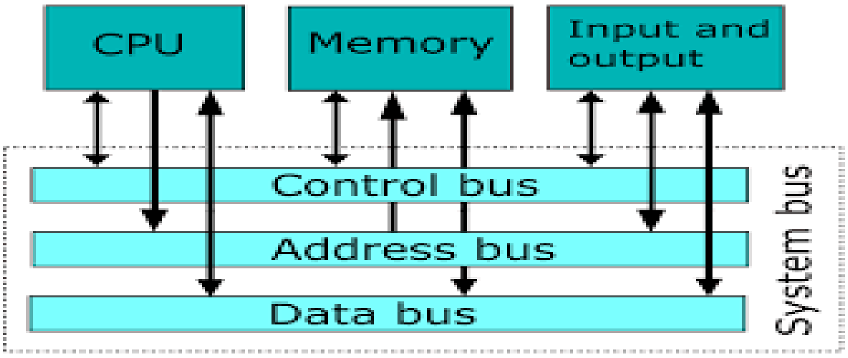
   ```
   Ex: MOV AL, 0x55 ;
       MOV BL, AL ;
   ```

4. What is a horizontal microcode? Why do we use it?

   Horizontal microcode is a micro coding technique where each microinstruction directly specifies the control signals needed for the operation, allowing for more complex and flexible control but requiring more memory.

5. Explain 3 major types of busses - address, data and control bus with an example.

   a. Data Bus: Transfers data between components.
   b. Address Bus: Carries addresses to locate data in memory.
   c. Control Bus: Sends control signals to manage data transfer and operations.



6. Give one example of the below instructions

   a. Arithmetic instructions.

```
MOV AL, 5 ;
ADD AL, 10 ;
```

b. Branch instructions

```
JMP label ; Jump to the location marked by 'label'
```

c. Data transfer instructions

```
MOV AL, 25 ; Load the value 25 into the AL register
```

d. Logic instructions

```
MOV AL, 0x0F ;
AND AL, 0xF0 ;
```

e. Bit-oriented instructions

```
MOV AL, 0x01 ;
SHL AL, 1 ;
```