1. What is Effective Address?
2. What are the purposes of using register pairs?
3. What are the differences between the indexed addressing and indirect addressing? What are the usages of each mode? Use some examples.
4. Compare the direct and indirect addressing mode with proper examples. In each mode, how many accesses does the processor have to refer to memory?
5. Describe the auto-decrement addressing mode. What are the differences between this mode and post-decrement addressing mode? Try to bring some examples for each mode.
6. What types of registers are necessary for a microprocessor? Define and bring some reasons.
7. Determine the effective address in each of the following instructions:
   a. MOVE R1, M[$3F]
   b. ADDI R1,#40
   c. INC R3
   d. MOVE R2, 100(R2)
8. Describe CCR (Condition Code Register) bits and explain what their functionality and how programmers can use them.
9. A machine has 256K addressable units. Each AU has 32 bits length. This machine also has 64 registers with 32-bit length. Each
instruction in this machine has a length of a 32-bit word. Each instruction consists of 4 different parts:
   a. Opcode
   b. Memory address
   c. Register address(code)
   d. 1 bit indicating *Indirect* addressing mode

Now answer these questions:

I. How many bits do we need to indicate executable codes, registers and memory addresses?

II. Draw the shape of instruction format and indicate the functionality of each bit.

III. How many bits are needed for *data bus* and *address bus*?

10. We have a machine with these properties:
   a. R1 and R2 are 16-bit registers.
   b. AUs has 16 bits.
   c. Value of R1 is 1000.
   d. Value of R2 is 2000.
   f. All numbers are hexadecimal.

Explain after executing each of instructions below, which register or which memory cells will change and what will be the new value of them. Also tell how many memory references do we need.

I. ADD R1, @R2
II. ADD 1000(R1), @R2
III. ADD #2000, @R2