Q-22)

Answer:

The machine language program given will need further analysis based on the actual instructions in it. However, with the provided instruction set table, a typical machine language program might perform tasks such as loading values into registers, performing arithmetic operations, storing results back into memory, and making conditional jumps. To give a precise function, we would need the actual series of instructions.

Q-23)

Answer:

1 080 ; Load the value from memory cell 80h into register 0

8 001 ; AND the value in register 0 with the bit pattern 01111111 to clear the sign bit

3 080 ; Store the modified value back into memory cell 80h

C 000 ; Halt

Q-24)

Answer:

1 0A0 ; Load the first number into register 0

1 1A1 ; Load the second number into register 1

7 022 ; OR the sign bit of register 0 with the sign bit of register 1, store in register 2

5 034 ; Add the values in register 0 and register 1, store in register 4

4 504 ; Move the result from register 4 to register 0

8 000 ; AND the result with the bit pattern 10000000 to check the sign bit

B 0A8 ; JUMP if the sign bit of the result is the same as the original

1 080 ; Otherwise, overflow has occurred

C 000 ; Halt

Q-25)

Answer:

A. 4034

Instruction: 4 R0S

- **4**: MOVE the bit pattern found in register R to register S.
- **R**: 0
- **S**: 3

Decode: MOVE the bit pattern from register 0 to register 3.

B. 8043

Instruction: 8 RST

- **8**: AND the bit patterns in registers S and T and place the result in register R.
- **R**: 0
- **S**: 4
- **T**: 3

Decode: AND the bit patterns in registers 4 and 3 and place the result in register 0.

C. B2A8

Instruction: B RXY

- **B**: JUMP to the instruction located in the memory cell at address XY if the bit pattern in register R is equal to the bit pattern in register 0. Otherwise, continue with the next instruction in sequence.
- **R**: 2
- **XY**: A8

Decode: JUMP to the instruction at address A8 if the bit pattern in register 2 is equal to the bit pattern in register 0.

D. 2045

Instruction: 2 RXY

- **2**: LOAD the register R with the bit pattern XY.
- **R**: 0
- **XY**: 45

Decode: LOAD register 0 with the bit pattern 45.

Q-26)

Answer:

A. **Instruction**: 29A5

B. **Instruction**: 1FB5

C. **Instruction**: 5546

D. **Instruction**: 7546

Q-27)

Answer:

A. **Bit Pattern in Register 4**:

- Register 4 is not explicitly modified by the given instructions, so it retains its initial state unless the contextual instructions affect it.

B. **Bit Pattern in Register 1**:

- After instruction at address 02 (`LOAD register 1 with value 4`), register 1 should contain the value 4.

Q-28)

Answer:

A)

- **Register 5**: Based on the instructions, there is no explicit modification or loading of register 5 mentioned in the provided instructions, so it likely remains unchanged from its initial state.

B)

- **Program Counter**: The program counter will contain the address of the HALT instruction, so it will be at `0D` or just after the HALT command is executed, likely pointing to the next address `0E`.

C)

- **Memory Location 04**:
  - Before HALT, the last STORE operation was `08: 34`, which stores the contents of register 3 into memory location 4.
  - Assuming register 3's value prior to this operation, the bit pattern in memory location 04 will be the content of register 3.
  - The exact value of register 3 depends on previous operations or initial values.

Q-29)

Answer:

```
2 0000 ; LOAD register 0 with the value 0

5 0022 ; ADD register 0 and the value 2, store in register 0

B 010A ; JUMP to instruction at address 0A if register 0 is less than 10

C 0000 ; HALT
```