Strathmore University

Bachelor of Science in Informatics and Computer Science (BICS)

Group A Task – 11/06/2025

Kemoi Kristina Chebet – 168652

Mukoma Dennis Murage – 139360

Mudibo, Sean Kadida - 168329

QUESTION 1:

To determine the minimum number of bits required for the PC, to address all memory locations, carry out the following steps:
- Example, if you want to address a minimum of 8 locations, you'll need address the following locations: 000, 001, …, 111.

- We needed 3 bits to address all locations
- The relation between the 3 bits and 8 locations is $2^3 = 8$. Hence to address n locations, we need a minimum of $\log_2 (n)$ bits

QUESTION 2:

The SIM, Set Interrupt Mask, instruction in the 8085 microprocessor is used to set and reset the maskable interrupt lines of the 8085 microprocessor, which are RST 7.5, RST 6.5, and the RST5.5. It works with an 8-bit accumulator. The 8 bits are used to control the interrupt masking/unmasking, resetting the RST 7.5 flipflop, and sending serial output.

D7 – Used for Serial Input Data

D6 – Serial Output data

D5 - Serial Output Enable

D4 – Reset RST 7.5 flip flop

D3 – Mask Set Enable

D2 – Mask RST7.5

D1 – Mask RST6.5

D0 – Mask RST5.5 Interrupt

QUESTION 3:

The 8255 is a programmable peripheral interface that provides 3 8-bit I/O ports, A, B and C.| Some of the attributes are:

1. Each port can be programmed as Input or Output
2. Port C can be split into 2 4-bit ports
3. It operrates on 2 main modes BSR or I/O mode

Starting with I/O mode:

1. Mode 0 – Simple I/O
    - No handshaking

    - Output latched
2. Mode 1 – Handshaking I/O
    - Uses port C for handshaking
    - Supports interrupt driven I/O
3. Mode 2 – Biderectional I/O
    - There is bi-directional data transfer
    - Only for port A

BSR mode is only used for Port C only. Each line of port C is set or reset accordingly by the control word. Lets explore how the control word controls the BSR mode bit by bit.
D7 bit is always 0 for BSR mode

Bits D4, D5 and D6 are don't care bits

Bits D3, D2, D1 are used to select the pin used in port C since port C is 8 pins needs 3 bits to address each pin

Bit D0 is used to set or reset the pin with 0 being set and 1 being Reset

QUESTION 4:

A counter is a device that counts the number of occurrences of events and increments its value every time it receives an external signal, while a timer is a digital circuit that measures time intervals based on a known clock source. The following are some of the differences between the two:

- Counters use external pulses as inputs, while Timers use the internal clock as input
- Timers measure time intervals while Counters measure the number of occurrences of an event
- Counters depend on the accuracy of an external source, while timers depend on the accuracy of the system clock

References

Ravivarman, D. N. (n.d.). *Microprocessor and Microcontroller.*