**Micro Processor & Embedded Systems**

**Assignment-1**

****

**NAME: – Vanshika Garg**

**BRANCH – CSE Devops**

**BATCH - B2**

**ROLL NO –R17217059**

**SAP ID – 500061511**

**Q.1 Differentiate between memory mapped and I/O mapped technique for 8085 microprocessor.**

Ans1.

| **Sr. No.** | **I/O Mapped I/O** | **Memory Mapped I/O** |
| --- | --- | --- |
| 1. | Maximum number of I/O devices that can be addressed is 256. | Maximum number of I/O devices that can be addressed is 65536 (theoretically). |
| 2. | I/O device has an 8 or 16 bit I/O address. | I/O device has a 20 bit Memory address. |
| 3. | I/O device is given IOR# and IOW# control signals | I/O device is given MEMR# and MEMW# control signals |
| 4. | Decoding is easier due to lesser address lines | Decoding is more complex due to more address lines |
| 5. | Decoding is cheaper | Decoding is more expensive |
| 6. | IN and OUT are the only available instructions. | Instructions available are STA addr, LDA . |

**Q.2 For a RAM Memory 16 K x 8 RAM IC, Calculate the followings.**

1. **No of Address lines**
2. **No of data lines**
3. **No of registers**
4. **No. of memory cells**
5. **No of Pages**
6. **No of chips required using 8K x 4 RAM IC.**

**Ans:**

1. No. of address lines: =>2^4 X 2^10 = 2^14 =14 address lines
2. No. of data lines:=>For 16K X 8, number of data lines required = 8
3. No. of registers:=> With 14 address lines, number of registers =16\*1024= 2^14 = 16384
4. No. of memory cells: =>16384\*8=131072
5. No. of pages: => 16384/256=64 pages
6. No. of clips required using 8K X 4RAM IC=>2^17/2^15 = 4 chips

**Q.3 Calculate the No of T states, with respect to 8085 microprocessor and write in the space is provided in table. Refer one example shown in table for the instruction STA 9000 H**

|  |  |
| --- | --- |
| Instruction | T- State calculation |
| STA 9000H | Opcode fetch(4 T) + Memory read(3 T)+ Memory read(3T)+ Memory write(3 T) = 13 (Total T- states) |
| IN 80 H | Opcode fetch(4 T) + Memory read(3 T)+I/O Read (3 T) = 10 (Total T- states) |
| RST 7 | Opcode fetch(6 T) + Memory Write(3 T)+ Memory Write(3 T) = 12 (Total T- states) |
| INR M | Opcode fetch(4 T) + Memory read(3 T)+ Memory read(3T)+ Memory write(3 T) = 13 (Total T- states) |
| HLT | Opcode fetch(4 T) + BUS IDLE Cycle(1 T) = 5 (Total T- states) |
| PCHL | Opcode fetch(6 T) = 6 (Total T- states) |
| LDA 9000H | Opcode fetch(4 T) + Memory read(3 T)+ Memory read(3T) + Memory read(3T)= 13 (Total T- states) |
| LXI 2000H | Opcode fetch(4 T) + Memory read(3 T)+ Memory read(3T)= 10 (Total T- states) |
| PUSH H | Opcode fetch(4 T) + Memory write(3T)+ Memory write(3 T) = 10 (Total T- states) |
| POP PSW | Opcode fetch(4 T) + Memory read(3 T)+ Memory read(3T)= 10 (Total T- states) |
| DAD B | Opcode fetch(4 T) + Bus IDLE(3 T)+ BUS IDLE(3T) = 10 (Total T- states) |

**Q.4 Calculate the time delay of the following program with count value FFFFH and Crystal frequency of 3MHz**

**DELAY: LXI H, Count 10-T states**

**LOOP: DCX H 6-T states**

**MOV A, L 4-T states**

**ORA H 4-T states**

**JNZ LOOP 7/10-T states**

**RET 10**

Ans 4.

| **Program** | **Time (T-States)** |
| --- | --- |
| **LXI B,FFFFH** **LOOP: DCX B** **MOV A,B** **ORA C** **JNZ LOOP** **RET** | 10 6 4 4 10 (For Jump), 7(Skip) 10 |

10 + (6 + 4 + 4 + 10) \* 65535H – 3 + 10 = 17 + 24 \* 65535H = 1572857. So the time delay will be 1572857 \* 1/3µs = 0.52428s.

Approximately, **0.5s delay.**