Department of Electrical Engineering, IIT Bombay

EE309 Computer Organization, Architecture and Microprocessors: Tutorial Sheet IV

The 8085: Interrupts

1. *Gaonkar 4Ed., Chapter 12*
   Check whether the following statements are true or false:

   (a) If the 8085 microprocessor is interrupted while executing a 3-byte instruction (assuming the interrupt is enabled), the processor will acknowledge the interrupt request immediately, even before the completion of the interrupt.

   (b) When an 8085 system is reset, all interrupts including the TRAP are disabled.

   (c) When the 8085 microprocessor acknowledges an interrupt, it disables the interrupt system (except TRAP).

   (d) If the instruction `RST 4` is written in a program, the program will jump to location $0020h$ without any external hardware.

2. *Gaonkar 4Ed., Chapter 12*
   The main program is stored beginning at $0100h$. The main program at $0120h$ has called the subroutine at $0150h$, and when the microprocessor is executing the instruction at $0151h$ (`LXI`), it is interrupted:

```
start:  0100h   LXI SP, 0400h
        0103h   EI
        ...
        0120h   CALL 0150h
        ...
sub:    0150h   PUSH B
        0151h   LXI B, 10FFh
        0154h   MOV C, A
        ...
        015Eh   POP B
        015Fh   RET
```

   (a) Specify the contents of stack location $03FFh$ after the `CALL` instruction.

   (b) Specify the stack locations where the contents of registers B and C are stored.

   (c) When the program is interrupted, what is the memory address stored on the stack ?

3. *Gaonkar 4Ed., Chapter 12*
   A program is stored in memory from 2000h to 205Fh. To check the first segment of the program up to location 2025h, a breakpoint routine call is inserted at location 2026h. The breakpoint routine is as follows:

```
breakpoint:  PUSH PSW        ; Save registers
             PUSH B
             PUSH D
             PUSH H
keycheck:    CALL keyboard   ; Check for a key
             CPI 0Ah         ; Is it key A ?
             JNZ zero_key    ; If not, check Zero key
             LXI H, 0007h    ; Load Stack Pointer displacement count
             DAD SP          ; Place memory address of (A) in HL
             MOV A, M
             OUT port_1      ; Display Accumulator contents
             DCX H           ; Point HL to the location of the flags
             MOV A, M
             OUT port_2      ; Display flags
             JMP keycheck    ; Go back and check the next key
zero_key:    CPI 00h         ; Is it the Zero key ?
             JNZ keycheck    ; If not, go and check key program
             POP H           ; Retrieve registers
             POP D
             POP B
             POP PSW
             RET
```

   If the stack pointer is initialized at 2099h, answer the following questions:

   (a) Specify the contents of memory locations 2098h and 2097h.

   (b) Specify the memory locations where the accumulator contents and the flags are stored when the microprocessor executes instruction `PUSH PSW` in the breakpoint routine.

   (c) Specify the memory locations where HL register contents are stored after executing the instruction `PUSH H`.

   (d) Specify the contents of the stack pointer when the breakpoint routine returns from the `keyboard` routine.

   (e) What address is placed in the program counter just after the instruction `RET` is completed ?