ECE3073 Computer Systems

Practice Questions

Responding to events

i) Itemise and provide a brief explanation of the advantages of using interrupts to respond to external events.

ii) Itemise and provide a brief explanation of the disadvantages of using interrupts to respond to external events.

iii) The following program provides service for two peripheral circuits (a and b) responding to external events.

```
loop:
        mov     r0,data_reg_a       ;read contents of status_reg_a    (1 T-state)
        and     r0,#0002h           ;test bit 1                       (1 T-state)
        jmpa    cc_NZ,service_a     ;if bit set jump to service routine (2/1 T-state/s)
        mov     r0,data_reg_b       ;read contents of status_reg_b    (1 T-state)
        and     r0,#0008h           ;test bit 3                       (1 T-state)
        jmpa    cc_NZ,service_b     ;if bit set jump to service routine (2/1 T-state/s)
        jmpa    cc_UC,loop          ;jump to start of polling loop    (2 T-states)
```

Note that the T-states given for each instruction are for the purposes of this question only. In a jump instruction the first number of T-states applies if the jump is taken, the second if execution continues straight on.

iiia) For peripheral circuit 'a' determine the maximum and minimum latency of this polling program in T states assuming that the computer is executing the polling loop when service is requested. Explain your reasoning behind the answers you give.

iiib)
For peripheral circuit 'b' determine the maximum and minimum latency of this polling program in T states assuming that the computer is executing the polling loop when service is requested. Explain your reasoning behind the answers you give.

iiic) Explain why the latency is the same for both peripheral circuit a and circuit b.

iv) Describe the circumstances in which synchronisation is necessary during data transfer.

v) Explain how handshake signals can be used to synchronise data transfer from a fast computer to a relatively slow peripheral device.

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