

B.E.& B. Arch Final (5th Semester CST) Examinations, 2007.

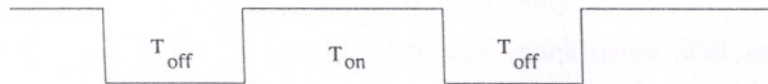
Sub: Microprocessor based system design (CST-503)

F.M. 100

Time: 3 hrs

- Answer any 5 questions.
- The figures in the margin indicate marks allotted to each question.
- If not mentioned assume that the processor is 8085A.

1. a) Describe the function of READY, HOLD and HLDA lines? [3]
- b) Draw the timing diagram of Memory read machine cycle with 3 wait states. [6]
- c) Suppose a compatible signal (rectangular waveform) is coming at bit 0 of port 0A8H. Write a subroutine which measures the ON time of the rectangular waveform. ON time should be expressed in terms of milliseconds. Assume that the clock frequency is 3.072 Mhz. [11]

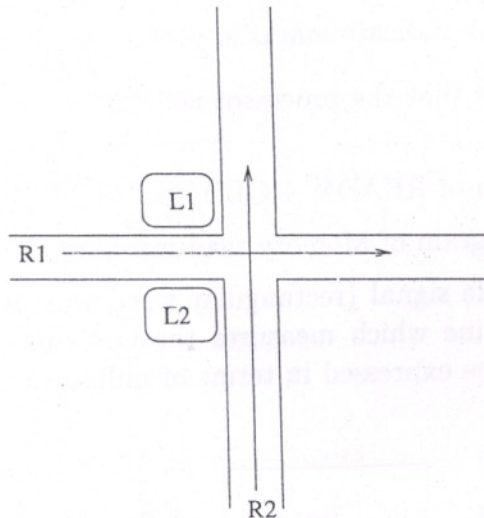


2. a) Write a program in 8086 assembly language to display your name (defined as a string in the data-segment of your program by making a call to a DOS call based subroutine *putchar* in a PC. Procedure *putchar* expects the ASCII code of the character to be displayed is loaded in DL register prior to a call. Code for the *putchar* is given below: [8]

```
putchar proc
    push ax
    mov ah, 2
    int 21h
    pop ax
    ret
putchar endp
```

- b) Show the use of the assembler directives, namely, ORG, DB, EQU and \$ with appropriate examples. [8]
- c) What do you mean by bus contention? When does it occur? What measure can be taken to prevent it? [4]

3. a) Consider the crossing of two one way roads as shown in the figure. In each road, traffic is controlled through a RED light (L1 and L2 respectively). Write a routine which controls the lights. Assume that the traffic density in each road is same. Clearly mention your assumptions regarding the ports or any other issues related to hardware or software. [5] [7]



- b) Draw the Processor programming model of 8086 and also show the addressing modes for operand addressing using appropriate instructions. [5] [7]
- c) Show the decoding of I/O mapped I/O ports; one input port and one output port with the same address (say, 0FAH). Decoding should be foldback free. [4] [6]
4. Consider two ^{μ-Processor based system development} KITS are being used for a serial data transfer through the SOD and SID lines without any handshaking mechanism or interrupt. The objective is to transfer a block of characters (bytes) from one KIT (transmitting characters through SOD) to another KIT (receiving characters through SID). ans.
- Write two routines *putchar* and *getchar* to be executed in transmitting and receiving sides respectively for transfer of 1 character. Assume standard serial data transfer format with 1 start bit, 8 data bits and 1 stop bit. Assume suitable delay values to control transmission speed. Also, write main routines to carry out block transfer from transmitter to receiver assuming that the source buffer and destination buffer addresses as well as number of bytes to be transferred are fixed. Show the connection between the KITS and clearly state the assumptions; if any. [20]
5. a) Suppose six LEDs (8-segments, common cathode, modules) are to be driven for displaying all possible strings in a system. Assume ^{ing} multiplexed mode of display, write a subroutine to display 1 to 6 in LEDs. Show the segment and digit driver connections and the ports driving them. [10]
- b) Write a scan routine which returns the position code of a 24 key matrix keyboard arranged in 4 × 6 form. You should show the port selecting the columns of the

matrix and the port through which you take row inputs. The scan routine will scan the keyboard in normal raster order (i.e., left to right and top to bottom) and continues scanning until a key is pressed.

[10]

6. a) Draw the processor programming model of MCS-48 microcontroller (say, 8749). Name the addressing modes available in this processor and show each of them with suitable example. Also, discuss the advantages of carrying out logical operations right on the in-built ports of this type of processors in the context of control applications.

[3 + 3 + 5]

b) Write a subroutine to convert 4 bit BCD digits (0 to 9) to corresponding Gray code with the help of a translation table stored in page 3 of the program memory.

[9]

7. Write short notes on (Any two)

[2 × 10]

a) Memory or I/O foldback problem and its remedy.

b) Show Parameter passing technique through stack using 8086 assembler language program segment.

c) List the hardware issues of design of a system development KIT with 8085A processor with particular emphasis on how single stepping can be done.