

Model Question Paper

13.703 EMBEDDED SYSTEMS

Max.Marks:100

Time:3 hrs

Part-A

(Answer all.Each carries 4 marks.)

1. Compare and contrast top-down and bottom-up design for embedded systems.
2. What factors provide an upper bound on the period at which the system timer interrupts for preemptive context switching?
3. Explain the 4-cycle handshaking of CPU bus.
4. Draw the pin diagram of PIC16f873.
5. Discuss the watch dog timer of PIC16f873.

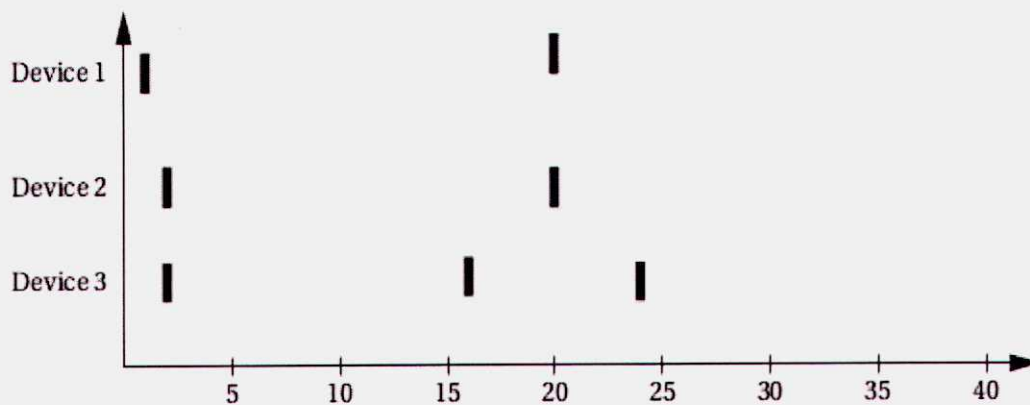
Part-B

(Answer one full question out of the two from each module.Each question carries 20 marks.)

6. a) write a program using interrupts to get data serially and send it to P2 while at the same time Timer 0 is generating a square wave of 5 KHz . (10)
b) Contrast and compare different addressing modes of 8051 microcontroller. (10)

OR

7. a) Discuss with an example how the stack is manipulated using direct addressing mode. (10)
b) Draw a UML sequence diagram for a vectored interrupt-driven read of a device. The diagram should include the background program, the interrupt vector table, the handler, and the device. (10)
8. a) Three devices are attached to a microprocessor: Device 1 has highest priority and device 3 has lowest priority. Each device's interrupt handler takes 5 time units to execute. Show what interrupt handler (if any) is executing at each time given the sequence of device interrupts displayed . (5)



b) You are given these periodic tasks

Task	Period	Execution time
P1	5 ms	1 ms
P2	10 ms	2 ms
P3	10 ms	2 ms
p4	15ms	3ms

- i. Show a cyclostatic schedule for the tasks.
- ii. Compute the CPU utilization for the system.
- iii. show a round robin schedule assuming that P1 does not execute during its first period and P3 does not execute during its second period. [3×5=(15)]

OR

9. a) For the periodic processes given below, find a valid schedule
 - i. using standard RMS, and
 - ii. adding one unit of overhead for each context switch. [2×5=(10)]

Process	CPU Time	Deadline
P1	2	30
P2	4	40
P3	7	120
P4	5	60
P5	1	15

b) Explain interprocess communication mechanisms. (10)

10. a) Describe the different models for programming the embedded systems. (10)
- b) Discuss the different components for embedded programs. (10)

OR

11. a) Discuss the usage of I2c bus in the embedded system network. (10)

b) What are the different program optimization techniques recognized by the compiler. (10)

12. Discuss the processor architecture of PIC16f873. (20)

OR

13. a) Discuss the USART functionalities of PIC microcontroller. (10)

b) Discuss the ADC module with a block diagram. (10)