

N.B. : (1) Question No. 1 is compulsory.

(2) Attempt any four out of remaining six questions.

(3) Figures to the right indicate full marks.

(4) Assume suitable data wherever required.

1. (a) Explain how interrupts are handled in 8051. 20  
 (b) Describe the difference between SJMP, AJMP and LJMP instructions of 8051 microcontroller.  
 (c) Explain in brief memory map of 80C196 microcontroller.  
 (d) Discuss the causes of interrupt latency in an embedded system.  
 (e) Differentiate between hard and soft RTOs
2. (a) Draw and explain CPU timing diagram for fetch and execute sequence of following instructions INC A, ADD A,#Data, INC DPTR, MOVX. 12  
 (b) Explain internal memory organization of 8051 microcontroller. 8
3. (a) Write a program to generate square wave of frequency 1 KHz and 75% duty cycle at pin P1.0 using 8051 microcontroller. Assume microcontroller is operating on 6 MHz frequency. 10  
 (b) Explain addressing modes of 80C196 with instruction examples. 10
4. (a) Explain in details Analog to digital converter in 80C196 microcontroller. 10  
 (b) Explain the following pins of 80C196 microcontroller. 10
  - (i) VREF
  - (ii) BUSWIDTH
  - (iii) BHE / WRH
  - (iv) INST
  - (v) HSO.0 to HSO.5
5. An embedded system needs a slave controller dedicated for scanning 4 x 4 matrix keyboard and 8-digit seven-segment display. Key code is transmitted and data to be displayed on seven-segment display is received on serial pins of the microcontroller. Design the above system using 8751 microcontroller (EPROM version of 8051) & minimum number of components. Write a Assembly language program for the designed system. 20
6. (a) Discuss in detail function of Real time kernel. 10  
 (b) Discuss the different scheduling policies used in an embedded system. 10
7. (a) What are semaphores? Explain different types of semaphore. 10  
 (b) Explain mailbox. Show how task sends message to another task waiting for the message to start. Show how a task sends a message pointer to another task waiting for that to start. 10