

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

(2) Solve any other four questions.

(3) Assume and state additional data if necessary to answer.

(4) Figures to the right indicate marks to the question.

1. A data acquisition system with following details is to be developed, 20
 - (a) Analog input 0 to 5 volts
 - (b) Number of channels 8
 - (c) Audio and Video alarms for set values violations (total 8)
 - (d) Relay drives (total 4).

Justify the choice of microcontroller as against microprocessor for above system and give the full details of such system, to be operational. Clearly specify the components used for interfacing and the assembly language programming involved in the working of the system.
2. (a) Explain the programmer's model of 8051 microcontroller with, emphasis on I/O port structures and interrupt mechanism it supports. 12
 - (b) The number A4h is placed somewhere in external RAM between 0500h and 0600h. Find the address of the number and store it in R4 (LSB) and R5 (MSB). Write 8051 code to do above operation. 4
 - (c) Explain the bit jump instructions of 8051 and their special applications in the system development. 4
3. (a) Suggest the hardware scheme to increase the number of interrupting sources, to be handled by INT0 or INT1 pin of 8051 and explain the working of it. 10
 - (b) Interface 8255 PPI to 8051 micro-controller and write code to do the following, 10
 - (i) Read port A and port B
 - (ii) Compare 100 samples of A and B ports and if they are equal, blink LEDs on port C and stop reading.
4. (a) Explain the functional units of 80C196 microcontroller with detailed working of pulse width modulator and event processor array (HS10). 15
 - (b) Explain the addressing modes of 80C196 microcontroller with instruction examples. 5
5. (a) What are the major characteristics of an 'embedded systems' ? Explain these with reference to different case studies (examples). 10
 - (b) How does real time operating system help concurrent task handling ? 10
6. (a) What are Semaphores ? Explain their types and the ways in which Semaphores one used to protect shared data. 10
 - (b) 'The choice of processor, memory and I/O for embedded system is application dependent' explain. 10
7. (a) How is inter process communication achieved in multitasking operations ? Explain with appropriate examples. 10
 - (b) Which are different scheduling policies and how priorities for the different tasks are decided for embedded systems ? 10