

**(REVISED COURSE)**

(3 Hours)

[Total Marks : 100]

- N.B. :** (1) Question No 1 is **compulsory** and attempt any **four** out of remaining **six** questions.  
 (2) Assume **suitable data** wherever **required**.  
 (3) **Figures** to the **right** indicate **full** marks.

1. (a) What is the significance of overflow flag in 8051 microcontroller. Explain how would you check whether the OV flag is zero. **20**
- (b) Write an assembly language program for 8051 micro controller to display BCD number (0 to 9) stored in internal data memory location 30 H on the single seven-segment display. Seven-segment display is common cathode type and it is connected to port 1 of the 8051 without decoder.
- (c) Explain security key present in 80C196 micro controller.
- (d) Explain why one should estimate worst case latency in an embedded system.
- (e) Task i is to be executed for 4ms at each 20th ms and task j is to be executed at each 25th ms for 15 ms, what are interrupt latencies of each task.
2. (a) Draw and explain memory map of 80C196 microcontroller. **10**
- (b) Explain how will communicate the data on the common TXD and RXD lines of 8051 microcontroller in the interprocessor communication. **10**
3. (a) Describe the functioning of HSO unit and HSI unit in 80196 microcontroller. **10**
- (b) There is the mosquito trap, which generates an active low transition on each trap of the mosquito. How you will use an 8051 timer to find the number of traps in one hour? Also write an assembly language program. **10**
4. (a) Explain the interrupt structure of the 8051 microcontroller. Explain how single stepping can be achieved. **10**
- (b) How does counting semaphore differ from mutex? How is a counting semaphore used? **10**

5. (a) What is mailbox ? How does mailbox passes a message during IPC ? 10
- (b) Design 8751 (EPROM version of 8051) system to send a digital value of an analog signal to the desktop computer though serial port. The analog signal is in the range of 0V to 5.12V. Use ADC0809 (8 bit, successive approximation type of ADC). Explain the design with the help of flow chart. 10
6. (a) Discuss the different scheduling policies used in an embedded system. 10
- (b) List some services provided by RTOs explain any three of them in detail. 10
7. (a) What are the techniques of power and energy management in an embedded system ? Give suitable examples. 10
- (b) What are the parameters of a task ? Why should each task have a distinct TCB ? 10