


(3 Hours)

[Total Marks : 100]

**N.B. :** (1) Question No. 1 is **compulsory**.(2) Attempt any **four** question out of remaining **six** questions.(3) Assume **suitable** data wherever **required** with justification.(4) **Figures** to the **right** indicate marks.

1. A microcontroller based system is to be designed using 8051 to control a motion and direction of a Robotic car. A Robotic car consists of two motors, a back motor with mechanical arrangement to connect the wheels and controls the speed; this motor is a d.c. motor. A front motor is a stepper motor and controls the direction. The direction and speed of a car is adjusted by push button switches. For direction control two push button switches marked as Left and Right. The speed of motor can be controlled by a single push button switch. Draw a complete schematic diagram for the control system using 8051. Write the program to achieve above operations. 20
  
2. (a) Explain how to interface an external ROM of 16 K and RAM of 8 K to a 8051 microcontroller. Draw the interface circuit. 10  
 (b) Explain the various counters and timer modes of 8051 microcontroller. Discuss some of its applications. 10
  
3. (a) Explain the following instructions of 8051 :- 10
  - (i) MOVX A, @ DPTR
  - (ii) MOVC A, @ DPTR
  - (iii) XRL A, # n
  - (iv) CJNE @ Rp, #n, radd
  - (v) DJNZ Rn, radd.
  
- (b) Explain how to interface a 2-digit seven segment display using 8051 microcontroller. 10  
 Write a program to display 
  
4. (a) With reference to 80 C196 microcontroller, explain Analog to Digital convertor and pulse width modulator. 10  
 (b) Explain the addressing modes of 80C196 with suitable examples. 10
  
5. (a) Explain an inter task communication in RTOS with the help of semaphores, message queues, mail boxes and pipes. 10  
 (b) What is an interrupt Latency. What are the factors affecting interrupt latency ? Discuss the methods to minimise interrupt latency. 10
  
6. (a) Explain the scheduling policies used in an embedded system. 10  
 (b) Explain the function of following pins of 80 C196 microcontroller :- 10
  - (i) BUS WIDTH
  - (ii) HS0.0 to HS0.5
  - (iii) EA
  - (iv) T2CAP
  - (v) INST

7. Write notes on any **four** of the following :-

20

- (a) Context switching
  - (b) Pre-emptive and Non-Preemptive Multitasking
  - (c) Priority inversion
  - (d) Important features of RTOS
  - (e) Timers of 80C196.
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