

Con. 5362-09.

T.E. (EXTC) Sem VI

Microcontrollers &amp; Embedded Programming

(3 Hours)

SP-8112

[Total Marks : 100]

10/12/09

2.30 to 5.30

- N. B. : (1) Question No. 1 is **compulsory**.  
 (2) Answer any **four** out of remaining **six** questions.  
 (3) Assume **suitable** data, wherever **required** with justification.

1. A microcontroller based system is to be designed to control a chemical process with following requirements :— 20

The entire chemical process has a four steps to be carried out one after another in a sequence.

- (a) **Step-1.** It involves mixing of liquid raw material by means of stirrer (driven by a DC motor) for 30 seconds.
- (b) **Step-2.** It involves heating of the above material at the temperature of 60°C for 60 seconds.
- (c) **Step-3.** It involves heating of the above material at temperature of 30°C for 30 seconds.
- (d) **Step-4.** It involves cooling of above material to a room temperature for 90 seconds.

For the purpose of heating, you may use a heater with feedback system with a temperature sensor, A/D convertor, relay to switch ON/OFF the heater to maintain a temperature.

Draw and explain a complete schematic diagram using either 8051 or 80196. Write a program for above control system.

2. (a) Draw and explain the internal architecture of 8051. 10
- (b) Draw and explain the interfacing circuit to interface a matrix keyboard and a seven segment display. 10
3. (a) Draw and explain the internal architecture of 80196. 10
- (b) Explain how to interface an external ROM and an external RAM with 80196. 10
4. (a) What are Semaphores ? Discuss the problems that may arise while using them. 10
- (b) Explain the various types of embedded system architectures and compare them. 10
5. (a) Explain the following instructions of 80196. 10
  - (i) LDBSE
  - (ii) DIVU
  - (iii) NORML
  - (iv) JNVT
  - (v) SKIP
- (b) Draw and explain the port structure of all the ports of 8051. 10
6. (a) Explain how to interface 8255 with 8051 and then 8255 port A with 8-bit DAC. Write a program to generate a ramp waveform. 10
- (b) List some services provided by RTOS and explain any two of them. 10

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

- (a) Serial communication in 8051
  - (b) Power down and idle mode of 80196
  - (c) Context switching
  - (d) Pre-emptive and Non-Pre-emptive multitasking
  - (e) Important features of RTOS.
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