

[IE-09001] MICROCONTROLLER TECHNIQUES AND ITS APPLICATIONS

END SEMESTER EXAM

Year: T.Y. B. Tech

Branch: Instrumentation and Control Engineering

Academic Year: 2013-14

Duration: 03 Hours

Max. Marks: 60

Instructions:-

- 1) Answer **all** questions.
- 2) Neat diagram must be drawn wherever necessary.
- 3) Assume suitable data if necessary.
- 4) Figures to the right indicate full marks.

Q.1 Solve any **Five**

- A) Explain the interrupt structure of 8051 along with its vector addresses. Also explain and interrupt execution sequence and the SFRs used for configuration of interrupts. **06**
- B) A 12-bit SAR ADC is interfaced using SPI protocol to 8-bit microcontroller, if $V_{re}(+)$ is connected to $V_{cc} (+5V)$ and $V_{ref} (-)$ is connected to ground, find its
1. Resolution
 2. % error for ± 1 LSB count
 3. Digital output for 2.3V analog input **06**
- C) Differentiate between Polling method and Interrupt method of programming. How on-chip UART can be used for multiprocessor communication in the 8051 microcontroller? Write a program by interrupt method to receive the data coming from transmitter at 9600 baud rate @ 11.0592MHz crystal frequency. **06**
- D) Discuss the architecture of 8051 microcontroller in context with
1. On-chip memory
 2. Communication ports
 3. Power Control registers. **06**

- E) For 8051 microcontroller, draw internal structure of timers. Explain the operation of Timers in mode 1 and mode 2. Using on-chip timer, write a program to generate 1KHz frequency by interrupt method. (Assume 12 MHz crystal frequency) **06**
- F) A unipolar, 1kg stepper motor having 1.8 degree step angle, is interfaced with 8051 based system. Draw interfacing diagram with motor driver and write a program to rotate the motor in clockwise direction. **06**

Q.2 Solve All

- A) A microcontroller based system is used in typical process control application, transmitter is used to sense process value and gives an input to controller as 4~20mA current signal. After manipulating the data, controller gives an output to actuator as 4~20mA signal. Draw a logical diagram indicating all input and output interfaces also write a program to achieve the same. **10**
- B) Design a system to enter your 10-digit contact number using 4x4 matrix keypad and send the logged data to personal computer via UART. Draw detailed interfacing diagram and write the program for the same. **10**
- C) Write a program to measure frequency of input wave given to input pin of 8051 microcontroller as shown below. Display the frequency on 16x2 alphanumeric LCD. **10**

