# College of Engineering, Pune

(An Autonomous Institute of Government of Maharashtra, Pune -411005)

## [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.
- B) A 12-bit SAR ADC is interfaced using SPI protocol to 8-bit microcontroller, if Vre(+) is connected to Vcc (+5V) and Vref (-) is connected to ground, find its
  - 1. Resolution
  - 2. % error for +-1LSB count
  - 3. Digital output for 2.3V analog input

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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.

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- D) Discuss the architecture of 8051 microcontroller in context with
  - 1. On-chip memory
  - Communication ports
  - 3. Power Control registers.

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- 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 06 crystal frequency)
- 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.

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## Q.2 Solve All

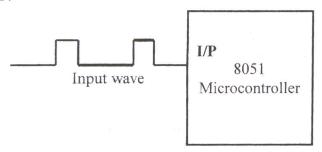
A) A microcontroller based system is used in typical process control application, transmitter is used to sense process value and gives an input to controller as 4~20mA current signal. After manipulating the data, controller gives an output to actuator as 4~20mA signal. Draw a logical diagram indicating all input and output interfaces also write a program to achieve the same.

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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.

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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.



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