Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

V SEMESTER B.TECH. (MECHATRONICS ENGINEERING)

END SEMESTER EXAMINATIONS, DEC/JAN 2017

SUBJECT: MICROCONTROLLER BASED SYSTEM DESIGN [MTE 3103]

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitable assumed.

1A. Write 1 line codes to do the following **02**
(i) Display only lower nibble of R0
(ii) Make P2.4 and P2.3 as inputs and rest bits of P2 as output

1B. With a neat block diagram, list the architecture of 8051 and briefly explain the Stack Operation with an example. **05**

1C. How many external interrupts are there in 8051? Explain the different techniques of activating them with relevant diagrams. **03**

2A. An LCD is interfaced to 8051 microcontroller through 8255. Port A of 8255 is used to send information (data/command) to LCD. Port C is used to send control signals [PC6 = Enable; PC5 = R/W; PC4 =RS). Program the microcontroller to display a word 'SEMESTER' on the 1st line of LCD display. (DPTR Addresses = 4000H – 4003H) **05**

2B. What is the dual role played by port 2? **02**

2C. In a semester a student has to take six courses. The marks of the student (out of 25 in each subject) are stored in RAM locations 47H onwards. Write an 8051 program to find the average marks and store it in external RAM location 0400H. Also save a copy in R6. **03**

3A. Design a counter for counting the pulses of an input signal. Write a program such that the pulses to be counted are fed to pin P3.4 with XTAL=22MHz **03**

3B. Write an 8051 program to generate a square wave of frequency 10kHz using timer 0 in mode 1. Do this continuously. **04**

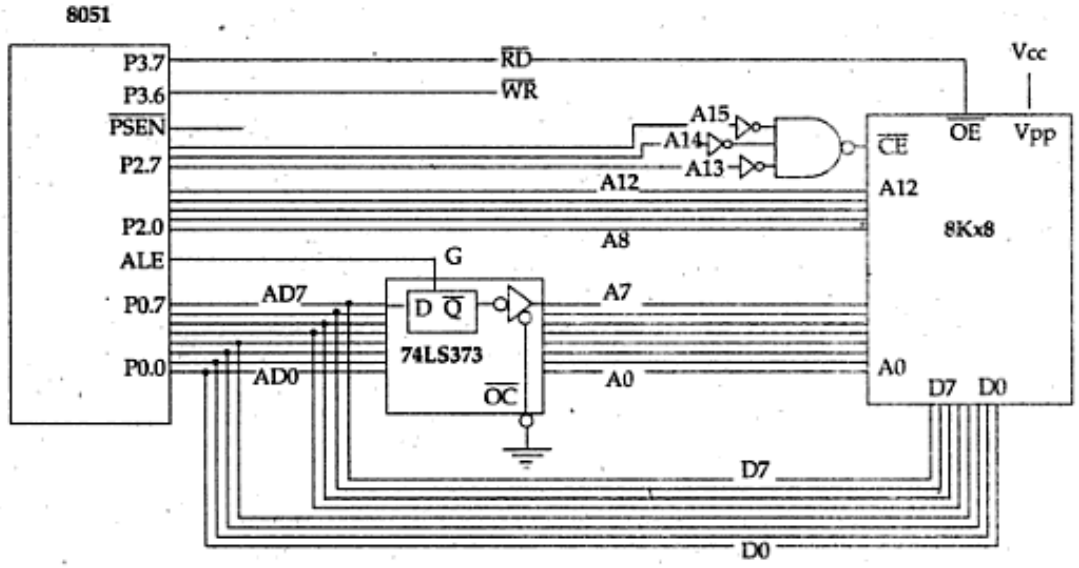
3C. What is a flag? With a neat diagram explain the PSW register of 8051 and explain the functionality of all bits **03**

4A. Write an 8051 software time delay subroutine to generate a time delay of 100 μsec when called. Assume crystal frequency as 12 MHz. Show delay calculations. Do not use timers. **02**

4B. P0.3 of 8051 is used to monitor a parameter in an industrial environment. If the parameter gives a reading 0Fh, a character 'H' is to be sent serially while giving a copy of it to P2. Otherwise a character 'L' is to be sent serially while saving a copy of P1. Baud Rate is 9600. **04**

4C. Using interrupts, write a program to generate two square waves, one of 5kHz frequency at pin P1.3, and another of frequency 25kHz at pin P2.3. Assume XTAL=22MHz. **04**

5A. A connection diagram of 8031 with an external peripheral device is as shown. Answer the following questions based on the interfacing diagram **04**



(i) Identify the external peripheral device (Data ROM /Program ROM/ Data RAM)
(ii) What kind of decoder circuit is used for selecting the memory block?
(iii) Find the address allocated to the selected memory block of the peripheral device.
(iv) What is the capacity of the external peripheral device?

5B. How will you double the baud rate in 8051? Illustrate with an example. **01**

5C. An 8 bit DAC is interfaced to 8051 through Port B of 8255. Find the address allocated to 8255 registers. Write a program to generate a staircase waveform of 10 steps continuously on the DAC interface. Max p-p voltage for DAC is 10V. **05**