Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

V SEMESTER B.TECH. (MECHATRONICS ENGINEERING)

END SEMESTER EXAMINATIONS, NOV 2017

SUBJECT: MICROCONTROLLER BASED SYSTEM DESIGN

[MTE 3103]

REVISED CREDIT SYSTEM

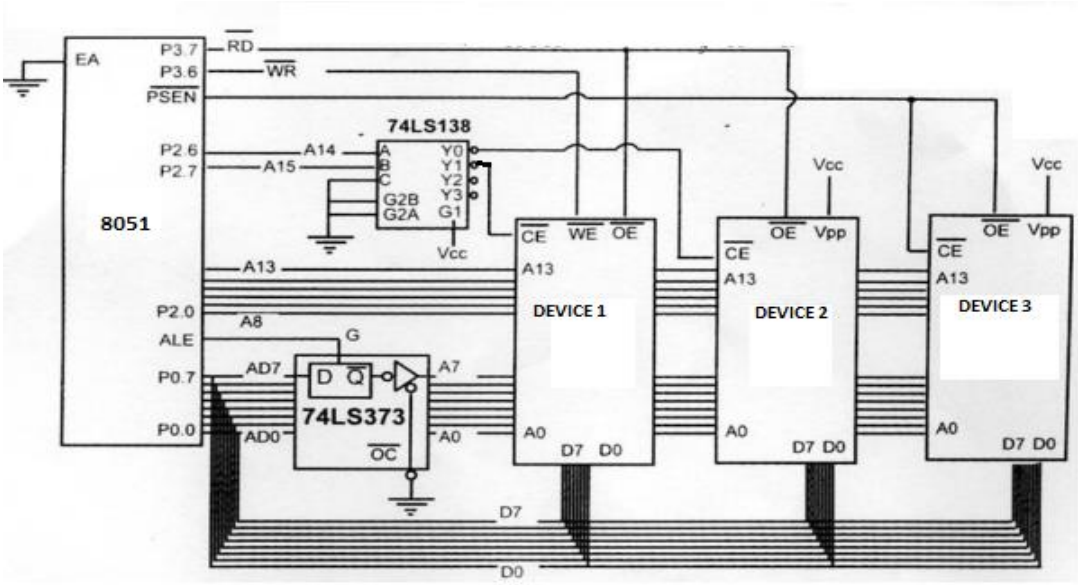
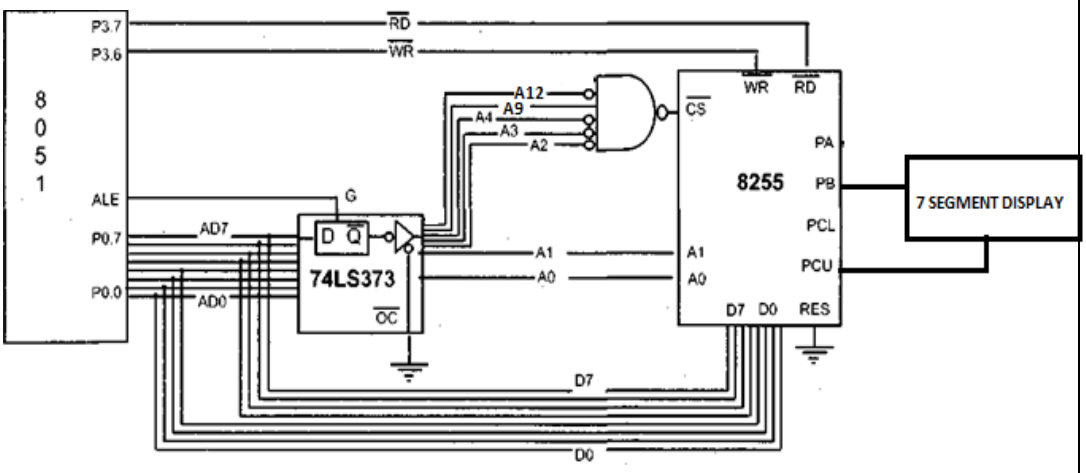
(24/11/2017)

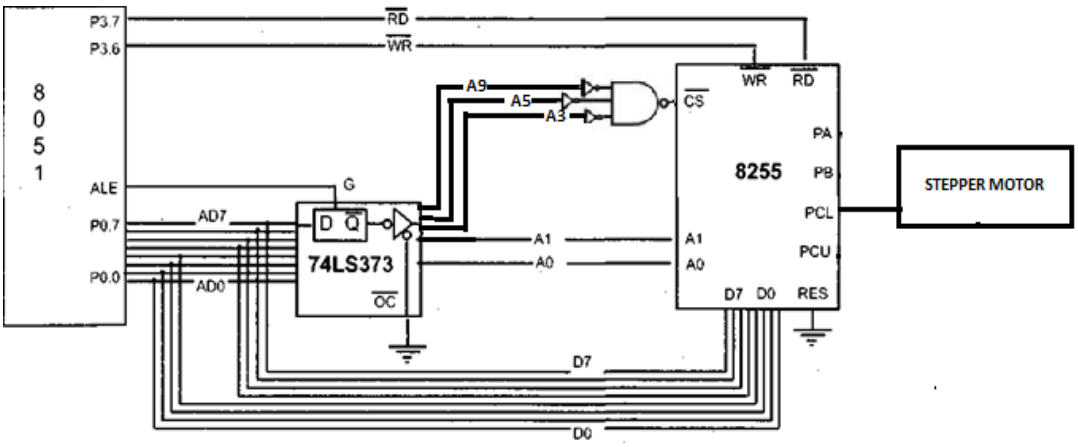
Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Data not provided may be suitably assumed

1A.	Write a assembly program using interrupts to do the following: (a) Receive data serially and send it to P0, (b) Have P1 port read and transmitted serially, and a copy given to P2, (c) using timer 0 generate a square wave of 5kHz frequency on P0.1. Assume that XTAL-11.0592Mhz. Set the baud rate at 4800.	**05**
1B.	With a neat pin structure, elucidate the operation of port 1 pin that is to be operated as an input.	**03**
1C.	Explain the following instructions (a) JBC ACC.7, next (b) SWAP A (c) NOP (d) MOVC A, @A+DPTR	**02**
2A.	An IR sensor is a part of a visitor counter module that is present at the entrance of a store. The sensor is connected to input pin 3.4 of an 8051 microcontroller. Write an ALP to display the visitor count on port 1 & port 2. The information is to be refreshed every 1 second. Once the count reaches 60,000, process is to be stopped. XTAL = 22MHz.	**04**
2B.	Assume that register A has packed BCD, write a program to convert packed BCD to two ASCII numbers and place them in R2 and R6.	**03**

2C.	Three memory devices are interfaced to 8051 as shown in fig Q2c.  **FIG. Q2c** (a) Identify the memory devices (1,2 3) (b) Calculate the address ranges allocated to each of them (c) What is the role of the ALE pin?	**03**
3A.	A common cathode, SIPO time multiplexed 7-segment display interface (6 units) is interfaced to an 8051 microcontroller through 8255 as shown in fig Q3a. LSB of port B is used to send the data serially and MSB of Port C is used to provide clock pulses. Find the address allocated to 8255 registers and program the microcontroller to display a word “CLOUDS” on the 7-segment display interface.  **FIG. Q3a**	**05**
3B.	Elaborate the Stack Operation with necessary sketches and examples.	**03**

3C.	List any four differences between Harvard & Von Neumann architecture.	**02**
4A.	Write a short note on the following: a. Sampling a low-level triggered interrupt b. Significance of the INTR pin in ADC	**03**
4B.	A stepper motor interface is connected to 8051 through 8255 as shown in fig.Q4b. Write a program to rotate the stepper motor in the following sequence. 1 revolution CW, 1 revolution ACW, 2 revolutions CW, 2 revolutions ACW … till it reaches 10 revolutions CW and 10 revolutions ACW. After this the process should repeat from the start. Step angle of the motor is 1.8° . Use a wave drive sequence.  **FIG. Q4b**	**05**
4C.	With a neat bit diagram, explain the Interrupt Priority register. Also, if the IP register has a value 000010101B, in what order will the interrupts be executed?	**02**
5A.	Write a program to copy the value 55H into RAM memory locations 40H to 41H using (a) direct addressing mode, (b) register indirect addressing mode without a loop, and with a loop	**03**
5B.	Write a program to send the message “The Earth is Beautiful” to serial port. Assume a SW is connected to pin P1.2. Monitor its status and set the baud rate as follows:(without interrupts) SW = 0, 4800 baud rate SW = 1, 9600 baud rate Assume XTAL = 11.0592 MHz, 8-bit data, and 1 stop bit.	**04**
5C.	What is the importance of the SMOD bit (D7 bit) of the PCON register? Write a program to get the value X from P1 and send X^2 to P2, continuously.	**03**