

MANIPAL INSTITUTE OF TECHNOLOGY

A Constituent Institution of Manipal University

V SEMESTER B.TECH. (MECHATRONICS ENGINEERING)

END SEMESTER EXAMINATIONS, NOV/DEC 2016

SUBJECT: MICROCONTROLLER BASED SYSTEM DESIGN [MTE 3103]

REVISED CREDIT SYSTEM (03/12/2016)

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- ✤ Answer ALL the questions.
- ✤ Missing data may be suitable assumed.
- 1A. Write a program to copy 10 bytes of data starting at ROM (on chip) address 400H to internal 02 RAM locations starting at 30H.
- **1B.** List and elaborate on the different Addressing Modes of 8051 with relevant examples and **05** syntax.
- 1C. Write a program to find the biggest number in an array of 5 numbers. Store the result in 50H. 03
- 2A. A Stepper Motor is interfaced to 8051 microcontroller through 8255 as shown. Find the 05 address allocated to the 8255 registers. Program the microcontroller to rotate the stepper motor for 2 revolutions clockwise and 2 revolutions anticlockwise continuously. Assume step angle to be 1.8 degrees.



2B. Explain the following instructions of 8051 with relevant examples (i) SWAP A (ii) JBC 10, xyz (iii) POP 4 (iv) MUL AB

02

- **2C.** With a neat pin structure of an I/O pin of Port 1, elucidate the operation of port 1 that is to be **03** operated as an input port.
- **3A.** Briefly explain the functionalities of PC and DPTR in 8051. Is the PC available in high and **02** low byte format?
- 3B. 8051 Serial port is connected to COM port of IBM PC and we use a Hyper Terminal Program 04 to send and receive data serially. Write a single 8051 program to the following tasks in the respective order

(i) Send a message "Hello World" to the PC

- (ii) Receive the data sent by PC and display it on 4 LEDs connected to the upper 4 pins of P1
- 3C. A switch is connected to P1.4 of 8051. Monitor the status of the switch continuously. 04 Whenever the switch is low, sound a buzzer connected to P2.6 for 10ms. Whenever the switch is high generate the following waveform 12 times on P1.2. (Xtal = 22MHz ; Use Timer 0 mode 1).



- 4A. While there are instructions such as JNC and JC to check the carry flag bit (CY) there are no 02 such instructions for overflow flag bit. Write a 1 line code to check status of OV. Also define the functionality of OV flag.
- **4B.** Write a single program that continuously gets a single bit of data from P1.7 and sends it to **04** P1.0 in the main while simultaneously.

(i) Creating a square wave of 50% duty cycle and 1kHz frequency on P2.5

(ii) Sending letter 'A' to the serial port

Use interrupts. Xtal = 11.059MHz, Baud Rate = 9600

4C. Identify the two peripheral memory devices (1&2) interfaced with 8031. Find the address **04** range allocated to each of them. Also, write a short note on EEPROM.



- 5A. A 512K memory chip has 8 pins for data. Find:(i) The organization(ii) The number of address pins for this memory chip
- **5B.** What is the default priority of interrupts on reset? Explain what happens if a low priority **02** interrupt is activated when 8051 is serving a high priority interrupt.
- 5C. A common anode type, SIPO, time multiplexed 7 segment display (4 units) is interfaced to 06 8051 microcontroller through 8255. 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 "CHIP" on the 7 segment display interface.

