

MANIPAL INSTITUTE OF TECHNOLOGY MANIPAL

V SEMESTER B.TECH. (MECHATRONICS ENGINEERING) END SEMESTER EXAMINATIONS, DEC 2017

SUBJECT: MICROCONTROLLER BASED SYSTEM DESIGN [MTE 3103]

REVISED CREDIT SYSTEM

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

✤ Answer ALL the questions.

nt Institution of Manipal University

- Data not provided may be suitably assumed
- 1A. Explain the five addressing modes of 8051 with suitable examples 05
- 1B. Explain the different types of conditional and unconditional jump 03 instructions of 8051. Specify the different ranges associated with these jump instructions.
- 1C. Write an 8051 subroutine in assembly to generate a time delay of 150
 02 µsec when called. Assume crystal frequency as 16 MHz. Show Support with necessary calculations. Do not use timers.
- 2A. A 2x16 LCD is interfaced to 8051 through 8255. Port A is sued to send 05 command or data and Port C is used to send control signals (PC6 Enable, PC5 R/W, PC4 CMD/Data). Write an program to display a word HELLO on the first line of the display.
- 2B. Write an ALP to find the smallest of five numbers stored in memory 03 locations 50H onwards. The smallest number is to be stored in R5.
- 2C. Explain the TMOD register with a neat bit diagram02
- **3A.** Write a single program to do the following using interrupts, 05
 - (i) continuously gets a single bit of data from P1.5 and sends it to P1.0 in the main while simultaneously.
 - (ii) Sending letter 'A' to the serial port

(iii) Creating a square wave of 75% duty cycle and 3kHz frequency on P2.2

Use interrupts. Xtal = 11.059MHz, Baud Rate = 4800

3B. Analyze the following program and indicate the status of STACK & PC 03 after the execution of every line

> ORG 0030H MOV R0.#25H MOV 05H,#55 MOV R1.#30H **PUSH 01** ACALL XYZ POP 5 END XYZ: MOV R0, #0AH ABC:DJNZ R0, ABC RET

3C. Differentiate between CISC & RISC processors (any 4 differences) 02

- **4A.** Write an 8051 ALP to generate a square wave of frequency 2kHz and 04 75% duty cycle. Use timer 1 in mode 1. Xtal = 22MHz
- **4B.** Explain with a diagram, the interfacing of DAC 0808 to 8051 chip. Write 04 the program to generate a sine wave on the CRO. Show the relevant calculation and look up table.
- **4**C. Assume that bit p2.2 of an 8051 controller is used to control an outdoor 02 light and bit p2.5 to control an indoor light. Write ALP to turn on the outdoor light and turn on the indoor one using only logic instructions. Do this continuously.
- 5A. Elaborate on the following types of memory and highlight their 04 advantages over the traditional types.
 - (b) NVRAM (a) EEPROM
- **5B.** With a suitable sketch, explain the utilization of Tri-state buffers for 03 reading the input pin and latch in pin diagram of port 1.

5C. Write short note on the following:

- a. Sampling a low level triggered interrupt
- b. Significance of the INTR pin in ADC