Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

V SEMESTER B. TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

MAKE UP EXAMINATIONS, DECEMBER 2019

MICROCONTROLLER BASED SYSTEM DESIGN [ELE3106]

REVISED CREDIT SYSTEM

Time: 3 Hours **Date: 01 January, 2020** **Max. Marks: 50**

Instructions to Candidates:

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

1A. With help of neat sketch, explain the architecture of 8051 microcontroller ***(03)***

1B. Give the bit-wise details of Program-Status-Word Register of 8051 and, describe the functions of all the bits. ***(03)***

1C. Write an 8051 ALP to find the number of equal bytes in their respective positions between two memory blocks 10H – 1FH and 20H-2FH. Store the count of equal bytes in external RAM location 1000H and count of other (non-equal) bytes at 1001H. ***(04)***

2A. Ten '8' bit ASCII codes are available in successive RAM locations starting at 30H. Write an 8051 ALP to convert these codes to equivalent binary. Store the binary equivalents in successive locations starting at 40H. If the ASCII code does not represent the code for any number between '0' and '9' or 'A' and 'F', do not convert it and display FFH at port '0' as an error code and count of such codes at port '1'. ***(05)***

2B.

i. Describe the bit details of Timer Mode Register of 8051.

ii. Describe and differentiate between the operation of 8051 timers in timer mode and counter mode. List the various uses (applications) of timer mode of operation and counter mode of operation.

iii. Explain the operation of timer of 8051 in polling and interrupt mode. ***(05)***

3A. Write an 8051 ALP to obtain a continuous, 600Hz, 40% duty cycle waveform at P2.0 pin of 8051. Use timer '1' in mode '2 to obtain the required delay. Assume f_{osc} = 11.0592MHz. ***(03)***

3B. Show the circuit to interface DAC-0800 to 8051 through Port '2' and, write an ALP to generate a triangular waveform of amplitude 3.5V. ***(03)***

3C. Draw the interfacing circuit to interface an analog to digital converter (ADC 0808) to 8051. Assume a water-level sensor placed in an overhead tank and the analog voltage signal corresponding to the current water level is given to 3rd input channel (IN3) of ADC 0808. Write an assembly language program to convert this value to digital and display at port 1 continuously. ***(04)***

4A. Show the interfacing circuit to interface a 14-pin, 16X2 LCD to 8051 and write an ALP to display 'MIT' on the center of first line and display 'MANIPAL' on the center of second line of LCD screen. ***(03)***

4B. Describe the following with respect to serial communication

i. Simplex, Half duplex and full duplex communication
ii. Asynchronous and synchronous communication ***(03)***

4C. Show the interfacing circuit to interface a hex key pad (numbers '0' to '9' and 'A' to 'F') to 8051 in 4 X 4 matrix mode. Use port pins P2.0 to P2.3 for the rows and P0.0 to P0.3 for the columns. Write an 8051 ALP to detect and identify the key closed (pressed) and display the ASCII code of the key pressed at port '1'. ***(04)***

5A. Describe the salient features of Berkley RISC – 1 processor architecture and compare it with the CISC processors of that time. ***(03)***

5B. Determine the values of registers 'R0, R1 and R2 when ARM7 executes the following instructions. Assume (R0) = 0x1234ABCD, (R1) = 0x1A2B3C4D and (R2) = 0x9F8E7D6C

i. ORR R0, R0, #0x0F00070
ii. EOR R1, R1, # 0x0000FFFF
iii. BIC R2, R2, # 0x0000FF00 ***(03)***

5C. Write ARM7 assembly program to

i. Find the 2's compliment of a '64' bit number available at 0x00003000 – 0x00003007 and store the result in the same locations.

ii. Multiply a '16' bit number available at 0x00005002 and 0x00005003 by '40' without using any instruction for multiplication. Store the result at 0x00005010 – 0x00005013. ***(04)***