Reg. No.											

MANIPAL INSTITUTE OF TECHNOLOGY

(A constituent unit of MAHE, Manipal 576104)

V SEM B.Tech (BME) DEGREE MAKE-UP EXAMINATIONS, DEC/JAN 2019-20.

SUBJECT: MICROCONTROLLER BASED SYSTEMS (BME 3102)
(REVISED CREDIT SYSTEM)
Wednesday, 1st January, 2020; 2 PM to 5 PM

TIME: 3 HOURS **MAX. MARKS: 50**

Instructions to Candidates:

1. Answer ALL questions.
2. Draw labeled diagram wherever necessary
3. Assume suitable data, if missing

1.	(A)	Justify that the Port3 of the 8051 microcontroller is a multipurpose port.	5
	(B)	How do you increase the current carrying capability of address bus of the 8051? Explain.	3
	(C)	How do you connect a 16×2 LCD module with the 8051 microcontroller?	2
2.	(A)	Design an interface for the 8051 microcontroller to have 4 kilo bytes of static RAM, and 6 additional 8-bit ports. Draw the complete interface diagram, and write the address allocation table.	5
	(B)	Is it possible to generate time-delay in the 8051 system without using the timers? Justify your answer with appropriate illustration.	3
	(C)	Construct a subroutine for the 8051 microcontroller to multiply two 2-digit decimal numbers.	2
3.	(A)	Making use of the 8051 instructions, write a program to implement an 8-bit ring counter in the accumulator with a delay of 1 second.	5
	(B)	The following is an instruction sequence written for an 8051 microcontroller system operating at a speed of 11.0582MHz.	3

```
START: MOV TMOD, #20H
       MOV TH1, #A4H
       MOV TL1, TH1
UP:    SETB TR1
WAIT:  JNB TF1, WAIT
       CLR TF1
       SJMP UP
```

(i) What is the purpose served by the sequence?

(ii) Suggest changes to be made in the program if the instruction in the first line is changed to MOV TMOD, #01H.

(C) What is the purpose of register "OPTION" in the PIC microcontroller? Explain. 2

4. (A) Write an instruction to carry out each of the following operations in the 8051 microcontroller system, and explain the instruction. 5

(i) To access a byte from the look-up table stored in the code memory

(ii) To copy a byte from the external memory in the range 00H to FFH

(B) Configure the serial subsystem of the 8051 to function as an 9-bit UART in duplex mode and for a BAUD = 2400. Assume F_{OSC} = 12MHz. 3

(C) Give an example to each of the following addressing modes of the 8051: 2

(i) Immediate

(ii) Indirect

(iii) Relative

(iv) Implicit

5. (A) Design an 8051 based system to generate a periodic square wave of frequency 5KHz and amplitude of +5V. 5

(B) Construct an 8051 based 2-digit seven-segment display and display "A1" continuously. 3

(C) How do you employ the 8051 microcontroller to count heart rate? 2