Reg. No.											

MANIPAL INSTITUTE OF TECHNOLOGY

(A constituent unit of MAHE, Manipal 576104)

V SEM B.Tech (BME) DEGREE END SEMESTER EXAMINATIONS, NOVEMBER 2019.

SUBJECT: MICROCONTROLLER BASED SYSTEMS (BME 3102)
(REVISED CREDIT SYSTEM)
Wednesday, 27th November 2019: 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)	Write your interpretation of interrupt subsystem of the 8051, if contents of the registers IE & IP are 93H and 18H respectively.	5
	(B)	Justify that the timers/counters of the 8051 can be used for measuring pulse frequency and pulse width.	3
	(C)	Design an 8-channel data acquisition hardware using the 8051 microcontroller and an appropriate 8-bit A-to-D converter.	2
2.	(A)	With illustrations, explain the following instructions of the 8051: (a) POP (b) XCHD	5
	(B)	Construct an assembly language software module to generate a delay of 0.5mS using the "Timer-0" of the 8051. Assume a crystal of frequency 11.0592MHz. Show delay calculations.	3
	(C)	Construct a subroutine for the 8051 microcontroller to convert a 2-digit decimal number in to ASCII code.	2
3.	(A)	Making use of the 8051 instructions, find out the square root of a 2-digit hexadecimal number present in the memory location 3FH.	5
	(B)	Design a hardware for implementing a real-time clock to display time in "HH:MM" format.	3
	(C)	How do you utilize the "polling technique" to expand the hardware interrupts of the 8051? Illustrate.	2

4. (A) Design a memory interface for the 8051 microcontroller to have 8 kilo bytes of EPROM in addition to the on-chip ROM, and 8 kilo bytes of static RAM. Make use of full decoding. 5

(B) Configure the UART of the 8051 to function as an 8-bit shift register to shift data from the microcontroller to an external device. 3

(C) Identify the addressing modes of the following instruction: 2

(i) MOV A, 00H

(ii) JC DOWN

(iii) MOVC A, @A+DPTR

(iv) LJMP 0000H

5. (A) Design a 3-digit product counter for an assembly line. Make use of the 8051 microcontroller and common-anode seven segments. 5

(B) Analyze the following instruction sequence: 3

```
START: MOV A, @R0
       ANL A, #F0H
       RR A
       RR A
       RR A
       RR A
       RL A
       MOV #F0H, A
       RL A
       RL A
       ADD A, F0H
       MOV F0H, A
       MOV A, @R0
       ANL A, #0FH
       ADD A, F0H
       MOV @R0, A
END:   SJMP END
```

(i) What is the purpose served the sequence?

(ii) Identify bugs, if any

(iii) Suggest an alternate sequence

(C) Explain Port-B change interrupt of the PIC microcontroller. 2