Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
A Constituent Institution of Manipal University

V SEMESTER B.Tech. (BME) DEGREE END SEM EXAMINATIONS NOVEMBER 2017
SUBJECT: MICROCONTROLLER BASED SYSTEMS (BME 3102)
(REVISED CREDIT SYSTEM)
Monday, 27th November 2017: 2 PM to 5 PM

TIME: 3 HOURS **MAX. MARKS: 100**

Instructions to Candidates:

1. **Answer all FIVE full questions.**
2. **Draw labeled diagram wherever necessary.**
3. **Assume suitable missing data, if any.**

1. (a) How is a microcontroller different from that of a microprocessor? Explain. **4**

(b) Draw a neat diagram of programmer's model of the 8051 microcontroller, and draw an expanded view of the register PSW to depict bitwise pattern. **6**

(c) Draw and explain the registers associated with the Timers/Counters of the 8051 microcontroller. **10**

2. (a) How does the Serial Port of the 8051 functions as a shift register in Mode 0? Explain. **6**

(b) What are the significances of the bits in the 8051 registers SCON and PCON respectively? **10**

(c) Differentiate among the 'short', 'absolute' and the 'long' addressing modes of the 8051 branching instructions. **4**

3. (a) How do you make use of the registers DPTR and PC in the indexed addressing mode? Illustrate with an example on each. **4**

(b) What is the result of operation in the destination on executing the following 8051 instructions, Assume the contents of the registers are (A) = AAh, (B) = 78h, (R1) = 20h, (20h) = FFh, and (PSW) = 81h, before execution. **10**

(i) XCH A, @R1

(ii) SETB D5h

(iii) SUBB A, F0h

(iv) XRL A, #55h

(v) RRC A

(c) Identify the addressing modes of the following 8051 instructions: **6**

(i) JNB Target

(ii) CPL A

(iii) INC 30h

(iv) ADD A, @ R0

(v) MOVX A, @ R1

(vi) POP E0h

4. (a) Write an 8051 assembly language program to decimally decrement 100 elements present in an array beginning at address 8500h in the external memory. **6**

(b) Interface an appropriate device to the 8051 microcontroller, and program it to generate the periodic signal shown in the fig. 4(b). **10**

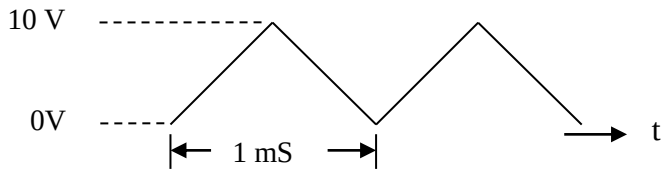

Fig. 4(b)

(c) Write a C - program to send ASCII characters corresponding to the hexadecimal digits 0-9 & A-F to Port 1 of the 8051 microcontroller. **4**

5. **(a)** Identify the operations and the overall task carried out by each of the following three 8051 routines. Write appropriate comments to the routines to make them readable. Assume, F_{OSC} = 12MHz. **6**

```
        ORG 001Bh
        LJMP INT_T1

        ORG 2000h
START:  MOV IE, #88h
        MOV R0, #E5h
        MOV A, #00h
   UP:  MOV 80h, A
        LCALL TIME
        INC A
        SJMP UP
```

```
TIME:   MOV TMOD, #10h
        MOV TH1, #00h
        MOV TL1, #00h
 ABV:   SETB TR1
WAIT:   SJMP WAIT
        CJNE R0, #00h, ABV
        MOV R0, #E5h
        RET
```

```
INT_T1: CLR TR1
        CLR TF1
        DEC R0
        IRET
```

(b) How is an indirect addressing mode implemented in the PIC microcontroller? Illustrate. **5**

(c) What is the BAUD rate of the UART in the 8051, if FOSC = 11.0592MHz, TH1 = F4H, SM1:SM0 = 0:1 in the SCON register, and SMOD = 1 in the PCON register? Justify your answer. **4**

(d) The 8051 registers ‘IE’, ‘IP’ and ‘TCON’ are having the data 8Fh, 02h and 0Ch, respectively, at certain point of program execution. What is your opinion on the configuration of the interrupt sub-system and the status of interrupts in the microcontroller? **5**