Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
(A Constituent Institute of Manipal University)
Manipal – 576 104

VI SEMESTER B.Tech (BME) DEGREE END SEMESTER EXAMINATIONS , MAY 2016
SUBJECT: Microcontrollers (BME 304)
Friday, May 13, 2016 (2.00 p.m. - 5.00 p.m.)

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

Instruction to Candidates:

Answer any FIVE full questions.
Assume relevant data if missing.
Give diagrams wherever necessary.

1. (a) Compare the stacks of the Intel 8051 and the PIC microcontrollers. (4)

   (b) How do you employ the 8051 microcontroller to measure the frequency of a signal? Illustrate. (6)

   (c) List and explain the interrupting sources available in the PIC microcontroller. (6)

   (d) Why does "Port 0" of the 8051 microcontroller require external pull-up? Justify your answer. (4)

2. (a) What are the features of serial subsystem of the 8051 microcontroller? How do you make use of serial subsystem as a shift register? Illustrate. (2+5)

   (b) What is SPI? Which microcontroller supports SPI? Make a list of SPI signals and write their significance. (1+1+5)

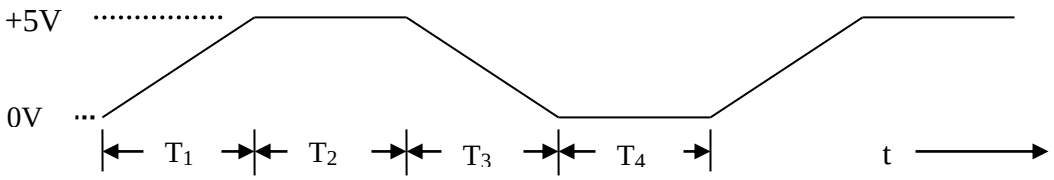
   (c) What are the provisions made available in the 8051 and the PIC microcontrollers to indirectly access the data memory? Illustrate with relevant examples. (6)

3. (a) Write an 8051 assembly language program to square a 2-digit decimal number read through Port 1, and to store the result in the external data memory. (8)

   (b) What is the meaning of "Short", "Absolute", and "Long" jump in the 8051 microcontroller? Explain with illustrations. (6)

   (c) Write an 8051 assembly language program to separate odd and even numbers present in a memory array starting at 8000H and ending at 8063H. Store the separated even numbers in an array starting at address 8100H, and odd numbers at address 8200H onwards. (6)

4. (a) Generate the following periodic waveform using the 8051 microcontroller and an appropriate interface circuit. (10)



Where $T_1 = T_2 = T_3 = T_4 = 1$ mS

(b) Interface two common anode seven segment displays to the 8051 microcontroller to display the decimal number present in the accumulator continuously. Let the display refresh rate be 200 Hz. (10)

5. (a) Design an 8051 microcontroller based temperature acquisition system to read room temperature every second. Store the temperature value (integer part only) in the internal memory location 70H and send the same to the Port 0. (10)

(b) Design a 4×4 matrix hexadecimal keyboard to be interfaced to the 8051 microcontroller, and write an appropriate assembly language program to read the keyboard. Store the read key-code in the accumulator "A". (10)

6. (a) Draw the structure of the 68HC11 microcontroller's status register and write the significance of each of the bit. (6)

(b) What is the significance of the register "ADCTL" associated with the ADC in the Motorola 68HC11? Explain. (5)

(c) Which instructions of the 8051 microcontroller make use of register B as default operand? Explain the operations of such instructions. (5)

(d) Make a list of the signals of the 8051 microcontroller required for interfacing external ROM and RAM, and draw the generic memory interface diagram depicting RAM and ROM interface with the 8051. (4)