Student Exam No._____

GANPAT UNIVERSITY

B. Tech. Semester: VI, Electrical Engineering

Regular Examination April – June 2015

2EE 601: Microcontroller & Embedded System

Time: 3 Hours **Total Marks:** 70

Instruction: 1 Attempt all questions.
2 Make suitable assumptions wherever necessary.
3 Figures to the right indicate full marks.
4 The programs in Assembly/ C must be in structured format and must contain the proper comments. **Programs without appropriate comments would not deserve full marks.**

Section - I

Que. – 1

(A) Explain any five arithmetic operation instructions of 8051 with examples. **[6]**

(B) Describe function of $\overline{PSEN}$, $\overline{EA}$, $\overline{RD}$, $\overline{WR}$ & ALE pins of 8051 microcontroller. **[6]**

OR

Que. – 1

(A) Discuss the differences between a Microprocessor and a Microcontroller with the help of their generalized block diagrams. **[6]**

(B) Describe the alternate functions of port 3 pins of 8051 microcontroller. **[6]**

Que. – 2

(A) What are the addressing modes in 8051 microcontroller? Discuss any two addressing modes in detail with example instructions. **[6]**

(B) A switch is connected to pin 2.7. Write a C program to monitor the status of switch SW and perform the following: **[5]**
(a) If SW=0, the stepper motor moves clockwise
(b) If SW=1, the stepper motor moves counter-clockwise
Also draw the typical interfacing of stepper motor with microcontroller through driver IC.

OR

Que. – 2

(A) Assume that a 60 Hz external clock is being fed into pin T1 (P3.5). Write a C program for counter 1 in mode 2 to display the count in ASCII. Display the ASCII digits (in binary) on P0, P1 & P2 where P0 has the least significant digit. Set the initial count to 100d. **[6]**

(B) Write an 8051 C program to toggle all bits of P1 continuously every second. Use Timer 1 mode 1 to create delay. Take XTAL = 11.0592 MHz. **[5]**

Que. – 3 Attempt any three **[12]**

(A) Draw the format of PSW register and write the function of each bit.

(B) What is the difference between MOVC and MOVX instructions? Explain clearly with examples.

(C) Explain the applications of 'bit', 'sbit' and 'sfr' declarations in Embedded C.

(D) Explain the concept of interrupts and the interrupt vector with respect to 8051 microcontroller.

Section – II

Que. – 4

(A) Draw the hardware circuit diagram for timer/counter control logic & explain it. **[6]**

(B) Discuss the memory organization of 8051 microcontroller in detail. **[6]**

OR

Que. – 4

(A) Create a new array, by removing only those integers that are perfectly divisible by 4, from an array starting from 40h. Location 30h contains number of terms of this array. The new array is to be created from location 60h. At the end, the accumulator should indicate number of terms found. **[6]**

(B) An array of 10 bytes is available in the external data memory location from 2000H onwards. Write an assembly language subroutine to compare it with the array of 10 bytes available in internal data memory location from 30H onwards. If both are identical in all respects, then return with carry flag cleared, otherwise set carry flag at return. **[6]**

Que. – 5

(A) An array of random integers is placed from internal data memory location 40h onwards. The number of terms of the array is available in the location 30h. Develop an assembly language program to place the entire array in reverse order in the same memory area. **[6]**

(B) Write an assembly language subroutine in which using only one pointer, pack two arrays of BCD digits to create a third array. The higher digits are available from 30h to 3Fh and lower ones from 40h to 4Fh. Packed BCD numbers are to be stored from 50h to 5Fh. **[5]**

OR

Que. – 5

(A) Write an embedded C program to generate continuous triangular wave at port P1 connected to an 8-bit DAC. Draw the DAC interfacing diagram. **[5]**

(B) Write a C program using interrupts to continuously get a single bit of data from P1.3 and send it to P1.6 in the main, while simultaneously **[6]**

(a) Creating a square wave of 400 µs period on pin P2.3 and

(b) Sending letter 'X' to the serial port at 4800 baud rate.

Use Timer 0 mode 2 to create square wave. Assume XTAL = 11.0592 MHz.

Que. – 6 Attempt any three **[12]**

(A) What is the need of drivers for controlling motor from microcontroller? Draw the interfacing diagrams of microcontroller with DC motor via thyristor and AC motor via TRIAC.

(B) Explain the port pin structure of 8051 port 1.

(C) What is 'key bouncing'? What are the methods of 'de-bouncing'?

(D) Explain the Simplex, Half Duplex, Full Duplex, Synchronous, and Asynchronous methods of serial communication.

END OF PAPER