Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE SEMESTER– 7th EXAMINATION – SUMMER 2015

Subject Code:172001 **Date:01/05/2015**

Subject Name: Microcontrollers and Embedded Systems

Time: 02.30PM-05.00PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 (a) Answer following questions **07**

[1] What is the difference between RISC and CISC technology?
[2] What is the difference between Von-Neumann and Harvard architecture?
[3] What is the instruction cycle time in PIC18F and 51 family microcontroller for 12 MHz crystal?
[4] What is the purpose of EA pin in 51 family microcontroller?
[5] What are the interrupts available in 51 family microcontroller?
[6] Explain PSW register of 51 family microcontroller
[7] What is the function of SMOD bit of PCON SFR?

(b) Explain following instructions of 51 family microcontroller **07**

[1] MOV A,55h [2] MOV A,#55h [3] MOV @R0,#44h
[4] MOVC A,@A+DPTR [5] XCH A,R1 [6] XCHD A,R2 [7] CPL A

Q.2 (a) Draw interfacing diagram to interface 16x2 LCD with 8051 microcontroller. Use port P0 to drive data lines and pins from port P1 for control signals. Write program to display message "GTU EXAM" on the LCD screen **07**

(b) Draw interfacing diagram to interface temperature sensor using ADC. Write program to read temperature. Draw relay circuit which is controlled by port pin P1.0. Relay should be energized if temperature value is greater than 50^0 C. Take necessary assumption for resolution of ADC and sensitivity of temperature sensor. **07**

OR

(b) Draw interfacing diagram of stepper motor with 89V51RD2 (51 family) microcontroller. Use port pins P1.0 to P1.3 for interfacing. Connect push-button switch at P3.2. Write C language program to rotate motor in full step mode in clockwise direction. Change direction of motor when user presses switch connected at P3.2. **07**

Q.3 (a) Explain programming steps for serial communication. Write program in C language to transmit message "Microcontroller for Mechatronics" to PC at baud rate 9600 continuously **07**

(b) Explain interfacing of Digital to analog converter with 89C51 (51 family) microcontroller. Write program to generate sinusoidal waveform with 36 samples per cycle. **07**

OR

Q.3 (a) Write program to generate square wave of frequency 1 KHz at port pin P1.0 of 89C51 microcontroller. Use timer 0 to generate delay. Consider crystal frequency 12 MHz. **07**

(b) Explain architecture of 8051 microcontroller. **07**

Q.4	**(a)**	Explain Interrupts of PIC18F family microcontrollers. Explain how to enable and disable interrupts in PIC18F family microcontrollers	**07**
	(b)	Explain programming of timer in PIC18F family microcontrollers and write program to generate square wave of frequency 100Hz on pin PORTB.5 using timer	**07**

OR

Q.4	**(a)**	Draw and explain architecture of PIC18F family microcontroller	**07**
	(b)	Compare 51 family and PIC18F family microcontrollers	**07**
Q.5	**(a)**	Explain following instructions of PIC18F family microcontroller [1] MOVLW 25h [2] ADDLW 11h [3] MOVWF 20h [4] COMF PORTB,F [5] MOVF PORTB,W [6]ANDWF 10h [7] BNZ HERE	**07**
	(b)	Write program for PIC18F family microcontroller to toggle all bits of PORTB and PORTC at the interval of 0.5 second assuming crystal frequency of 4 MHz in Assembly or C language	**07**

OR

Q.5	**(a)**	Explain rotate instructions RRCF, RRNCF, RLCF and RLNCF with one example for each. Write program to transfer value stored in WREG serially via port pin RB1. Send LSB first.	**07**
	(b)	Draw circuit diagram to interface DC motor with 89C51 microcontroller with help of motor driver IC L293D. Write program in C or assembly language to rotate motor in clockwise or anticlockwise direction.	**07**

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