

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-VII • EXAMINATION – WINTER 2013

Subject Code: 170907**Date: 03-12-2013****Subject Name: Advanced Microcontrollers and Embedded Systems****Time: 10:30 TO 01:00****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) State in brief all the features of CIP51 Microcontroller family. Also explain memory organization of the same in detail. **07**
- (b) How many general purpose timers are available in C8051F12x Microcontrollers? Give its different operating modes and explain any two operating modes of Timer 2 in detail. **07**

- Q.2** (a) What is Crossbar? Write the instruction sequence and name of port pins at which all the signals of UART0, SPI0(Three wire mode), SMBus, CEX0...CEX5, ECI, CP0, CP1, /INT0, /INT1, T2, T2EX, /SYSCLK are mapped. **07**
- (b) Write a program which calculates phase difference between the voltage and current waveforms, which are converted from sine wave to square wave and applied to P1.3 and P1.4 pins of P89V51RD2 respectively using PCA timer. **07**

OR

- (b) Write an assembly language program to transmit "WELCOME TO GTU" using UART of P89V51RD2 Microcontroller by operating the UART in mode 1 continuously at a baud rate of 9600 bps. The string is ended by carriage return. The ASCII Code of carriage return is 0DH and that of line feed is 0AH. Use timer 2 to set the baud rate. **07**
- Q.3** (a) Which are the different UART0 operational modes in P89V51RD2 Microcontroller? Explain Multiprocessor Communication and Automatic address recognition features in detail. **07**
- (b) Explain the operation of SPI communication protocol available in CIP51 Microcontroller with suitable diagram. Which are its different operating modes? Explain any one in detail. **07**

OR

- Q.3** (a) Explain Inter-IC protocol in brief. Which are the different conditions in I2C? Explain each of them in detail. **07**
- (b) Explain how following logics are incorporated in I2C protocol in CIP51 Microcontroller family? (i) Arbitration, (ii) Clock low extension (iii) SCL Low timeout (iv) SCL High timeout **07**

- Q.4** (a) Draw block diagram of ADC0 and explain how temperature can be controlled by it in brief and explain window compare logic by giving suitable example in detail. **07**
- (b) What is SFR Paging? Why SFR Paging is required in CIP51 Controllers? Explain the operation of three byte SFR Page stack in the event of Interrupt. **07**

OR

- Q.4** (a) Why Watch-dog timer is necessary for embedded systems? Describe the formula for Time-out period of WDT in NXP or Si-Lab microcontrollers. **07**

- (b) What is PLL? Explain how it is used for generating the required system clock frequency in C8051F12x Microcontrollers with its block diagram? **07**
- Q.5** (a) Explain the comparison of various software Architecture in detail. **07**
(b) Explain semaphores in detail. Explain how the problem of Reentrancy can be eliminated by using semaphores with suitable examples. **07**
- OR**
- Q.5** (a) Explain following in brief: **07**
(i) Priority Inversion in RTOS.
(ii) Semaphore Variants.
(b) What is Scheduler in RTOS? Explain Task and Task States in detail with suitable diagram. **07**
