Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – WINTER • 2014

Subject Code: 725401 Date: 02-12-2014

Subject Name: Mixed Signal Controllers

Time: 02:30 pm - 05:00 pm 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 the following questions in relation with MSP430 CPU. **07**

1) Explain the use of P1DIR register?
2) Which ports are having Interrupt capabilities?
3) Mention the basic function of VLO in Clock module.
4) Explain the use of OSC OFF bit in Status Register.
5) Explain the characteristics of Low Power Mode LPM3?
6) How many MCLK cycles are essential for Hardware Multiplier operation?
7) Explain the use of P1REN register.

(b) Answer the following questions. **07**

1) How the architecture of MSP430 is different from the architecture of 8051?
2) Explain the sources of clock signals in MSP430 CPU.

Q.2 **(a)** Explain the requirements of a Watchdog timer. Discuss the registers involved for Watchdog timer settings. **07**

(b) Explain the block diagram of timer with its operations. **07**

OR

(b) Describe the general strategies to achieve low power consumption. **07**

Q.3 **(a)** Explain the block diagram of Analog to Digital Convertor in MSP430 CPU. **07**

(b) How can you configure a timer to acquire an analog signal with sampling rate as 1 KHz? Describe the use of Special Function Registers of Timer and ADC for this purpose. **07**

OR

Q.3 **(a)** Explain all the Low Power Modes available with MSP430 CPU and describe their characteristics for clock frequency operation. **07**

(b) Write a C language Program to configure a Digital to Analog Convertor and Timer module to generate a triangular signal with positive and negative ramp in the range of 0 Volts to +3 Volts, having frequency of 10 Hz. **07**

Q.4 **(a)** Write a C language Program for the implementation of following task using Hardware Multiplier. Consider a(i) and b(i) as two arrays each of 16 bit size. **07**

$$Y = \sum_{i=0}^{15} [a(i) * b(i)] * 25$$

	(b)	With the help of a block diagram, explain the operation of Comparator in MSP430 CPU.	**07**

OR

Q.4	**(a)**	What is the requirement of a Hardware Multiplier module in Embedded processors? Explain the block diagram of Hardware Multiplier module in MSP430 CPU.	**07**
Q.4	**(b)**	Explain the block diagram of DAC12 in MSP430.	**07**
Q.5	**(a)**	Explain the use of DMA Controller for the implementation of a convolution in Filter design.	**07**
	(b)	Explain the block diagram of DMA Controller with the use of important special function registers.	**07**

OR

Q.5	**(a)**	Mention all the six types of Data Transfer modes in DMA Controller with their main applications.	**07**
	(b)	How can you use DMA controller in SD Memory Card interfacing?	**07**

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