

GUJARAT TECHNOLOGICAL UNIVERSITY**ME - SEMESTER– II EXAMINATION – SUMMER 2014****Subject Code: 725401****Date: 16/06/2014****Subject Name: Mixed Signal Controllers****Time:****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) What is the role of GIE bit in status register?
 - 2) How can you give an interrupt signal to MSP430, which will be considered as Non Maskable one?
 - 3) How JTAG interface is supported in MSP430?
 - 4) Give an example of emulated instruction.
 - 5) How Low Power Mode LPM4 is different in comparison with other low power modes?
 - 6) Comparator can be considered as 1 bit ADC. Justify this statement.
 - 7) What is the difference between Straight Binary and 2's Complement mode in DAC?
- (b)** Answer the following questions. **07**
- 1) Justify the orthogonal nature of MSP430 CPU with required examples of instructions.
 - 2) Explain the role of DCO in generating required clock frequencies.
- Q.2 (a)** It is required to generate a square wave with ON time as 800 msec and OFF time also as 800 msec. Discuss the configuration for Watch dog timer to implement this task. **07**
- (b)** Explain the capture mode of operation in Timer with the help of a block diagram. **07**

OR

- (b)** Describe all the modes supported by Watch Dog Timer to help in system design. **07**
- Q.3 (a)** Answer the following questions. **07**
- 1) Explain the stack operations supported with MSP430 CPU.
 - 2) Explain the use of Analog to Digital Converter in digitizing multiple analog channels.
- (b)** It is required to acquire an analog signal at a sampling frequency of 2KHz. Discuss the requirements of Timer and its configuration along with configuration for ADC module with required Special Function Registers in MSP430 for this task. **07**

OR

- Q.3 (a)** Answer the following questions. **07**
- 1) Explain the methods to achieve low power consumption in Microcontroller based system design.
 - 2) Explain the role of Buffer in ADC.

- (b) Configure Digital to Analog Converter module and Timer module to generate a saw tooth waveform of 100 Hz frequency. Write C Program for the same. **07**

- Q.4** (a) Use Hardware multiplier to implement following equation where a(i) and b(i) are two arrays each of 16 bit size. Write C language Program for this task. **07**

$$Y = \sum_{i=0}^9 (a[i] * b[i])^2$$

- (b) Discuss the method of implementing Single Slope measurement with Comparator in MSP430 CPU. **07**

OR

- Q.4** (a) Explain the set of registers in Hardware Multiplier module along with mathematical operations supported. **07**

- Q.4** (b) Explain the operation associated with Grouping of multiple DAC modules in MSP430 with necessary waveform and block diagram. **07**

- Q.5** (a) Explain all the addressing modes in association with DMA Controller. **07**

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

- 1) Explain Single Transfer and Block Transfer modes with DMA Controller?
- 2) Explain any three triggering sources for DMA Controller operation.

OR

- Q.5** (a) Describe the characteristics of Burst-Block Transfer mode in DMA controller. Explain an application in which this mode can be useful. **07**

- (b) Explain a case study to use ADC, Hardware multiplier and DMA controller in the implementation of convolution algorithm. **07**
