College of Engineering
School of Aerospace Engineering

AE 6705: Introduction to Mechatronics

LAB6

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Question 1

Solution:
Crystal oscillator such as a piezoelectric one would be used in cases which require very precise clocking such as phones, computers, signal generators, GPS applications, oscilloscopes, etc. Whereas, DCO is less precise and drifts as time passes, and therefore, would be used for more simple and inexpensive applications such as microwaves, dish washers, radios, etc.

Question 2

Solution:

- MCLK: Master clock, used by CPU, and its typical speed is fast (MHz)
- SMCLK: Sub-Master clock, used by peripherals, and its typical speed is fast for like serial communication
- ACLK: Auxiliary clock, used by periherals, and its typical speed is slow for like timers, ADC

Question 3

Solution:
SysTick is a simple timer on MSP432 and it counts down from a value which the user chooses. This value is configured at the STCVR register and can be used to trigger an interrupt. Once the counter reaches zero from this value the count down will restart from the value and this will be repeated. The downside of SysTick is that it can only be associated with MCLK and the max value for the period cannot provide a long enough delay for many peripherals.

On the other hand, Timer A is capable of being tied to other clocks besides MCLK including SMCLK and ACLK and is capable of generating PWM signals which are essential for actuator applications. Furthermore, it is possible to configure multiple timers at the same time with Timer A with a more flexible delay using different type of modes.