

Tutorial 5

Question 1: (10)

- a) There are multiple timer peripherals in our microcontroller. Why are we using TIM7? When would we want to using a different timer? (2)
- b) Compare and contrast an interrupt and a subroutine. (2)
- c) How come we are able to return from an ISR and a subroutine in the same way? Discuss how each of these returns work. (3)
- d) In the context of timers, what is an update event? (1)
- e) Explain why buffering of timer registers (specifically the ARR) is useful. (2)

Question 2: (9)

- a) Discuss what has to be done in order to implement nested subroutines. (3)
- b) Discuss the benefit of an interrupt-driven system. (3)
- c) In the context of exception, what is a stack frame? What is it used for? (2)
- d) Which is the only exception which does not generate a stack frame? (1)

Question 3: (4)

- a) Assume our timer is being clocked at 24 MHz. If the prescaler is set to 123 and the auto reload register is set to 456, what will the period between update events be? (2)
 - b) Assume our timer is being clocked at 8 MHz. If we want the time between interrupts to change by 1 second as the contents of the ARR changes by 2047, what is a suitable prescaler value? (2)
- Put differently: what should the timer's CNT register tick period be such that 2047 ticks takes 1 second. Then calculate the require PSC to get that tick period.

Bonus: (2)

Discuss the details of the protocol used to interface with the LCD screen. (2)

Marked out of: 23

Available marks: 25