EE458 - Real Time Programming
HW 3

References:
RTC Chapter 4 and 5
CUG Chapters 1, 2, 5, and 23

Please type all responses. Hand written work will not be accepted.
Where appropriate, give specific RTEMS directives and lines of code.

1. What is the purpose of a task control block (TCB)?
2. How many seconds of downtime per year are implied by 7 nines (99.99999%) reliability?
3. How many managers (components) are included in RTEMS?
4. Which RTEMS managers are optional?
5. Given only the name of an RTEMS semaphore how would you determine the semaphore's index? List specific lines of code. Assume a single processor system.
6. What happens when you use the STRINGIFY() macro instead of the XSTRINGIFY() macro in the showmacro.c program? (To answer the question you just need to describe what happens. If you are interested in how stringification works and why two macros are necessary look in the cpp info pages. In particular look at the Macros-> Stringification node.)
7. How should showmacro.c be modified to display the value of the CONFIGURE_INIT_TASK_STACK_SIZE macro? (Give specific lines of code as an answer.)
8. How should showstruct.c be modified to display either “POSIX Available” or “POSIX is not Available” depending on whether or not the POSIX API has been configured? The program should use only information found in the initialization data structures, not macro values. (Give specific lines of code as an answer.)
9. How do you change the priority of the current task to priority 10? How do you determine the priority of the current task?
10. How do you disable preemption of the current task?
11. Is it possible for one task to suspend another task? Is it possible to change the priority of another task? Is it possible to change the mode of another task?
12. What are “per task” variables? What directive is used to declare a variable “per task”? How are “per task” variables implemented?
13. What is the notepad? How many notepad locations does RTEMS provide? What is the size of a notepad location?

Make a backup copy of the original twotasks.c program before trying the following exercises.

14. Comment out the call to rtems_task_suspend() from the task 1 routine in the twotasks.c application. What is displayed when the application runs? Why?
15. With the rtems_task_suspend() call still commented out, comment out the calls to rtems_task_resume() and rtems_task_wake_after() from the task 2 routine. Change the mode of both tasks so that time slicing is enabled. What is displayed when the application runs? Why?
16. With the rtems_*() calls still commented out and time slicing enabled, set the priority of both tasks to 10. What is displayed when the application runs? Why?