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10EC842

Eighth Semester B.E. Degree Examination, June/July 2015
Real Time Operating System

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions, selecting
atleast TWO questions from each part.**

PART – A

- 1 a. Write the state machine diagram, for real time service using polling and explain how it is different from event driven service. Write the algorithms for both the cases. (12 Marks)
- b. With diagrams, explain all the parts in a real time service timeline with and without hardware acceleration. (08 Marks)
- 2 a. Write thread state transition table and state transition diagram with five possible states. Also write the thread state reentrant function with task lock and unlock functions. What happens if these two functions are removed for a satellite application function? (12 Marks)
- b. With diagram and an example, explain hard RTS, isochronal RTS, soft RTS and soft isochronal RTS utility graphs. (08 Marks)
- 3 a. Describe preemptive fixed priority policy using RM with an example and equation of RMLUB. Derive RMLUB equation considering the two critical cases with timing diagrams and relationship graphs for T_1 and T_2 . (12 Marks)
- b. Explain deadline monotonic policy with equations and illustrate if $D_i = T_i$, $T_1 = 2$, $T_2 = 5$, $C_1 = 1$ and $C_2 = 1$. How does DM differ from RM policy? (08 Marks)
- 4 a. Explain ECC memory design using hamming code. The data byte is $(11000100)_2$. Write tables and calculations for forming encoded data and for the corrected data. Write the calculation and correction if d_5 is changed during transmission. (12 Marks)
- b. Write the equations and conditions for WCET and ACET for hard and soft real time systems respectively. Also list the five conditions for CPU and I/O overlap situation for deadline D_i . (08 Marks)

PART – B

- 5 a. Determine individual utilization, total utilization and RMLUB, if $T_1 = 3$, $T_2 = 5$, $T_3 = 15$, $C_1 = 1$, $C_2 = 2$, $C_3 = 3$. Write the timing diagram for RM, EDF and LLF scheduling policies, for 15 time units. Write the calculations and the analysis for all the three policies. (12 Marks)
- b. Explain the terms blocking, deadlock, livelock and critical section with examples. (08 Marks)
- 6 a. Define the functions of the three firmware components. Also write an application program for synchronizing two tasks using semaphore and delay functions. (12 Marks)
- b. Explain exception and assert with programming examples. (08 Marks)
- 7 a. Explain how path length, efficiency and CPI can be estimated by considering a sample C code to compute Fibonacci sequence. Consider the suitable platform and the tools that are used for these. (12 Marks)
- b. Explain the four basic methods to build performance monitoring capability into hardware. (08 Marks)
- 8 a. Describe reliability and availability with equation, diagrams and examples. (10 Marks)
- b. Explain the design issues for process and memory management in the RTOS design for a PIC microcontroller. (10 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.