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**M.Tech. Degree Examination, Dec. 2013/Jan. 2014**  
**Real Time Operating Systems**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions.**

1.
  - a. With diagrams, explain hard real time, isochronal, soft real time, anytime, soft isochronal service utilities. (10 Marks)
  - b. Differentiate between preemptive and non-preemptive scheduling. (06 Marks)
  - c. Write the pseudocode of a basic event driven software service. (04 Marks)
  
2.
  - a. Write the timing diagram, conditions and equations with respect to RMLUB for the following 2 cases and analyze them by writing the relationship curves for a 2 service example.
    - Case : i)  $C_1$  short enough to fit all three releases in  $T_2$
    - Case : ii)  $C_1$  too large to fit lost release in  $T_2$ . (10 Marks)
  - b. Explain the two algorithms for determining N and S feasibility test, with equations. (06 Marks)
  - c. Differentiate between deadline monotonic and earliest deadline first policies. (04 Marks)
  
3.
  - a. With the data given below show how a hamming encoding for an 8 – bit word with 4 parity bits and an overall word parity – bit is used for the following conditions. (Detection or corrections).
    - Case : i) No ERRORS
    - ii) SBE, CAN CORRECT
    - iii) MBE DETECTED, CAN'T CORRECT
    - iv) PARITY ERROR, CAN CORRECT.
 Data : "11000100". (12 Marks)
  - b. Explain a simple pipeline with an example of stage overlap depth = 4. (04 Marks)
  - c. Explain execution efficiency and pipelining. (04 Marks)
  
4.
  - a. Explain RM scheduling. Calculate the utility of the CPU resource achievable for the following systems of tasks.
    - i)  $T_1 = 50$   $T_2 = 80$ ,  $C_1 = 25$ ,  $C_2 = 35$
    - ii)  $T_1 = 2$ ,  $T_2 = 4$ ,  $T_3 = 16$ ,  $C_1 = 1$ ,  $C_2 = 1$ ,  $C_3 = 4$ .
 Write scheduling diagram for each of the above. (10 Marks)
  - b. Determine availability and QoS, if MTBF = 26 seconds, MTTR = 5 seconds, dropouts = 48 when deliveries is 90. (04 Marks)
  - c. Explain power management and processor clock modulation. (06 Marks)
  
5.
  - a. With a block diagram, explain different subsystems for stereo –vision tracking system. (06 Marks)
  - b. List any four high-speed serial interconnection and low-speed serial interconnection used for real-time embedded systems. (04 Marks)
  - c. With the help of diagrams of memory map and memory hierarchy, explain memory subsystem in an embedded system. (10 Marks)

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.

- 6** a. Describe path length, efficiency and calling frequency with a 'C' code to generate members of Fibonacci sequence. **(10 Marks)**  
b. Compare reliability and availability in a real time system. **(05 Marks)**  
c. Explain the basic concepts of drill down tuning. **(05 Marks)**
- 7** a. Explain the RTOS system software mechanisms. **(08 Marks)**  
b. Define the three firmware components. **(06 Marks)**  
c. Explain exceptions and assert. **(06 Marks)**
- 8** a. Describe RTOS design issues in a PIC micro controller. **(10 Marks)**  
b. Showing TTD (time to deadline) draw EDF scheduling for the tasks and explain :  
 $T_1 = 3$        $C_1 = 1$   
 $T_2 = 5$        $C_2 = 2$   
 $T_3 = 15$       $C_3 = 3.$  **(10 Marks)**

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