M.Tech. Degree Examination, December 2012
Real Time Operating Systems

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions.*

1   a. Explain briefly the history of embedded systems and write the pseudocode for basic real time service. **(05 Marks)**
    b. Explain with a neat diagrams, hard real-time service utility, isochronal service utility and best effect service utility. **(08 Marks)**
    c. Explain with a pseudocode, thread safe reentrant functions. **(07 Marks)**

2   a. Explain Liu and Layland proposed sufficient feasibility test by taking the example of two service (RMLUB). **(07 Marks)**
    b. Describe the relationship between sufficient and N and S (necessary and sufficients) feasibility tests using subset diagram. **(05 Marks)**
    c. Explain dynami priority policies and with a figure/diagram, brief about RM policy and EDF policy overload scenario. **(08 Marks)**

3   a. Explain intermediate I/O, overlap definitions, overlap conditions and deduce the axioms about overlap. **(08 Marks)**
    b. Mention the factor that contribute for the increase of CPI (clock/instructions) and explain how the hazards can be minimized. **(07 Marks)**
    c. Explain in brief on flash file systems and flash wear leveling. **(05 Marks)**

4   a. Define priority inversion. Mention the three conditions that causes unbounded priority inversion. Explain the solution for unbounded priority inversion. **(10 Marks)**
    b. Explain the ways of handling mined deadlines and quality of service (QOS) for a real time system. **(10 Marks)**

5   a. Mention hardware components of a real time embedded system. Explain in brief any three hardware components. **(10 Marks)**
    b. Explain with a figure any two firmware components (device driver interface figure). **(05 Marks)**
    c. Explain good coding practices which makes writing RTOS code easier. **(05 Marks)**

6   a. Mention the levels of single step debugging. Explain task or process level debugging. **(07 Marks)**
    b. Explain exception handling by taking the example of divide-by-zero exception. **(06 Marks)**
    c. Explain power-on self test and diagnostics. **(07 Marks)**

7   a. Explain hardware supported profiling and tracing. **(10 Marks)**
    b. Define reliability and availability and their similarity and differences. Explain design trade OFFs between the cost and simply engineering HR to reduce MTBF (meantime between failure). **(10 Marks)**

8   a. Explain the method for implementing low end and mid range RTOSs on PIC microcontrollers and brief about PIC18RTOS design. **(10 Marks)**
    b. Explain multitasking application by taking the example of digital clock and thermometer that runs on PIC microcontroller. **(10 Marks)**

* * * * *