

R09**Code No: D8403****JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****M.Tech II - Semester Examinations, March/April 2011****REAL TIME OPERATING SYSTEMS****(REAL TIME SYSTEMS)****Time: 3hours****Max. Marks: 60**

Answer any five questions
All questions carry equal marks

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1. a) List and explain the real time applications in the area of signal processing.
 b) How does the testing of real time software differ from testing of other software?
 c) Is assembly language the most appropriate language for real time software?
 [12]
2. a) What do you understand by the term “real time”? How is the concept of real-time different from the traditional notion of time? Explain your answer using a suitable example?
 b) Explain the periodic task model in detail. [6+6]
3. a) Explain the rate monotonic scheduling algorithm
 b) Under what condition does rate monotonic scheduling guarantee schedulability.
 c) Determine whether the following set of periodic tasks is schedulable on a uniprocessor, using rate monotonic algorithm.
 Task P1: computation time =30 sec. deadline=100 sec
 Task P2: computation time =5 sec. deadline=250 sec
 Task P3: computation time =30 sec. deadline=150 sec
 Substantiate your answer with an execution trace. [12]
4. Determine whether the following set of periodic tasks is schedulable on a uniprocessor using DMA (Deadline Monotonic Algorithm). Show all your intermediate steps in your computation. [12]

| Task | Start-Time (m Sec) | Processing-Time (m Sec) | Period (m Sec) | Deadline (m Sec) |
|------|-----------------------|----------------------------|-------------------|---------------------|
| T1 | 20 | 25 | 150 | 140 |
| T2 | 60 | 10 | 60 | 40 |
| T3 | 40 | 20 | 200 | 120 |
| T4 | 25 | 10 | 80 | 25 |

5. a) Explain why algorithms that can be used satisfactorily to schedule real-time tasks on multiprocessors often are not satisfactory to schedule real-time tasks on distributed systems, and vice-versa.
 b) Write short notes on predictability and validation of dynamic multiprocessor systems.
 [12]

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6. a) Explain the problems that might arise if hard-real time tasks are made to share critical resources among themselves using traditional operating system primitives such as semaphores or monitors. Briefly explain how these problems can be overcome.
b) Write short notes on effects of resource contention and resource access control. [6+6]
7. Explain the operation of Priority Ceiling Protocol in sharing critical resources among real-time tasks. Explain how PCP is able to avoid deadlock. [12]
8. a) Suppose that you have to select a suitable computer for a process control application, out of several available computers. Write four important performance parameters which you would consider in benchmarking real-time computer systems. Define these parameters and explain why they are important in real-time applications. [12]
b) Explain why traditional (non real-time) operating systems need to dynamically change the priority levels of tasks. What is the implication of this for real-time application development using such an operating system? [6+6]

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