CS 447 Distributed Systems

Midsemester Examination **Marks 50**

Oct. 1, 2003 **Time: 2:30-4:30**

1. A group of collaborating service daemons implementing a distributed service designate one of the daemons as a coordinator for some common tasks. Any number of daemons may join this group dynamically. A newly joining daemon always takes over the coordinatorship from the previous coordinator. A daemon may also leave the collaborative service, thereby transferring the coordinatorship to the service daemon that joined before it, if any. The group may startup with a single service daemon. Design and implement a fully distributed protocol to implement the above leave and join operations. [*Help: Work out your solution on your answer-sheet, and finally write it neatly in the style that we have followed for distributed mutual exclusion algorithm. Ensure that there are no livelocks, deadlocks, busy waits, loss of coordinator and duplicate coordinators. No shared memory.*] **20 Marks**

2. Why is non-determinism important in distributed systems? With non-deterministic choices, isn't there a risk of loosing messages/state? Answer in the context of communications paradigms that you have studied. Use examples. **10 Marks**

3. In the case of a read-replication DSM, show how you will solve *write-write*, *read-write* clashes. Use an example for each case. **10 Marks**

4. Let's assume that you have (designed) a distributed framework for interoperability. Now recommend an application development process to users of this framework so that the users can follow the same for developing applications on top of this infrastructure. [*Hint: Identify the modules/files/reusable libraries, tools, dependencies, and development processes. Take an example.*] **10 Marks**