

**January 2010  
Preliminary Exams**

**Computer Operating Systems (Questions 1-4)**

**Problem 1**

Describe the function of a short term process scheduler. Define a multilevel process scheduling queue. Explain the idea of feedback. Explain the advantage of feedback multilevel scheduling queue over simple multilevel queue. Define either "process aging" or "process decay" and explain how one of these techniques are used in multilevel feedback scheduling.

**Problem 2**

Define synchronization primitives. Give examples. Motivate the need for synchronization primitives in OS design. That is, explain why there is a need to formally design such primitives rather than solve synchronization problems in an ad hoc manner. State the mutual exclusion problem. Using synchronization primitive examples you defined provide a solution to the problem.

**Problem 3**

Define virtual memory. Describe how page-based virtual memory is organized. With respect to such memory organization, explain the principle of locality of reference. Define the concept of a working set. Explain how the two concepts are related. Explain why the OS may need to keep track of the working set of each process and how it does it.

**Problem 4**

Describe how and the OS schedules read/write head of the disk. Explain the need for such scheduling. Describe LOOK and C-LOOK disk scheduling algorithms. Give an example of read/write head scheduling using these two algorithms. One of the algorithms results in less read/write head movement. Name which one and explain why. However, the other algorithm is preferred. Explain why.