

## 2010/Spring Operating System PhD Qualifying Exam

Student ID \_\_\_\_\_ Name \_\_\_\_\_

1. What is the *inverted page table* (IPT), and what are the advantages and disadvantages of using it? (15 points)
2. Consider a file system that uses *inodes* to represent files. Disk blocks are 8KB in size, and a pointer to a disk block requires 4 bytes. This file system has 10 direct disk blocks, as well as three indirect disk blocks (i.e., one single-indirect block, one double-direct, and one triple-indirect, respectively). What is the maximum size of a file that can be stored in this file system? ( 15 points)
3. What is a *ballooning technique* , which is used in virtual machine monitors ? Explain why it can be more efficient than VMM-level paging. (15pts)
4. Explain how a client system can verify whether a remote system is running a known (verified) operating system. You can assume the hardware of the remote system cannot be compromised. (15pts)
5. What are the main differences between homogeneous sensor network environment and mobile personal sensor network (PSN) environment? What are the differences in the requirements of the sensor platforms for the two environments? (15 points)
6. What would be the major new workload on personal mobile platforms such as smart-phones which will be imposed by emerging mobile pervasive applications? (15 points)