1. In a multiprogramming and time-sharing environment, several users share the system simultaneously. This situation can result in various security problems.

a. What are two such problems?

b. Can we ensure the same degree of security in a time-shared machine as in a dedicated machine? Explain your answer.

2. What network configuration would best suit the following environments? Explain your answers.

a. A dormitory floor

b. A university campus

c. A state

d. A nation

3. Describe the five major activities of an operating system in regard to file management?

4. What is the main advantage for an operating-system designer of using a virtual-machine architecture? What is the main advantage for a user?

5. Describe the differences among short-term, medium-term, and long term scheduling.

6. What are the benefits and detriments of each of the following? Consider both the systems and the programmers’ levels.

a. Synchronous and asynchronous communication

b. Automatic and explicit buffering

c. Send by copy and send by reference

d. Fixed-sized and variable-sized messages

7. Provide two programming examples in which multithreading does not provide better performance than a single-threaded solution.

8. Can a multithreaded solution using multiple user-level threads achieve better performance on a multiprocessor system than on a single-processor system? Explain.

9. Discuss how the following pairs of scheduling criteria conflict in certain settings.

a. CPU utilization and response time

b. Average turnaround time and maximum waiting time

c. I/O device utilization and CPU utilization

10. Consider a system implementing multilevel queue scheduling. What strategy can a computer user employ to maximize the amount of CPU time allocated to the user’s process?

11. What is the meaning of the term busy waiting? What other kinds of waiting are there in an operating system? Can busy waiting be avoided altogether? Explain your answer.

12. Windows Vista provides a new lightweight synchronization tool called slim reader–writer locks. Whereas most implementations of reader– writer locks favor either readers or writers or perhaps order waiting threads using a FIFO policy, slim reader–writer locks favor neither readers nor writers, nor are waiting threads ordered in a FIFO queue. Explain the benefits of providing such a synchronization tool.

13. Explain the difference between internal and external fragmentation.

14. Compare paging with segmentation with respect to the amount of memory required by the address translation structures in order to convert virtual addresses to physical addresses.

15. Discuss the hardware support required to support demand paging.

16. Assume that you are monitoring the rate at which the pointer in the clock algorithm (which indicates the candidate page for replacement) moves. What can you say about the system if you notice the following behavior:

a. Pointer is moving fast

b. Pointer is moving slow

17. What are the advantages and disadvantages of a system providing mandatory locks instead of providing advisory locks whose usage is left to the users’ discretion?

18. Some systems automatically open a file when it is referenced for the first time, and close the file when the job terminates. Discuss the advantages and disadvantages of this scheme as compared to the more traditional one, where the user has to open and close the file explicitly.

19. Discuss how performance optimizations for file systems might result in difficulties in maintaining the consistency of the systems in the event of computer crashes.

20. In what situations would using memory as a RAM disk be more useful than using it as a disk cache?

21. What is an operating system? What are the functions of an operating system? Have these definitions changed over time?

22. Discuss the tradeoffs involved in choosing a time quantum in CPU scheduling. Does the choice of a good quantum depend on how the system will be used?

23. What are the differences between single-threaded vs. multithreaded processes?

24. What is a batch file? What purposes does a batch file have?

25. Find a file system which you have used (like the NTFS used in Windows, for example), and describe some of its properties in terms of the concepts discussed in the text: for example, what attributes are stored per file, or what directory structure is used?

26. What is a VMware? How has it changed the landscape of desktops and servers?