1. When a program is in execution, what action does the processor perform in order to fetch the next instruction?
   a. Pop the address of the instruction from the stack.
   b. Copy the contents of the PC to the MAR.
   c. Look up the address of the instruction in the associated process control block.
   d. Trap to the ISR.

2. Which one of the following statements concerning a TRAP instruction is true?
   a. It is part of the WIN32 API.
   b. It is used in the implementation of library functions that invoke system calls.
   c. The processor is expected to be in supervisor mode before executing it.
   d. It is a POSIX.1 system call.

3. What is the purpose of dual-mode operation?
   a. To enable the operating system to take control of the processor.
   b. To save power.
   c. To protect the operating system and hardware from corruption.
   d. To distinguish an ordinary user from a super-user (administrator).

4. Which one of the following statements concerning storage devices is false?
   a. In handling a cache miss, a block (rather than a single word) is transferred from the next level in the memory hierarchy.
   b. Management of cache memory is the responsibility of the operating system.
   c. A disk cache is implemented in main memory.
   d. Main memory is volatile.

5. What are utilities?
   a. Peripherals that are connected to a computer.
   b. Operating system routines that execute in supervisor mode.
   c. Data structures that are part of the kernel of an operating system.
   d. Shells, compilers and other useful system programs.

6. What is POSIX?
   a. A standard operating system interface and environment.
   b. A version of the UNIX operating system.
   c. A portable platform for Java programming.
   d. A subsystem of Windows NT, 2000 and XP that isolates the Executive from platform-specific hardware differences.
7. Which one of the following operating systems was written for minicomputers?
   a. MS-DOS 1.0
   b. OS/360
   c. UNIX version 7
   d. Windows NT

8. Which technique was introduced because a single job could not keep both
   the CPU and the I/O devices busy?
   a. Time-sharing.
   b. Spooling.
   c. Preemptive scheduling.
   d. Multiprogramming.

9. Which one of the following statements correctly describes the relationship
    between the processes and programs in a computer system at any given moment?
    a. Every program stored in secondary memory must be associated with a process.
    b. A different program must be associated with every process.
    c. Several programs may be associated with the same process.
    d. Several processes may be associated with the same program.

10. Which one of the following state-transitions does not affect any “ready” queue?
    a. Release.
    b. Timeout.
    c. Event occurs.
    d. Admit.

11. Which kind of scheduling involves activation and suspension of processes?
    a. Short-term.
    b. Middle-term.
    c. Long-term.
    d. Prioritised.

12. Which one of the following statements about processes in UNIX is true?
    a. A user process can temporarily become a system process.
    b. A system process can be preempted.
    c. An “exec” system call spawns a child process.
    d. Parent and child processes share their data segments.

13. Which one of the following statements about kernel-level threads is true?
    a. They are the unit of dispatch.
    b. They are protected from each other within a process.
    c. They share the same user stack within a process.
    d. They share the same kernel stack within a process.
14. Which model for implementing a threads library has been adopted in most modern operating systems?
   a. Pure user-level.
   b. Pure kernel-level.
   c. MxN.
   d. Java.

15. Which threads library is available on POSIX-compliant systems?
   a. Fibers.
   b. C-threads.
   c. Pthreads.
   d. UI-threads.

16. Which one of the following statements about threads is false?
   a. Creating a thread is faster than creating a process.
   b. In the pure user-level model, if one thread blocks then all threads associated with the same process block.
   c. In the pure kernel-level model, if one thread blocks then all threads associated with the same process block.
   d. Threads can execute simultaneously if there are multiple processors.

17. What makes the behaviour of a multi-threaded program unpredictable?
   a. It depends upon random numbers.
   b. Execution switches from one thread to another outside the control of the program.
   c. One cannot assume that loading and storing a word in memory is an atomic operation.
   d. Programmers often make mistakes.

18. Why are shared variables in multi-threaded Java programs sometimes declared to be “volatile”?
   a. To remind the programmer that they are dangerous.
   b. To allow the JVM to invalidate them when power is turned off.
   c. To enable more than one thread to access them.
   d. To ensure that the most recent value written to such a variable is supplied to any thread accessing it.

19. Which one of the following operations cannot be used to acquire a lock on a resource?
   a. Enabling interrupts.
   c. Busy-waiting using exchange instruction.
   d. Waiting on a semaphore.

20. How can a semaphore $s$ be used to solve the critical-section problem?
   a. Initialize $s$ to 0; enter section after waiting on $s$; exit after signaling on $s$.
   b. Initialize $s$ to 1; enter section after waiting on $s$; exit after signaling on $s$.
   c. Initialize $s$ to 0; enter section after signaling on $s$; exit after waiting on $s$.
   d. Initialize $s$ to 1; enter section after signaling on $s$; exit after waiting on $s$. 