First Question

Q1 B1

Choose the best Answer:

1) The Windows CreateProcess() system call creates a new process. What is the equivalent system call in UNIX:
   a) NTCreateProcess()
   b) process()
   c) fork()
   d) getpid()

2) When interrupt occurs, the contents of PSW go to:
   a) Cash memory
   b) Control stack
   c) Interrupt service routine memory area
   d) None of the above.

3) What services are provided by the OS:
   a) Program execution.
   b) Access to I/O devices.
   c) Controlled access to files.
   d) Error detection and response
   e) All of the above

4) A(n) ________ is the unit of work in a system:
   a) process
   b) operating system
   c) timer
   d) mode bit

5) A microkernel is a kernel ________:
   a) containing many components that are optimized to reduce resident memory size
   b) that is compressed before loading in order to reduce its resident memory size
   c) that is compiled to produce the smallest size possible when stored to disk
   d) that is stripped of all nonessential components

6) Suppose that process forked 3 threads.
   Terminating the process will cause:
   a) Terminating all its threads.
   b) Terminating just one thread
   c) Non of the threads will be terminated
   d) None of the above

7) A process can be switched because of:
   a) Clock interrupt
   b) I/O interrupt
   c) Memory fault
   d) All of the above
8) What statement concerning privileged instructions is considered false
   a) They may cause harm to the system.
   b) They can only be executed in kernel mode.
   c) They cannot be attempted from user mode.
   d) They are used to manage interrupts

9) _____ provide(s) an interface to the services provided by an operating system.
   a) Shared memory
   b) System calls
   c) Simulators
   d) Communication

10) _____ is/are not a technique for passing parameters from an application to a system call.
    a) Cache memory
    b) Registers
    c) Stack
    d) Special block in memory

11) The _____ of a process contains temporary data such as function parameters, return addresses, and local variables.
    a) text section
    b) data section
    c) program counter
    d) stack

12) A process control block _____.
    a) includes information on the process's state
    b) stores the address of the next instruction to be processed by a different process
    c) determines which process is to be executed next
    d) is an example of a process queue

13) When a child process is created, which of the following is a possibility in terms of the execution or address space of the child process?
    a) The child process runs concurrently with the parent.
    b) The child process has a new program loaded into it.
    c) The child is a duplicate of the parent.
    d) All of the above

14) A process may transition to the Ready state by which of the following actions?
    a) Completion of an I/O event
    b) Awaiting its turn on the CPU
    c) Newly-admitted process
    d) All of the above
Second Question No. of Branches (1) (7/20)

Q2 B1 Short Essay (Solve Just 7 of them)

1) What is a bootstrap program, and where is it stored? (1 Mark)
2) Why is main memory not suitable for permanent program storage or backup purposes? Furthermore, what is the main disadvantage to storing information on a magnetic disk drive as opposed to main memory? (1 Mark)
3) Describe the relationship between an API, the system-call interface, and the operating system? (1 Mark)
4) Describe some requirements, or goals, when designing an operating system? (1 Mark)
5) Explain the main differences between a short-term and long-term scheduler? (1 Mark)
6) Explain the concept of a context switch? (1 Mark)
7) Name and describe the different states that a process can exist in at any given time? (1 Mark)
8) What effect does the size of the time quantum have on the performance of an RR algorithm? (1 Mark)
9) Explain the process of starvation and how aging can be used to prevent it? (1 Mark)

Third Question No. of Branches (1) (6/20)

Q3 B1 (6/6)

Consider the following set of processes, with the length of the CPU burst given in milliseconds:

<table>
<thead>
<tr>
<th>Process</th>
<th>Burst Time</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>P₁</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>P₂</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>P₃</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>P₄</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>P₅</td>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>

The processes are assumed to have arrived in the order P₁, P₂, P₃, P₄, P₅, all at time 0.

a) Draw four Gantt charts that illustrate the execution of these processes using the following scheduling algorithms: FCFS, SJF, nonpreemptive priority (a larger priority number implies a higher priority), and RR (quantum = 2).

b) What is the turnaround time of each process for each of the scheduling algorithms in part a?

c) What is the waiting time of each process for each of these scheduling algorithms?

d) Which of the algorithms results in the minimum average waiting time (over all processes)?

End of Questions