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**SUBJECT: OS SEM: Vsem**

**1. Which of the following is NOT a valid deadlock prevention scheme?** (a) Release all resources before requesting a new resource   
(b) Number the resources uniquely and never request a lower numbered resource than the last one requested.  
(c) Never request a resource after releasing any resource   
(d) Request and all required resources be allocated before execution.

**2. Let m[0]…m[4] be mutexes (binary semaphores) and P[0] …. P[4] be processes.  
Suppose each process P[i] executes the following:**

**wait (m[i]); wait(m[(i+1) mode 4]);**

**------**

**release (m[i]); release (m[(i+1)mod 4]);**

**This could cause**   
(a) Thrashing   
(b) Deadlock  
(c) Starvation, but not deadlock   
(d) None of the above

**3. A graphics card has on board memory of 1 MB. Which of the following modes can the  
card not support?**   
(a) 1600 x 400 resolution with 256 colours on a 17 inch monitor  
(b) 1600 x 400 resolution with 16 million colours on a 14 inch monitor  
(c) 800 x 400 resolution with 16 million colours on a 17 inch monitor   
(d) 800 x 800 resolution with 256 colours on a 14 inch monitor

**4. Using a larger block size in a fixed block size file system leads to**   
(a) better disk throughput but poorer disk space utilization  
(b) better disk throughput and better disk space utilization  
(c) poorer disk throughput but better disk space utilization  
(d) poorer disk throughput and poorer disk space utilization

**5. Consider the following statements with respect to user-level threads and kernel supported threads  
i. context switch is faster with kernel-supported threads  
ii. for user-level threads, a system call can block the entire process  
iii. Kernel supported threads can be scheduled independently  
iv. User level threads are transparent to the kernel**

**Which of the above statements are true?**   
(a) (ii), (iii) and (iv) only  
(b) (ii) and (iii) only  
(c) (i) and (iii) only  
(d) (i) and (ii) only

**6. In a system with 32 bit virtual addresses and 1 KB page size, use of one-level page tables for virtual to physical address translation is not practical because of**  
(a) the large amount of internal fragmentation  
(b) the large amount of external fragmentation  
(c) the large memory overhead in maintaining page tables  
(d) the large computation overhead in the translation process

**7. A virtual memory system uses First In First Out (FIFO) page replacement policy and allocates a fixed number of frames to a process. Consider the following statements:  
P: Increasing the number of page frames allocated to a process sometimes increases the page fault rate.  
Q: Some programs do not exhibit locality of reference. Which one of the following is TRUE?**  
(a) Both P and Q are true, and Q is the reason for P   
(b) Both P and Q are true, but Q is not the reason for P.   
(c) P is false, but Q is true   
(d) Both P and Q are false.

**8. A single processor system has three resource types X, Y and Z, which are shared by three processes. There are 5 units of each resource type. Consider the following scenario, where the column alloc denotes the number of units of each resource type allocated to each process, and the column request denotes the number of units of each resource type requested by a process in order to complete execution. Which of these processes will finish LAST?**

alloc request

X Y Z X Y Z

P0 1 2 1 1 0 3

P1 2 0 1 0 1 2

P2 2 2 1 1 2 0

(a) P0  
(b) P1  
(c) P2  
(d) None of the above, since the system is in a deadlock

**9. Suppose the time to service a page fault is on the average 10 milliseconds, while a memory access takes 1 microsecond. Then a 99.99% hit ratio results in average memory access time of**

(a) 1.9999 milliseconds  
(b) 1 millisecond  
(c) 9.999 microseconds  
(d) 1.9999 microseconds

**10. Which of the following need not necessarily be saved on a context switch between processes?**   
(a) General purpose registers  
(b) Translation look-aside buffer  
(c) Program counter  
(d) All of the above

**11. Normally user programs are prevented from handling I/O directly by I/O instructions in them. For CPUs having explicit I/O instructions, such I/O protection is ensured by having the I/O instructions privileged. In a CPU with memory mapped I/O, there is no explicit I/O instruction. Which one of the following is true for a CPU with memory mapped I/O?**  
(a) I/O protection is ensured by operating system routine(s)  
(b) I/O protection is ensured by a hardware trap  
(c) I/O protection is ensured during system configuration  
(d) I/O protection is not possible

**12. What is the swap space in the disk used for?**  
(a) Saving temporary html pages  
(b) Saving process data  
(c) Storing the super-block  
(d) Storing device drivers

**13. Increasing the RAM of a computer typically improves performance because:**  
(a) Virtual memory increases  
(b) Larger RAMs are faster  
(c) Fewer page faults occur  
(d) Fewer segmentation faults occur

**14. Consider the following table of arrival time and burst time for three processes P0, P1 and P2.**

Process Arrival time Burst Time

P0 0 ms 9 ms

P1 1 ms 4 ms

P2 2 ms 9 ms

**The pre-emptive shortest job first scheduling algorithm is used. Scheduling is carried out only at arrival or completion of processes. What is the average waiting time for the three processes?**  
(a) 5.0 ms  
(b) 4.33 ms  
(c) 6.33 ms  
(d) 7.33 ms

**15. A file system with 300 GByte uses a file descriptor with 8 direct block address. 1 indirect block address and 1 doubly indirect block address. The size of each disk block is 128 Bytes and the size of each disk block address is 8 Bytes. The maximum possible file size in this file system is**  
(a) 3 Kbytes  
(b) 35 Kbytes  
(c) 280 Bytes  
(d) Dependent on the size of the disk

**16. Consider a machine with 64 MB physical memory and a 32-bit virtual address space. If the page size is 4KB, what is the approximate size of the page table? (GATE 2001)**(a) 16 MB  
(b) 8 MB  
(c) 2 MB  
(d) 24 MB

**17. More than one word are put in one cache block to (GATE 2001)**  
(a) exploit the temporal locality of reference in a program  
(b) exploit the spatial locality of reference in a program  
(c) reduce the miss penalty  
(d) none of the above

**18. Which of the following statements is false? (GATE 2001)**   
(a) Virtual memory implements the translation of a program’s address space into physical memory address space  
(b) Virtual memory allows each program to exceed the size of the primary memory  
(c) Virtual memory increases the degree of multiprogramming  
(d) Virtual memory reduces the context switching overhead

**19. A thread is usually defined as a ‘light weight process’ because an operating system (OS) maintains smaller data structures for a thread than for a process. In relation to this, which of the followings is TRUE?**  
(a) On per-thread basis, the OS maintains only CPU register state  
(b) The OS does not maintain a separate stack for each thread  
(c) On per-thread basis, the OS does not maintain virtual memory state  
(d) On per thread basis, the OS maintains only scheduling and accounting information.

**20. Let the page fault service time be 10ms in a computer with average memory access time being 20ns. If one page fault is generated for every 10^6 memory accesses, what is the effective access time for the memory?**  
(a) 21ns  
(b) 30ns  
(c) 23ns  
(d) 35ns