UGC-NET/JRF-COMPUTER SCIENCE & APPLICATIONS

Unit Test : OPERATING SYSTEM

Time: 00: 60 Hour **Date : 19-09-2015**
M.M. : 40

INSTRUCTIONS: Attempt all the 20 questions. Each question carry two marks.

1. The state of a process is defined by :
(a) the final activity of the process
(b) the activity just executed by the process
(c) the activity to next be executed by the process
(d) the current activity of the process

2. The degree of multi-programming is :
(a) the number of processes executed per unit time
(b) the number of processes in the ready queue
(c) the number of processes in the I/O queue
(d) the number of processes in memory

3. Consider the following set of processes, the length of the CPU burst time given in milliseconds :

Process	Burst time
P1	6
P2	8
P3	7
P4	3

Assuming the above process being scheduled with the SJF scheduling algorithm:
(a) The waiting time for process P1 is 3ms. (b) The waiting time for process P1 is 0ms.
(c) The waiting time for process P1 is 16ms. (d) The waiting time for process P1 is 9ms.

4. 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 (GATE CS 2000)
(a) 1.9999 milliseconds (b) 1 millisecond
(c) 9.999 microseconds (d) 1.9999 microseconds

5. 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

6. Fetch_And_Add(X,i) is an atomic Read-Modify-Write instruction that reads the value of memory location X, increments it by the value i, and returns the old value of X. It is used in the pseudocode shown below to implement a busy-wait lock. L is an unsigned integer shared variable initialized to 0. The value of 0 corresponds to lock being available, while any non-zero value corresponds to the lock being not available.

```
AcquireLock(L){
while (Fetch_And_Add(L,1))
  L = 1;
}
ReleaseLock(L){
L = 0;
 }
```

This implementation
(a) fails as L can overflow
(b) fails as L can take on a non-zero value when the lock is actually available
(c) works correctly but may starve some processes
(d) works correctly without starvation

7. In a particular Unix OS, each data block is of size 1024 bytes, each node has 10 direct data block addresses and three additional addresses: one for single indirect block, one for double indirect block and one for triple indirect block. Also, each block can contain addresses for 128 blocks. Which one of the following is approximately the maximum size of a file in the file system?
(a) 512 MB (b) 2 GB (c) 8 GB (d) 16 GB

8. Consider a disk system with the following specifications. Number of surfaces=8, outer diameter = 12cm, inner diameter = 4cm, number of sectors/track=20, sector size = 4KB, inter track distance= 0.2 mm. Then what is total number of sectors per surface in disk?
(a) 200 (b) 4000 (c) 2000 (d) 1600

9. For the above data what will be the capacity of the disk in bytes?
(a) 6.4MB (b) 64MB (c) 128MB (d) 32MB

10. Consider the following disk queue with request for i/o blocks on cylinders: 98,180,37,170,14,75,67,165 Initially the disk head is at cylinder 55. Assume that the seek time for one cylinder is 1ms.Find the total time required to complete this request if SSTF algo is used.
(a) 180ms (b) 235ms (c) 293ms (d) 391ms

11. A system uses FIFO policy for page replacement. It has 4 page frames with no pages loaded to begin with. The system first accesses 100 distinct pages in some order and then access the same 100 pages but now in the reverse order. How many page faults will occur? (GATE CS 2010)
(a) 196 (b) 192 (c) 197 (d) 195

12. Main function of shared memory is:
(a) to use primary memory efficently (b) to do intra process communication
(c) to do inter process communication (d) none of above

13. If the property of locality of reference is well pronounced in a program
(a) the number of page faults will be more (b) the number of page faults will be less
(c) the number of page faults will same (d) none of above

14. Memory protection is normally done by
(a) the processor and the associated hardware
(b) the operating system
(c) the compiler
(d) the user program

15. Which is single user operating system
(a) MS-DOS (b) UNIX (c) XENIX (d) LINUX

16. Semaphores function is to
(a) synchronize critical resources to prevent deadlock
(b) synchronize processes for better CPU utilization
(c) used for memory management
(d) none of above

17. A processor uses 2-level page tables for virtual to physical address translation. Page tables for both levels are stored in the main memory. Virtual and physical addresses are both 32 bits wide. The memory is byte addressable. For virtual to physical address translation, the 10 most significant bits of the virtual address are used as index into the first level page table while the next 10 bits are used as index into the second level page table. The 12 least significant bits of the virtual address are used as offset within the page. Assume that the page table entries in both levels of page tables are 4 bytes wide.

Further, the processor has a translation look-aside buffer (TLB), with a hit rate of 96%. The TLB caches recently used virtual page numbers and the corresponding physical page numbers. The processor also has a physically addressed cache with a hit rate of 90%.

Main memory access time is 10 ns, cache access time is 1 ns, and TLB access time is also 1 ns. Assuming that no page faults occur, the average time taken to access a virtual address is approximately (to the nearest 0.5 ns)

(a) 1.5 ns (b) 2 ns (c) 3 ns (d) 4 ns

18. Which of the following memory allocation scheme suffers from external fragmentation?

(a) Segmentation (b) Pure demand paging

(c) Swapping (d) Paging

19. Pre-emptive scheduling is the strategy of temporarily suspending a running process

(a) before the CPU time slice expires (b) to allow starving processes to run

(c) when it requests I/O (d) to avoid collision

20. Pool based allocation of memory achieves better usage. Memory can be preempted from inactive programs and used to accommodate active programs. This is called

(a) Preemption (b) Swapping (c) Spooling (d) Scheduling

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1. (d)	2. (d)	3. (a)	4. (d)	5. (c)	6. (b)	7. (b)
8. (b)	9. (c)	10. (c)	11. (a)	12. (c)	13. (b)	14. (a)
15. (a)	16. (a)	17. (d)	18. (a)	19. (a)	20. (b)	