

<b>Philadelphia University</b> <b>Faculty of Engineering</b> <b>Department of Computer Engineering</b>		<b>First Semester 2015/2016</b> <b>Date:- 03/02/2016</b> <b>Allowed time:- 2 Hours</b>
<b>Operating Systems (630422) Final Exam</b>		
<b>Student Name: - .....</b> <b>ID: - .....</b>		

<b>Question 1:</b> chose the correct answer for the followings.	<b>12 points</b>
1- 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	
2- Which of the followings involves distributing tasks across multiple computing cores. A) Concurrency      B) Task parallelism      C) Data parallelism      D) Parallelism	
3- One of the followings allows a thread to run on only one processor. A) Processor affinity      B) Processor set      C) NUMA      D) Load balancing	
4- A(n) _____ refers to where a process is accessing/updating shared data. A) critical section      B) entry section      C) mutex      D) test-and-set	
5- Which of the following data structures in the banker's algorithm is a vector of length $m$ , where $m$ is the number of resource types? A) Need      B) Allocation      C) Max      D) Available	
6- One of the followings is the dynamic storage-allocation algorithm which results in the smallest leftover hole in memory. A) First fit      B) Best fit      C) Worst fit      D) None of the above	
7- Consider a 32-bit address for a two-level paging system with an 8 KB page size. The outer page table has 1024 entries. How many bits are used to represent the second-level page table? A) 10      B) 8      C) 12      D) 9	
8- In the enhanced second chance algorithm, which of the following ordered pairs represents a page that would be the best choice for replacement? A) (0,0)      B) (0,1)      C) (1,0)      D) (1,1)	
9- The _____ allocation algorithm allocates available memory to each process according to its size. A) equal      B) global      C) proportional      D) slab	
10- In an environment where several processes may open the same file at the same time, _____. A) the operating system typically uses only one internal table to keep track of open files B) the operating system typically uses two internal tables called the system-wide and per-disk tables to keep track of open files C) the operating system typically uses three internal tables called the system-wide, per-disk, and per-partition tables to keep track of open files D) the operating system typically uses two internal tables called the system-wide and per-process tables to keep track of open files	
11- Order the following file system layers in order of lowest level to highest level. [1] I/O control                      [2] logical file system                      [3] basic file system [4] file-organization module                      [5] devices  A) 1, 3, 5, 4, 2      B) 5, 1, 3, 2, 4      C) 1, 5, 3, 4, 2      D) 5, 1, 3, 4, 2	
12- Which of the following is the simplest method for implementing a directory? A) tree data structure      B) linear list      C) hash table      D) nonlinear list	

**Question 2:-** Ordinarily the `exec()` system call follows the `fork()`. Explain what would happen if a programmer place the call to `exec()` before the call to `fork()`. **2 points**

**Question 3:-** Distinguish between data and task parallelism. **2 points**

**Question 4:-** Write two short methods that implement the simple semaphore `wait()` and `signal()` operations on global variable `s`. **3 points**

**Question 5:-** What is the difference between deadlock prevention and deadlock avoidance? **2 points**

**Question 6:-** Explain how paging is implemented and how CPU can access data within a page. **2 points**

**Question 7:-** Explain the sequence of events that happens when a page-fault occurs. **3 points**

**Question 8:-** Why do all file systems suffer from internal fragmentation?

**2 points**

**Question 9:-** What are the problems associated with linked allocation of disk space routines?

**3 points**

**Question 10:-** Suppose we have the following page accesses: 1 2 3 5 4 2 3 5 4 1 2 5 1 1 3 1 4 and that there are three frames within our system. what is the number of page faults for the given reference string using Optimal Replacement, FIFO and LRU algorithms?

**6 points**

**Optimal Replacement:-**

**FIFO**

**LRU**

**Question 11:-** Assume a system has a TLB hit ratio of 90%. It requires 15 nanoseconds to access the TLB, and 85 nanoseconds to access main memory. What is the effective memory access time in nanoseconds for this system?

**3 points**

Good Luck

*Sultan M. Al-Rushdan*