



Final Examination Cover Sheet

First Semester: 1435-1436 / 2014-2015

Course Instructor: _____	Exam Date: _____	5-1-2015
Course Title: <u>Operating Systems</u>	Course Code: _____	IT-241
Exam Duration: <u>120 minutes (Two hours)</u>	Number of Pages: (including cover page)	<u>10</u>

Exam Guidelines

- Mobile phones are not permitted.
- Calculators are permitted.

Marking Scheme

Questions	Score
1 (15 marks)	
2 (10 marks)	
3 (5 marks)	
4 (5 marks)	
5 (5 marks)	
6 (5 marks)	
7 (5 marks)	
Total Marks = 50	

Student Name: _____	Student ID: _____
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Question 1: MULTIPLE CHOICE QUESTIONS

[15 MCQs of 15 Marks]

1. If a process is executing in its critical section, then no other processes can be executing in their critical section. This condition is called:
A. **Mutual exclusion** اعضاء متبادر
B. Critical exclusion
C. Synchronous exclusion
D. Asynchronous exclusion
2. A _____ saves the state of the currently running process and restores the state of the next process to run.
A. save-and-restore
B. state switch
C. **context Switch**
D. None of the above
3. The _____ model allows a user-level thread to be bound to one kernel thread.
A. many-to-many
B. **two-level**
C. one-to-one
D. many-to-one
4. In the *Dynamic Partitioning* technique of memory management, the placement algorithm that chooses the block that is closest in size to the request is called:
A. **Best-fit**
B. First-fit
C. Next-fit
D. All of the above
5. In _____ allocation, each file has its own index block(s) of pointers to its data blocks.
A. **Indexed**
B. Linked
C. Contiguous
D. None

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6. Which of the following is not considered a file attribute?
- A. Name
 - B. Size
 - C. **Resolution**
 - D. Protection
7. With SCAN algorithm:
- A. The disk arm starts at one end of the disk, and moves toward the half of disk.
 - B. **The disk arm starts at one end of the disk, and moves toward the other end.**
 - C. The disk arm starts at one end of the disk, and moves toward the last queue.
 - D. None of the above.
8. Which one of the following is a visual (mathematical) way to determine the deadlock occurrence?
- A. Starvation graph
 - B. **Resource allocation graph**
 - C. Inversion graph
 - D. None of the above
9. A character-stream device _____.
- A. transfers data in blocks of bytes
 - B. **transfers data a byte at a time**
 - C. is a device such as a disk drive
 - D. is similar to a random access device
10. The _____ is the implementation of an access matrix consists of sets of ordered triples.
- A. **global table**
 - B. access list for objects
 - C. lock-key mechanism
 - D. capability list



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11. Global table implementation of matrix table contains _____.
- A. domain
 - B. object
 - C. right set
 - D. **All of the above**
12. The common name for the crime of stealing passwords is _____.
- A. spooling.
 - B. identity theft.
 - C. **spoofing.**
 - D. hacking.
13. When an attempt is to make a machine or network resource unavailable to its intended users, the attack is called _____.
- A. **denial-of-service attack**
 - B. slow read attack
 - C. spoofed attack
 - D. starvation attack
14. What is known as masquerading?
- A. **When one participant in communication pretends to be someone else.**
 - B. When attacker modifies data in communication
 - C. When attack is of fraudulent repeat of a valid data
 - D. When attack gains access to remote systems.
15. C-LOOK Algorithm is a version of _____.
- A. SCAN.
 - B. C-LOOK.
 - C. **C-SCAN.**
 - D. SSTF.



Question 2: TRUE OR FALSE QUESTIONS

[10 Marks]

Write True or False in front of each statement.

1. A system call is triggered by hardware. **FALSE**
2. CPU utilization is the number of processes those are completed per time unit. **TRUE**
3. The segment of code in which the process may change common variables, update tables, write into files is known as non-critical section. **FALSE**
4. A file system must be mounted before it can be accessed. **TRUE**
5. Virtual File Systems on UNIX provide an object-oriented way of implementing file systems. **TRUE**
6. SCAN algorithm sometimes called the elevator algorithm. **TRUE**
7. Shortest Seek Time First (SSTF) scheduling is a form of Shortest Job First (SJF) scheduling; may cause starvation of some requests. **TRUE**
8. The rows of *Access Matrix* represent objects. **FALSE**
9. Encrypting messages is a way to prevent them from being deleted or lost. **FALSE**
10. The fundamental structure of Windows 7 file system (NTFS) is a volume. **TRUE**



Question 3: Answer the following questions briefly

[5 marks]

(i) Define Operating System.

A program that acts as an intermediary between a user of a computer and the computer hardware.

(ii) Define Bootstrap Program.

- It is loaded at power-up or reboot.
- Typically stored in ROM or EPROM, generally known as firmware.
- Initializes all aspects of the system.
- Load operating system kernel and starts execution.

(iii) What is Kernel.

- "The one program running at all the times on the computer".
- The kernel is the central module of an OS.
- It is the part of the OS that loads first, and it remains in main memory.

(iv) List out categories of System Calls.

- Process Control
- File Management
- Device Management
- Information Maintenance
- Communications
- Protection

(v) List out Process States.

- New
- Running
- Waiting
- Ready
- Terminated



Question 4: Explain three conditions that must be satisfied to solve the Critical Section problem.

[5 marks]

Answer:

- (i) In a solution to the critical section problem, no thread may be executing in its critical section if a thread is currently executing in its critical section. This is known as *mutual exclusion*.
- (ii) Second requirement is *progress*. Only those threads that are not executing in their critical sections can participate in the decision on which process will enter its critical section next.
- (iii) Finally, a bound must exist on the number of times that other threads are allowed to enter their critical state after a thread has made a request to enter its critical state. This requirement is called *bounded waiting*.

Question 5: Answer the following questions:

[5 marks]

- (i) What is the difference between delete and truncate file operations?

Answer:

Delete is releasing all file space, so that it can be reused by other files, and erase the directory entry.

Truncate is erasing the contents of a file but keeping its attribute except for file length which reset to zero.

- (ii) Name any four file attributes with brief description for each.

Answer: (any four)

Name – only information kept in human-readable form

Identifier – unique tag (number) identifies file within file system

Type – needed for systems that support different types

Location – pointer to file location on device

Size – current file size

Protection – controls who can do reading, writing, executing

Time, date, and user identification – data for protection, security, and usage monitoring

Question 6:

[5 marks]

- (i) Explain the working of SCAN disk scheduling algorithm?

Answer:

The disk arm starts at one end of the disk, and moves toward the other end, servicing requests until it gets to the other end of the disk, where the head movement is reversed and servicing continues.

SCAN algorithm sometimes called the **elevator algorithm**.

If requests are uniformly dense, largest density at other end of disk and those wait the longest.

- (ii) Consider a disk queue holding requests to the following cylinders in the listed order: 110, 52, 13, 101, 72, 165, 140, 80. Assuming the disk head is at cylinder **58** and moving upward through the cylinders?

What is the order that the requests are serviced using SCAN algorithm and SSTF algorithm?

Answer:

Using SCAN Algorithm:

52, 13, 72, 80, 101, 110, 140, 165

Using SSTF Algorithm:

52, 72, 80, 101, 110, 140, 165, 13

Question 7: List out various **programs threats** and explain any two of them.
[5 marks]

Answer:

(i) Trojan Horse:

Many systems have mechanisms for allowing programs written by users to be executed by other users. If these programs are executed in a domain that provides the access rights of the executing user, the other users may misuse these rights. A text-editor program, for example, may include code to search the file to be edited for certain keywords. If any are found, the entire file may be copied to a special area accessible to the creator of the text editor. A code segment that misuses its environment is called a Trojan horse.

(ii) Trap Door:

The designer of a program or system might leave a hole in the software that only she is capable of using. This type of security breach (or trap door) was shown in the movie WarGames.

(iii) Logic Bomb:

Consider a program that initiates a security incident only under certain circumstances. It would be hard to detect because under normal operations, there would be no security hole. However, when a predefined set of parameters was met, the security hole would be created. This scenario is known as a logic bomb.

(iv) Stack and Buffer Overflow:

The stack- or buffer-overflow attack is the most common way for an attacker outside the system, on a network or dial-up connection, to gain unauthorized access to the target system. An authorized user of the system may also use this exploit for privilege escalation.