NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY
Faculty of Computing and Informatics

QUALIFICATION : BACHELOR OF COMPUTER SCIENCE : SYSTEMS ADMINISTRATION, COMMUNICATION NETWORKS ; BACHELOR OF SOFTWARE DEVELOPMENT, BACHLOER OF GEO-INFORMTION TECHNOLOGY	
QUALIFICATION CODE: 80BSAN; 07BACS, 07BGEI	**LEVEL:** 6
COURSE: OPERATING SYSTEMS	**COURSE CODE:** OPS621S
DATE: JANUARY 2025	**SESSION:** 2
DURATION: 3 HOURS	**MARKS: 70**

SECOND OPPORTUNITY/SUPPLEMENTARY EXAMINATION QUESITON PAPER	
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INSTRUCTIONS
1. Answer ALL the questions. 2. Read all the questions carefully before answering. 3. Number the answers clearly

THIS QUESTION PAPER CONSISTS OF 5 PAGES
(including this front page)

Multiple Choice and Fill in question/True and False: Writhe the question number and the correct answer next to it. **[20 Marks]**

1. Which OS is pre-emptive processing and put high significance on priority processing.

   a) Batch OS
   b) Real-Time OS
   c) Network OS
   d) Distributed OS

2. Which is an example of an embedded operating system?

   a) Windows 10
   b) Android
   c) FreeRTOS
   d) Ubuntu

3. Which term correctly describe fragmentation in memory management?

   a) Misuse of CPU usage
   b) Inefficiency usage of memory space due to dynamic allocation leading to memory space wastage.
   c) Loading programs into memory.
   d) The speed at which data is transferred from the processor to memory.

4. Which of the following correctly explain "swapping" in memory management?

   a) Copying files to disk
   b) Moving processes between main memory and virtual memory.
   c) Changing the file permission to read.
   d) More memory space the process in memory management.

5. Which tern explain the techniques used in memory management to divides memory into fixed-size blocks?

   a) Paging
   b) Segmentation
   c) Compaction
   d) Virtual Memory

6. Which term correctly describe page fault in Memory management.

   a) When a page is not found in the main memory.
   b) An error in memory allocation.
   c) Incorrectly data written a memory page
   d) Misuse of page table.

7. What is the primary function of virtual memory?

   a) Faster access to data.

b) It offers the ability to the OS to cater for processes larger than the Main memory can accommodate.
c) Simplifies the operation memory management.
d) Efficiency in power consumption.

8. What is a process in OS?

a) A collection of running programs.
b) An instance of a program that is running.
c) A technique used to manage memory management.
d) scheduling of tasks.

9. What does the term scheduling refers to in process management?

a) Process allocation to memory pages.
b) Technique applied by the OS in determining the the order in which processes are executed.
c) Configuration of processes.
d) Process allocation to CPU.

10. The read state of a process indicates that ....

a) The process is currently under execution.
b) The process is waiting for an event to occur prior execution.
c) The process is waiting for CPU time.
d) The process has completed its execution.

Fill in the missing words:

11. A specialized software that enables the OS and hardware peripheral component to communicates is a _____.
12. A/an _____ is a signal from hardware or software indicating that there is an event that in the computer that requires immediate attention.
13. _____ is a nonprimitive scheduling algorithm that handles incoming in the order they arrive in the ready.
14. A(n) _____ contains files with the names of users who are allowed to access it and the type of access each user is permitted.
15. _____ are resources that can be taken away from active process and reallocated to another process in the ready queue.

Determine whether the following statements are true or false:

16. File management includes creating, editing, moving, and deleting files on a computer system:
17. Operating system security is mainly concerned with protecting the system from unauthorised access and threats.
18. Least Recently Used algorithm (LRU) works on the assumption that the most recently used page is likely not to be requested back in the RAM.
19. Regular software updates are critical in the maintained of the OS security and protecting against system vulnerabilities.

20. Round Robin scheduling algorithm function on process priority basis.

Sectio B: Short questions [20 Marks]

1. List and explain any four goals that describe good scheduling policy in process management? (8)
2. Explain the master file directory (MFD) and state its role. (4)
3. Explain the difference between shared and virtual devices. Give one (1) example of each device. (4)
4. Explain the difference between the following concepts used in operating systems.
   a. Aging (2)
   b. Context Switching (2)

Section C: Practical [30 Marks]

Question 1

You are given that it takes **1.5 ms** to travel from one track to the next, and that the read/write arm is originally positioned at Track 350. The request queue (number of tracks) is 0-700. (Ignore rotational time and transfer time, just consider seek time). You must note that the read/write arm by default moves towards the high-numbered tracks.

Compute how long it will take to satisfy the following track requests which are all present in the wait queue:

427, 118, 610, 105, 274, 77, 555

1.1 Use the following seek strategy algorithms, illustrate using a graph how the track requests will be serviced.

a) SSTF (5)

b) LOOK (5)

1.2 Calculate the average seek time for both seek strategies mentioned in 1.1.

a) SSTF (2)
b) LOOK (2)

Question 2

2.1 In demand paging, a page replacement policy is used to manage system resources. Given that main memory has 4-page frames available to programs and that a program consisting of 15 pages is to be loaded in main memory. The request pages are provided below in order:

1 0 2 1 4 3 1 0 2 0 4 3 1 2 4

Suppose that all the page frames are initially empty.

a) Using the following Least Recently Used (LRU) removal algorithms, demonstrate how you will fit the pages in the frames (8)

b) Calculate the hit rate and page fault. (2)

Question 3:

3.1 Suppose You are given the following memory blocks of size in (MB): ***[150, 350, 500, 200, 300].*** The following processes require the indicated memory size (MB) need to be allocated.

- ***Process 1:120***
- ***Process 2: 300***
- ***Process 3: 180***
- ***Process 4: 490***
- ***Process 5:560***

a) Using the ***Best Fit Memory*** allocation indicate the memory blocks that will be allocated. (5)

b) Calculate the total memory fragmentation that will occur. (1)

Exam Ends