061306T4CSC

COMPUTER SCIENCE LEVEL 6

ICT/OS/CS/CR/02/6/A

UNDERSTAND OPERATING SYSTEMS

July/August 2024

TVET CURRICULUM DEVELOPMENT, ASSESSMENT AND CERTIFICATION COUNCIL (TVET CDACC)

WRITTEN ASSESSMENT

TIME: 3 HOURS

INSTRUCTIONS TO CANDIDATE

1. The paper consists of **two** sections: **A** and **B**
2. Answer **ALL** questions in Section **A** and any **Three** from section **B**
3. Marks for each question are indicated in the brackets
4. A separate answer booklet will be provided
5. Do not write on the question paper

This paper consists of FOUR (4) printed pages

Candidates should check the question paper to ascertain that all pages are printed as indicated and that no questions are missing.

SECTION A: (40 Marks)

Answer ALL the questions in this section

1. Outline TWO relationships between operating systems and computer hardware. (2 Marks)
2. State any THREE functions of the Memory Management Unit (MMU). (3 Marks)
3. Critical section is a fundamental concept in concurrent programming and operating system design that plays a crucial role in the overall performance of an operating system. Explain THREE reasons why Critical sections are important in an operating system. (6 Marks)
4. Regularly checking for and installing device driver updates is an essential maintenance task to a computer operating system. List FOUR benefits of keeping drivers updated. (4 Marks)
5. Distinguish between the following terms as applied in operating systems. (6 Marks)
   a) Internal and external fragmentation.
   b) Paging and segmentation.
   c) Processes and threads.
6. Computer administrators can control several file attributes within a computer system. State any FOUR benefits of controlling these attributes. (4 Marks)
7. Race condition arises when the outcome of operations depends on the relative timing of their execution. Outline THREE reasons why race conditions are notoriously difficult to detect in software. (3 Marks)
8. Page fault is a mechanism used by the operating system to manage memory efficiently in demand-paged virtual memory systems. Explain how a page fault occurs. (2 Marks)
9. Outline FOUR factors to consider when choosing a file organization method. (4 Marks)
10. Explain the following memory allocation strategies employed by operating systems. (6 Marks)
    a) First Fit
    b) Best Fit
    c) Coalescing

SECTION B: (60 Marks)

Answer any THREE questions in this section

11. An organization that has jobs that can be queued, scheduled, and executed without requiring immediate user interaction plans to acquire an operating system.

    a) Recommend the most suitable operating system the organization should acquire.
    Batch processing

    (2 Marks)

    b) Discuss SEVEN reasons that justify your choice of operating systems in 11 a) above.

    (14 Marks)

    c) Outline FOUR limitations of your choice of operating systems in 11 a) above.

    (4 Marks)

12. An operating system is essential application software that is installed in every computing device.

    a) Discuss any SIX reasons why a computer needs an operating system. (12 Marks)

    b) Briefly explain the following Operating System Architectures giving an example in each case. (8 Marks)

        i) Monolithic Kernel Architecture

        ii) Microkernel Architecture

        iii) Layered Architecture

        iv) Hybrid kernel architecture

13. Process management is a crucial aspect of operating systems that ensures efficient utilization of resources and smooth execution of programs.

    a) Explain FIVE process management tasks the operating systems undertakes.

    (10 Marks)

    b) The Table below shows the arrival time and CPU burst time for three processes. Use it to answer the questions that follow.

Process	Arrival time (ms)	CPU burst (ms)
A	0	8
B	1	5
C	4	1

Assuming the operating system uses a preemptive version of shortest job first.

i) Calculate the waiting time for each process. (3 Marks)

ii) Calculate the turnaround time for each process. (3 Marks)

iii) Calculate the average waiting time. (1 Mark)

iv) Calculate the average turnaround time. (1 Mark)

v) Draw a Gantt chart to show the order of execution. (2 Marks)

14.

a) Discuss FIVEsecurity options that can be configured in local policy settings to enhance system security. (10 Marks)

b) Performance Monitor is a versatile tool in Windows-based computers that is very valuable to system administrators. Explain FIVE common uses of Performance Monitor. (10 Marks)

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