



MANICALAND STATE UNIVERSITY OF APPLIED SCIENCES

FACULTY OF ENGINEERING, APPLIED SCIENCES AND TECHNOLOGY

DEPARTMENT: COMPUTER SCIENCE AND INFORMATION SYSTEMS

MODULE: OPERATING SYSTEMS

CODE: BCOS123

SESSIONAL EXAMINATIONS

APRIL 2024

DURATION: 3 HOURS

EXAMINER: MR A. MUZENDA

INSTRUCTIONS

1. Answer *any four* questions.
2. Start a new question on a fresh page
3. Total marks 100

Additional material(s): None

QUESTION 1

- a) You are employed as a System Administrator of a bank. The bank is about to acquire a new operating system. Advise management on the desirable qualities of an effective operating system. [15]
- b) Explain the role of a system call in an operating system. You must use practical examples of system calls found in operating systems. [10]

Total Marks [25]

QUESTION 2

- a) A concerned parent has donated a computer for the School Development Association use only. As a computer science teacher, you have been tasked to identify and install the necessary software. Justify your choice of the software. [15]
- b) A list of all passwords is kept within the operating system. If a user manages to read this list password protection is no longer provided. Suggest a scheme that will avoid this problem. [6]
- c) With the aid of an example, explain the concept of context switching with operating systems. [4]

Total Marks [25]

QUESTION 3

- (a) Describe four (4) functions an effective operating system should accomplish. [12]
- (b) Explain any two (2) types of operating systems. [4]
- (c) Explain the concept of thrashing in operating systems and outline how it can be detected and recovered from. [9]

Total Marks [25]

QUESTION 4

- (a) Using a process state diagram, identify the different states a live process may occupy and how a process moves between these states. [10]
- (b) Explain the purpose of Interprocess Communication (IPC). [5]
- (c) Differentiate between a process and a thread with some examples. [5]
- (d) With the aid of an example, explain the race condition in process synchronization. [5]

Total Marks [25]

QUESTION 5

- (a) Explain memory segmentation. [5]
- (b) Explain paging in memory management and how it operates. [5]
- (c) Consider the following set of processes that arrive at time 0, with the length of CPU time given in milliseconds:

Process	Arrival Time	Processing Time
P1	0	3
P2	2	3
P3	3	1
P4	5	4
P5	8	2

- (i) Draw the Gantt Chart using the FCFS algorithm; [3]
- (ii) Calculate average turnaround time; [3]
- (iii) Calculate average waiting time; [3]
- (iv) Calculate throughput; and [3]
- (v) Calculate processor utilisation. [3]

Total Marks [25]

QUESTION 6

- (a) Using examples, compare and contrast preemptive and non-preemptive scheduling as used in process management. [4]

(b) Explain the following:

(i) Deadlock using an example. [4]

(ii) Conditions that are necessary for a deadlock to occur. [8]

(iii) Three strategies of dealing with a deadlock problem. [9]

Total Marks [25]

.....**END OF EXAMINATION**.....