



UNIVERSITY EXAMINATIONS

SECOND SEMESTER 2023/2024 ACADEMIC YEAR

**FIRST YEAR EXAMINATION FOR THE DEGREE OF
BACHELOR OF SCIENCE IN (ICT) AND BACHELOR OF
EDUCATION (SCIENCE)**

BICT 125/COMP 224: OPERATING SYSTEMS

STREAM: R

TIME: 2 HRS

DAY: TUESDAY [2.30P.M – 4.30P.M]

DATE: 16/04/2024

THIS QUESTION PAPER CONSISTS OF THREE (3) PAGES

PLEASE DO NOT OPEN UNTIL THE INVIGILATOR SAYS SO.

INSTRUCTIONS

- Answer **ALL** questions in section **A** and any **TWO** questions in section **B**
- All questions in section B carry equal marks

SECTION A (30 MARKS)**QUESTION ONE (30 MARKS)**

- A Process Control Block contains many pieces of information associated with a specific process. Explain **FIVE** information types of a PCB. **(5 Marks)**
- List down **FOUR** examples of operating systems in the market today. **(2 Marks)**
- List **THREE** levels of scheduling used in process scheduling. **(3 Marks)**
- As a process executes it changes state. Explain the **FIVE** states that a process can have at any given time. **(5 Marks)**
- Explain **FIVE** functions of a computer operating system. **(5 Marks)**
- Discuss **TWO** disk space to file allocation methods that could be used in operating systems. **(2 Marks)**
- Explain the term page table as applied in operating systems. **(2 Marks)**
- The table below shows details of process in a computer system. Use it to answer the questions that follow.

Process ID	Arrival Time	Burst Time
W	0	2
X	2	7
Y	2	20
Z	3	3

Assume the system is using SJF scheduling

- Determine the average waiting time for the process. (Show your working) **(5 Marks)**
- Explain **ONE** disadvantage of using this system. **(1 Marks)**

Section B each question is worth 20 Marks Answer any TWO questions in this section.

QUESTION TWO (20 MARKS)

- a) Explain the following types of operating systems: **(10 Marks)**
- i. Multi-user operating system
 - ii. Multitasking operating system
 - iii. Network operating systems
 - iv. Real time operating systems
 - v. Time sharing operating systems
- b) Kate was investigating conditions necessary for deadlocks to occur in operating systems. List and explain **FOUR** conditions that she was likely to identify. **(8 Marks)**
- c) Describe the term disk cache as applied in computers. **(2 Marks)**

QUESTION THREE (20 MARKS)

- a) Describe **FOUR** process scheduling techniques. **(8 Marks)**
- b) Explain the following page replacement algorithms: **(6 Marks)**
- i. LRU
 - ii. Optimal page algorithm
- c) Nissi Company Ltd. was experiencing security issues with its file system. Explain **THREE** logical security measures that it could implement in order to mitigate the issue. **(6 Marks)**

QUESTION FOUR (20 MARKS)

- a) Deadlock prevention is accomplished by preventing any of the Coffman conditions from occurring. Briefly explain how the **FOUR** conditions can be prevented. **(8 Marks)**
- b) Jane was required to design a job scheduling algorithm for a proposed operating system. Explain **THREE** features she should consider in the design. **(6 Marks)**
- c) Outline **THREE** differences between a program and a process in process management. **(6 Marks)**

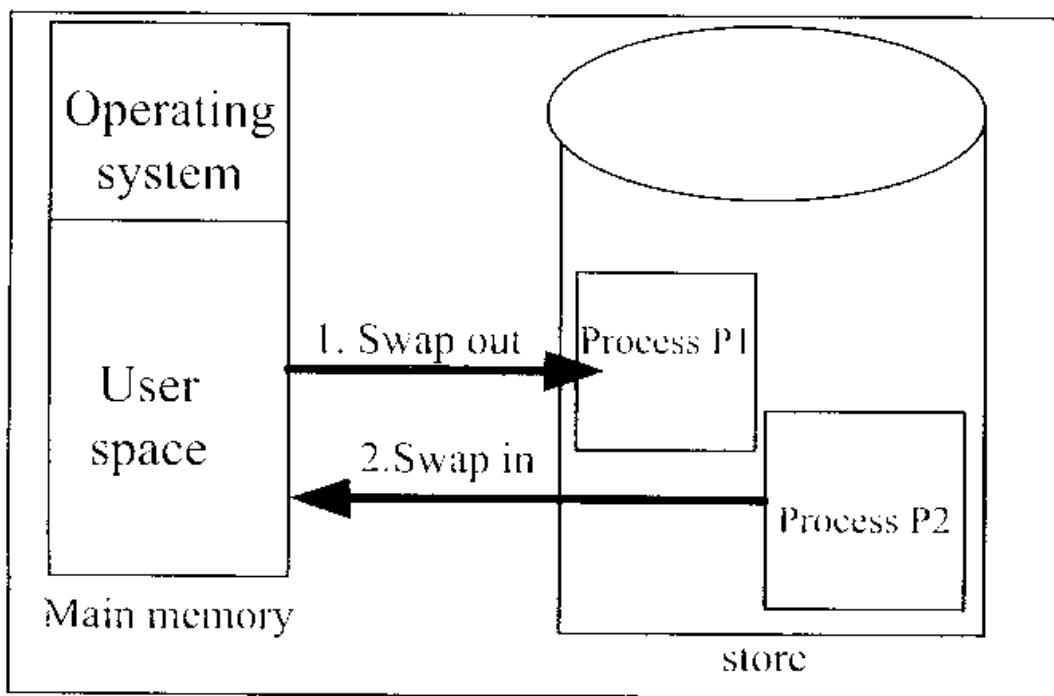
QUESTION FIVE (20 MARKS)

a) Define the following terms:

(10 Marks)

- i. Pre-emptive scheduler
- ii. Non pre-emptive scheduler
- iii. Response time
- iv. Turn-around time
- v. Through put

b) The figure below shows a memory allocation technique. Use it to answer questions that follow.



(i) Identify the appropriate memory management techniques depicted in the figure.

(2 Marks)

(ii) Explain **TWO** benefits that could be realized when using memory management technique identified in (i).

(4 Marks)

c) Distinguish between logical and physical addresses as applied in memory management.

(4 Marks)