



**UGANDA INSTITUTE OF INFORMATION AND COMMUNICATIONS
TECHNOLOGY**

END OF SEMESTER ONE EXAMINATIONS

ACADEMIC YEAR 2025/2026

DEPARTMENT: ICT
YEAR OF STUDY: ONE
PROGRAMME: DIPLOMA IN COMPUTER SCIENCE (DCS)
COURSE: OPERATING SYSTEMS
COURSE CODE: CSC112
DATE: THURSDAY 11TH DECEMBER, 2025
TIME: 09:00 AM – 12:00 NOON
DURATION: 3 HOURS

INSTRUCTIONS:

- (a) This paper consists of two sections A and B**
- (b) Section A carry 40 marks and is compulsory**
- (c) Attempt any THREE questions from section B**
- (d) Any number in section B carry equal marks**
- (e) Credit will be given for use of relevant examples and illustrations**
- (f) Begin each number on a new page of the answer sheet**

SECTION A [40 MARKS]

Attempt ALL the Questions in this section.

Question 1

- (a) State **four functions** performed by the operating system. (4 marks)
- (b) Define **deadlock** as used in operating systems. (2 marks)
- (c) List **any two operating systems** used on mobile phones. (2 marks)
- (d) State **four resources** controlled by an operating system. (4 marks)
- (e) Define **file management** as used in operating systems. (2 marks)
- (f) What is **swapping** as used in memory management? (2 marks)
- (g) Differentiate between internal and external memory fragmentation. (4 marks)
- (h) Define **Process Control Block** and give **two pieces** of information it usually contains. (4 marks)
- (i) Describe **two types** of I/O devices used in computer systems. (4 marks)
- (j) Give differences of **First-Come, First-Served (FCFS)** and **Shortest Job First (SJF)** scheduling algorithms. (4 marks)
- (k) Explain the difference between a sector and a track on a hard disk. (4 marks)
- (t) Describe **any two types** of memory partitioning schemes used in operating systems. (4 marks)

SECTION B [60 MARKS]

Attempt Only Three Questions in this section.

Question 2

UICT runs the Academic Information Management System (AIMS) to manage many student records stored in various files. You are tasked with designing an efficient file management system for this environment.

Required:

- (a) Define the term **file** as used in operating systems. (2 marks)
- (b) Identify **three file attributes** that would consider and justify your choice of each of them. (6 marks)
- (c) State and describe **four functions** of file management. (8 marks)
- (d) Explain **two different file access methods** you would recommend. (4 marks)

Question 3

In a manufacturing plant, multiple processes (jobs) are scheduled to utilize the machinery efficiently. The plant management wants to optimize the process scheduling to minimize waiting time and improve throughput.

Required:

- (a) Define a process as used in operating systems. (2 marks)
- (b) Explain three criteria used to compare different scheduling algorithms. (6 marks)
- (c) The table below gives processes with their burst times.

Process	Burst Time
P1	8 ms
P2	4 ms
P3	9 ms
P4	5 ms

Calculate the average waiting time using the Shortest Job First (SJF) non-preemptive scheduling algorithm. (3 marks)

(d) Draw the **five state process model** showing state transition. (5 marks)

(e) Describe the difference between long-term and short-term schedulers in process management. (4 marks)

Question 4

A computer system is designed to efficiently manage its main memory to run multiple processes concurrently. The system administrator is evaluating different memory management techniques to optimize performance and reduce fragmentation.

(a) Differentiate between: (4 marks)

(i) contiguous memory allocation and non-contiguous allocation. (4 marks)

(ii) a frame and a page as used in memory management. (4 marks)

(iii) physical memory and virtual memory. (4 marks)

(b) Explain these algorithms:

(i) Best Fit Algorithm (2 marks)

(ii) Worst Fit Algorithm (2 marks)

(iii) First Fit Algorithm. (2 Marks)

(c) What is the main function of **Memory Management Unit**? (2 marks)

Question 5

A printing system manages multiple printers and print jobs submitted by various users.

Each print job requires access to certain printers and resources. Sometimes, jobs get stuck waiting indefinitely for resources, leading to a deadlock situation.

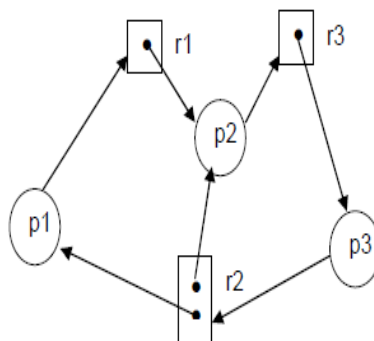
Required:

(a) Define a deadlock in the context of operating systems. (2 marks)

(b) Explain the four necessary conditions for a deadlock to occur. (8 marks)

(c) Describe three strategies for deadlock management. (6 marks)

(d) Explain whether the graph below reveals a deadlock. (2 marks)



(e) Suggest what would be done to break the deadlock. (2 marks)

Question 6

- (a) Define **segmentation** as used in memory management. (2 marks)
- (b) Below are three processes P1, P2 and P3 with their burst times indicated against them.

<i>Process</i>	<i>Burst time</i>
<u>P1</u>	24
<u>P2</u>	3
<u>P3</u>	3

Suppose the processes arrive in the order P2, P1 and P3.

Determine the average waiting time if the scheduling follows First Come First Served Algorithm. (6 marks)

- (c) Identify and describe four components of the I/O Subsystem (8 marks)
- (d) Differentiate between **contiguous memory allocation** and **fixed partition memory allocation** schemes. (4 marks)

END