



*(Knowledge for Development)*

**KIBABII UNIVERSITY**

**UNIVERSITY EXAMINATIONS  
2021/2022 ACADEMIC YEAR**

**END OF SEMESTER EXAMINATIONS  
YEAR TWO SEMESTER TWO EXAMINATIONS**

**FOR THE DEGREE OF  
BACHELOR OF SCIENCE COMPUTER SCIENCE**

**Course code : CSC 224 [A]  
Course title : principles of operating  
systems**

**DATE: 09/05/2022 TIME: 02:00 P.M – 4:00 P.M**

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**INSTRUCTIONS TO CANDIDATES**

Answer **Questions ONE and ANY OTHER TWO.**

**QUESTION ONE**

Compulsory

[30 marks]

a. Define the following terms as used in operating Systems:

Distributed systems [1 Mark]

Traffic controller [1 Mark]

Waiting state [1 Mark]

PCB [1 Mark]

b. What are the four major activities of an operating system in regard to memory management? [4 Marks]

c. What is the distinction between buffering, caching and spooling? [6 Marks]

d. Detail briefly three different ways in which a computer operating system identifies and authenticates users. [6 Marks]

e. The part of the OS that manages memory is the memory manager. Discuss four major problems that are handled by the OS memory manager. [8 Marks]

f. Differentiate between internal and external fragmentation. [2 Marks]

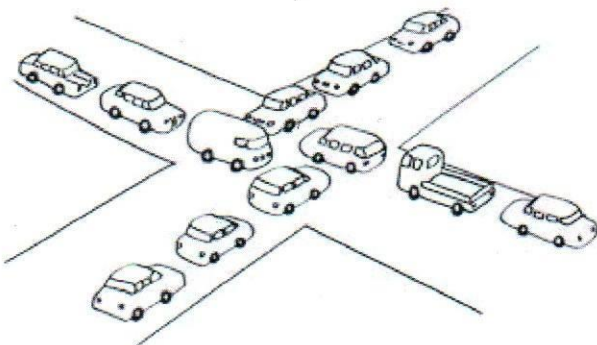
**QUESTION TWO**

[20 marks]

a. The operating system at times suspends a process. Briefly detail four valid reasons for process suspension. [4 Marks]

b. What is mutual exclusion? Describe why it is important in operating systems. [3 Marks]

c. Consider the traffic deadlock depicted in the Figure below.



i. Describe four necessary requirements for mutual exclusion in the example above. [8 Marks]

ii. State a simple rule that will avoid deadlocks in this system. [2 Marks]

d. Give reasons why audit trail is an important tool in a computing environment. [3 Marks]

### QUESTION THREE

[20 marks]

a. Illustrate your understanding of round robin scheduling [4 Marks]

b. Consider the set of 6 processes whose arrival time and burst time are given below

Process Id	Arrival time	Burst time
P1	5	5
P2	4	6
P3	3	7
P4	1	9
P5	2	2
P6	6	3

b. i. Given the above information; an operating system executes the six processes using round robin scheduling with a quantum of 3. Draw the Gantt chart for the processes. [4 Marks]

ii. Calculate the average wait time for the above table. [2 Marks]

c. Every process has its own PCB (Process Control Block). Highlight seven information contained in a PCB [7 Marks]

d. Show your understanding of kernel level threads [3 Marks]

### QUESTION FOUR

[20 marks]

a. Describe the following allocation algorithms:

i. First fit [1 Mark]

ii. Best fit [1 Mark]

iii. Worst fit [1 Mark]

b. i. Given memory partitions of 100K, 500K, 200K, 300K, and 600K (in order), how would each of the First-fit, Best-fit, and Worst-fit algorithms place processes of 212K, 417K, 112K, and 426K (in order)? [6 Marks]

ii. Which algorithm makes the most efficient use of memory? [1 Mark]

iii. Write brief notes on short term CPU scheduler [5 Marks]

c. With the aid of a well labeled diagram describe the five state model. [5 Marks]

QUESTION FIVE

[20 marks]

- a. Describe how a distributed system works. [5 Marks]
- b. Differentiate between a process and a program [4 Marks]
- c. Explain six ways an operating system can prevent intruders from accessing a system [6 Marks]
- d. i. What is compaction? [2 Marks]
- ii. What is its importance in operating systems? [3 Marks]