



NATIONAL OPEN UNIVERSITY OF NIGERIA

PLOT 91, CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESSWAY, JABI-ABUJA

FACULTY OF SCIENCES

DEPARTMENT OF COMPUTER SCIENCE

B. SC. COMPUTER SCIENCE PROGRAMME

2023_2 EXAMINATIONS

COURSE CODE: CIT 315

COURSE TITLE: OPERATING SYSTEMS

COURSE UNIT: 3

TIME: 2 HOURS 45 MINUTES

INSTRUCTION(S): ANSWER QUESTION ONE (1) AND ANY OTHER THREE (3) QUESTIONS

Question One

(a) Consider the following segment table: what are the physical address for the following logical addresses? (i) 0430, (ii) 110, (iii) 2500, (iv) 3400 (v) 4112. [10 Marks]

Segment	Base	Length
0	219	600
1	2300	14
2	90	100
3	1327	580
4	1952	96

(b) Define race condition in the context of concurrent programming and explain how it can occur. [4 Marks]

(c) Threads are divided into four categories. Discuss them. [6 Marks]

(d) Compare and contrast the operation of cache for read and write operations. [5 Marks]

Question Two

(a) i. Explain the steps involved in context switching. [4 Marks]

ii. What factors affect the speed of context switching? [3 Marks]

(b) How does a thread perform a system call? [3 Marks]

(c) Explain the concept of memory swapping and its purpose in memory management. [5 Marks]

Question Three

(a) Explain the concept of contiguous memory allocation and non-contiguous memory allocation in operating systems. [4 Marks]

(b) Describe fixed partitioning in memory allocation and discuss its disadvantages. [4 Marks]

(c) i. Explain the concept of a cache and its importance in computer systems design. [4 Marks]

ii. What are the two essential properties for a memory cache to be useful? [3 Marks]

Question Four

(a) i. Define the concept of interrupt in the context of computing. [3 Marks]

ii. Explain the difference between hardware interrupts and software interrupts. [3 Marks]

(b) Describe the implementation of user-level threads. [4 Marks]

(c) Describe the life cycle of a thread, including its states and transitions. **[5 Marks]**

Question Five

(a) i. What is a hybrid thread model? **[2 Marks]**

ii. Describe the three methods of associating user and kernel-level threads. **[6 Marks]**

(b) Provide advantages and disadvantages of user-level threads. **[4 Marks]**

(c) How does interrupt handling differ for I/O interrupts, timer interrupts, and interprocessor interrupts? **[3 Marks]**

Question Six

(a) Discuss how the operating system allocates resources to a process. **[4 Marks]**

(b) i. What is the role of the scheduler or dispatcher in process execution? **[3 Marks]**

ii. What is the purpose of the stack in a process? **[2 Marks]**

(c) i. What is dynamic partitioning in memory allocation? **[3 Marks]**

ii. How does it address the limitations of fixed partitioning? **[3 Marks]**