

CHUKA UNIVERSITY
University Examinations 2020/ 2021

**SECOND YEAR SECOND SEMESTER EXAMINATION FOR THE AWARD OF
DEGREE IN BACHELOR OF EDUCATION**

COSC 226: PRINCIPLES OF OPERATING SYSTEMS

STREAMS: BED Y2S2

DATE: JULY 2021

TIME: 2 HOURS

SECTION A: Answer all questions in this section

QUESTION ONE (30 Marks)

- a) Outline **THREE** main purposes of an operating system. **[3 marks]**
- b) Giving examples, describe open-source operating systems. **[4 marks]**
- c) Explain each of the following computing environments. **[6 marks]**
- i) Traditional Computing
 - ii) Mobile Computing
 - iii) Distributed Systems
- d) Distinguish between the scheduling algorithms below. **[6 marks]**
- i) Shortest-Job-First Scheduling
 - ii) Priority Scheduling
 - iii) Round-Robin Scheduling
- e) In the context of process synchronization, discuss the Critical-Section Problem. **[4 marks]**
- f) Distinguish between preemptive and nonpreemptive kernels. **[4 marks]**
- g) Outline any **THREE** advantages of thread pools. **[3 marks]**

SECTION B: ATTEMPT ANY TWO QUESTIONS (40 MARKS)

QUESTION TWO (20 MARKS)

- a) Explain any **FOUR** services provided by an operating system. **[4 marks]**
- b) Describe any **THREE** types of system calls provided by an operating system. **[6 marks]**
- c) Describe the differences among short-term, medium-term, and long-term scheduling. **[6 marks]**

- d) Outline **FOUR** reasons for providing an environment that allows process cooperation. [4 marks]

QUESTION THREE (20 MARKS)

- a) Using a well labeled diagram, describe the five process states. [6 marks]
b) Discuss any **THREE** criteria suggested for CPU-scheduling algorithms. [6 marks]
c) Outline **FOUR** conditions that should hold simultaneously in a system for a deadlock situation to arise. [4 marks]
d) Distinguish between logical address and physical address spaces. [4 marks]

QUESTION FOUR (20 MARKS)

- a) Distinguish between Magnetic and Solid-State Disks. [4 marks]
b) Discuss any **TWO** categories of system programs. [4 marks]
c) Briefly distinguish between the following classic problems of synchronization.
i) The Bounded –Buffer Problem [4 marks]
ii) The Readers-Writers Problem [4 marks]
iii) The Dining-Philosophers Problem [4 marks]

QUESTION FIVE (20 MARKS)

- a) Outline **THREE** ways in which to deal with deadlocks. [3 marks]
a) Differentiate between Asynchronous and Deferred thread cancellation. [6 marks]
b) Each process in a computer is represented in the operating system by a process control block having many pieces of information associated with a specific process.
i) Draw a well labeled diagram of a Process Control Block. [3 marks]
ii) Distinguish between the Memory-Management information and Accounting information held by the Process Control Block. [4 marks]
c) Using a diagram, explain the concept of process swapping. [4 marks]