LIMKOKWING UNIVERSITY OF CREATIVE TECHNOLOGY
ESWATINI

Test 1

Faculty of Information and Communications Technology
Bachelor Degree in Information Technology

BIOS4111
Operating Systems
Trimester: 05
From July 2024 to October 2024

BITOS4111

OPERATING SYSTEMS

MODULE DETAILS

Course Location	:	Swaziland
Examiner (s)	:	Mr. Ndumiso E. Khumalo
Contact details (email)	:	ndumisoe.khumalo@gmail.com
Commence Date	:	Week 4
Submission Date	:	Week 4
Duration	:	2 hours

INSTRUCTIONS:

1. This paper has **2 QUESTIONS**
2. Answer **ALL** questions
3. The Total Marks is 60 and this paper contributes 15% to your final mark
4. Marks are provided next to each question in square brackets []
5. Use the spaces provided in the question paper or the provided answer sheet.
6. Read each question carefully before attempting.
7. Misconduct, cheating, possession of unauthorised materials, improper use of materials, unauthorised removal of materials from examination rooms or ignoring the instructions given by supervisors is STRICTLY PROHIBITED.

This exam paper consists of 3 pages including this cover page

GOODLUCK!!!

QUESTION 1 – 25 MARKS

a. Processes can execute concurrently or in parallel. Differentiate between concurrent execution and parallel execution [2]

b. Outline the 3 basic computing resources for the computer system [3]

c. With the aid of a diagram, explain:
   i. the monolithic structure and the layered structure in operating systems [6]
   ii. the modes of operation in operating systems & how they are implemented [6]
   iii. the states in which a process can be in [8]

QUESTION 2 - 35 MARKS

a. Outline the ALL the necessary conditions for a deadlock to occur. [4]

b. With the aid of a diagram, explain two fundamental models of inter-process communication [4]

c. Consider the following set of processes that arrive at time 0, with the length of the CPU burst given in milliseconds.

Process	Burst Time	Priority
P_1	10	3
P_2	1	1
P_3	2	4
P_4	1	5
P_5	5	2

The processes arrive in the order P_1, P_2, P_3, P_4, P_5. Draw a Gantt chart for these processes and calculate the average waiting time using each algorithm below: [12]

i. First Come First Serve (FCFS) Scheduling Algorithm
ii. Shortest-Job-First (SJF) Scheduling Algorithm
iii. Round Robin (RR) Scheduling Algorithm with a time quantum of 4 milliseconds
iv. Priority Scheduling Algorithm

d. Consider a system with twelve resources and three threads: T_0, T_1, and T_2. Thread T_0 requires ten resources, thread T_1 may need as many as four, and thread T_2 may need up to nine resources. Suppose that, at time t_0, thread T_0 is holding five resources, thread T_1 is holding two resources, and thread T_2 is holding two resources as illustrated below.

	Maximum Needs	Current Needs
T_0	10	5
T_1	4	2
T_2	9	2

Prove that at time t_0, the system is in a safe state if the sequence of execution is $<T_1, T_0, T_2>$.
Suppose that, at time t_1, thread T_2 requests and is allocated one more resource. Is the system still in safe state? [5]

…….. THE END …….