UGANDA MARTYRS UNIVERSITY

UNIVERSITY EXAMINATIONS
FACULTY OF SCIENCE

DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION SYSTEM

END OF SEMESTER FINAL ASSESMENT

SEMESTER 1, 2021/2022

COURSE	:	**BACHELOR OF INFORMATION TECHNOLOGY, BACHELOR OF COMPUTER SCIENCE**
PAPER	:	**OPERATING SYSTEMS**
CODE	:	**CSC 2103**
SEMESTER	:	**TWO**
DATE	:	**24/01/2022**
TIME	:	**9:30-12:30pm**
DURATION	:	**3 HOURS**

Instructions

3. *Attempt any 4 Questions*
4. *Time Allowed 3 Hours Only*
5. *Use of relevant Illustrations/diagrams will earn you a bonus mark (s)*
6. *Remember to indicate the question number you have answered.*
7. *Write your name, course and registration number on all your answer sheets*
8. *All answers should be written on the answer booklet*
9. *All university rules apply*

Question 1

a. Write short notes on the following terms as used in Operating Systems **(14 Marks)**
   i. Multitasking
   ii. Multiprogramming
   iii. System Call
   iv. IPC
   v. Interrupt
   vi. Kernel
   vii. Bootstrap Program

b. Explain the Functions of an Operating System **(6 Mark)**

c. What are the main advantages and disadvantages of the microkernel approach to operating system design? **(5 Mark)**

Question 2

a) Define an Operating system (1 mark)

b) Differentiate between the following

i. Monolithic and layered structures to designing operating systems (4marks)
i. Message passing and shared memory interprocess communication (4marks)
ii. Independent and cooperating processes (4marks)
iii. Job queue and ready queue (4marks)
iv. Preemptive and non-preemptive scheduling (4marks)
v. User mode and kernel mode (4marks)

Question 3

a) Define a Process (1mark)
b) Briefly explain components of a process (3marks)
c) Briefly explain the five process states (5 marks)
d) Describe the contents of a Process Control Block (PCB).Use a diagram to illustrate (6 marks)
e) Describe the major activities of an operating system in regard to process management? **[10 Marks]**

Question 4

a. Define a thread **(1 Mark)**
b. Most operating-system kernels are now multithreaded. Explain the benefits of multithreaded programming **(3 marks)**
c. Explain the three multi-threading models **(5 marks)**
d. A deadlock situation can arise if four conditions hold simultaneously. List these conditions **(4 Marks)**
e. Discuss the methods for deadlock handling **(12 Marks)**

Question 5

Define the following CPU scheduling criteria terms: - *(8marks)*

i) Waiting time

ii) Turnaround time

iii) throughput

iv) Response time

a) Consider the following set of processes, with the length of the CPU burst given in milliseconds:

Process	Burst Time	Priority
P_1	2	2
P_2	1	1
P_3	8	4
P_4	4	2
P_5	5	3

The processes are assumed to have arrived in the order P1, P2, P3, P4, P5, all at time 0.

i. Draw four Gantt charts that illustrate the execution of these processes using the following scheduling algorithms: FCFS, SJF, non-preemptive priority (a larger priority number implies a higher priority), and RR (quantum = 2). (8 Marks)

ii. What is the Average waiting time each of the scheduling algorithms in part i)above? (4 Marks)

iii. What is the Average Turnaround Time for each of the scheduling algorithms in part i) above? (4 Marks)

iv. Which of the algorithms results in the minimum average waiting time (over all processes)? (1mark)

Question 6

a. Define memory management (1 mark)

b. Distinguish between the following as used in memory management

i. Internal Fragmentation and External Fragmentation (4marks)

ii. Dynamic Loading and Dynamic Linking (4marks)

iii. Logical Address space and physical address space (4marks)

iv. Fixed partitions and Dynamic partitions (4marks)

v. Segmentation and Paging (4marks)

vi. Page and frame (4marks)