CHUKA   **UNIVERSITY**

UNIVERSITY EXAMINATIONS

FOURTH YEAR EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF COMPUTER SCIENCE

COSC 428: OPERATING SYSTEMS DESIGN

STREAMS:BSC COMP SCI   **TIME: 2 HOURS**

DAY/DATE: FRIDAY 24/09/2021   **8.30 A.M – 10.30 A.M**

INSTRUCTIONS

SECTION A-COMPULSORY

QUESTION ONE (30 MARKS)

a) Briefly explain the meaning of the following concepts:
- i) Distributed operating systems.   (2 marks)
- ii) Network Operating System (NOS)   (2 marks)
- iii) Thread   (2 marks)

b) State and explain any four elements of a process image.   (4 marks)

c) Distinguish between protection error and arithmetic error in the context of operating systems. Give one example for each to illustrate your answer.   (4 marks)

d) State and explain any three system memory design goals.   (3 marks)

e) Briefly describe the two main components of a cache. Use a well labelled diagram to illustrate your answer.   (4 marks)

f) Briefly explain any five responsibilities of a memory manager.   (5 marks)

g) Describe any four elements of information found in process table.   (4 marks)

SECTION B: ANSWER ANY TWO QUESTIONS FROM THIS SECTION

QUESTION TWO (20 MARKS)

a) Briefly describe the meaning of the following terms:
- i) Zombie process.   (2 marks)

    ii)   Process table.   (2 marks)

    iii)   Micro kernel.   (2 marks)

b) State and explain three categories of information found in a process control block. (6 marks)

c) Explain the concept of device management as used in operating systems.   (3 marks)

d) Briefly explain four objectives of designing operating systems.   (4 marks)

e) Explain the main use of system call.   (1 mark)

QUESTION THREE (20 MARKS)

a) Briefly explain four dynamic partitioning algorithms that are used in operating systems

    (4 marks)

b) Explain the hierarchical organization of computer memory. Use a well labelled diagram to illustrate your answer.   (4 marks)

c) Briefly describe two limitations of fixed partitioning.   (2 marks)

d) Distinguish between frames and pages as used in memory management.   (2 marks)

e) Briefly explain the challenge of designing system memory and how it is addressed.

    (2 marks)

f) State and explain three mutual exclusive strategies that uses busy waiting mechanism.

    (6 marks)

QUESTION FOUR (20 MARKS)

a) Briefly explain producer/consumer problem in the context of inter process communication.   (5 marks)

b) State and explain three techniques used to solve producer/consumer problem. (6 marks)

c) Explain four objectives of file management in operating systems.   (4 marks)

d) Briefly describe three components of an input and output management system. (3 marks)

e) Explain the meaning of the term 'buffer' as used in operating systems during message passing.   (2 marks)

QUESTION FIVE (20 MARKS)

a) Briefly outline the main purpose of IPC   (2 marks)

b) In context of process execution explain what is meant by system call and context switch and provide examples.   (5 marks)

c) The figure below shows two processes T1 and T2 executing in the CPU.
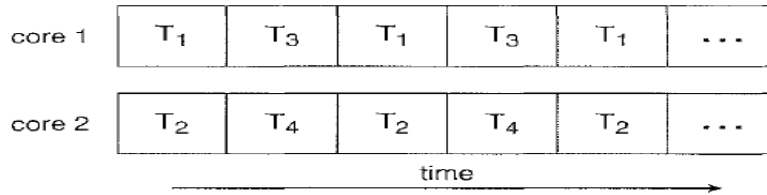
core 1	T_1	T_3	T_1	T_3	T_1	...
core 2	T_2	T_4	T_2	T_4	T_2	...

time →

Fig 1.

   i) Describe the type of system exhibited in the figure 1 above.   (3 marks)

   ii) Give two advantages of the system stated above.   (2 marks)

d) Describe the Execution of a Remote Procedure Call.   (8 marks)