CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATION
RESIT/SUPPLEMENTARY / SPECIAL EXAMINATIONS
EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN COMPUTER SCIENCE

COSC 428: OPERATING SYSTEMS DESIGN

STREAMS: **TIME: 2 HOURS**

DAY/DATE: MONDAY 01/11/2021 **8.30 A.M - 10.30 A.M.**

INSTRUCTIONS:

- Answer Question One and any other two questions

Section A-Compulsory

QUESTION ONE (30 MARKS)

a) In concurrency systems, several liveness issues arise. Describe the following issues. You can use an algorithm.

   i) Livelocks (3 marks)

   ii) Deadlocks (3 marks)

b) When the average queue is only one, the disk scheduling algorithms reduces to FCFS scheduling. *Explain why this assertion is true.* (2marks)

c) Using the layered approach explain the organization of a computer system (4 marks)

d) Compare and contrast cluster and symmetrical multiprocessing. (8 marks)

e) Using suitable example, define remote procedure call. (2 marks)

f) Draw a process state transition diagram using the five states and explain the interpretation of each process (5 marks)

g) Describe how memory and process management are accomplished by the operating system? (3 marks)

Section B: Answer any two questions from this section

QUESTION TWO (20 MARKS)

a) In context of multithreading systems, explain the importance of the following and briefly describe how it can be carried out in Java. (12 marks)

i) Thread Synchronization

ii) Setting thread priority

iii) Pausing thread

iv) Blocking and unblocking thread using Inter-thread communication

b) **Referring to the figure below answer the following questions:**

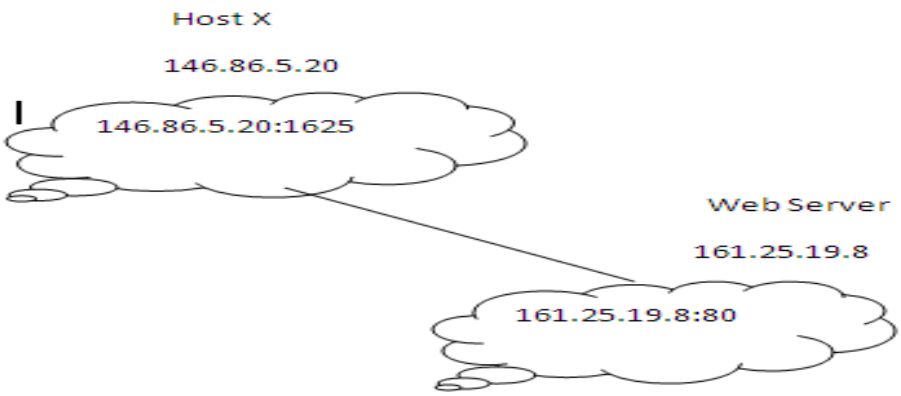

Fig 1.

i) Briefly describe how interaction takes place between the two systems (3 marks)

ii) What do the 1625 and 80 refer to and why are the necessary in inter-process communication (3 marks)

iii) Explain the use and importance of 146.86.20.5 and 161.25.19.8 in the above system (2 marks)

QUESTION THREE (20 MARKS)

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

b) The figure below shows two processes T1 and T2 executing in the CPU.

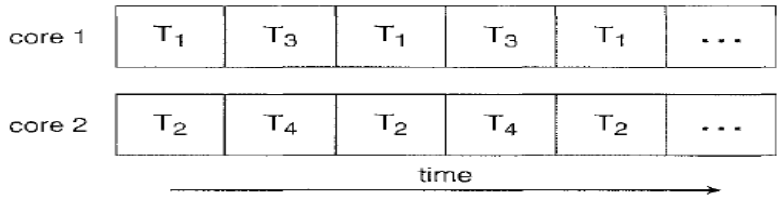

Fig 2.

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

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

c) Describe the Process control block and the various pieces of information that it contains in regard to process management. (5 marks)

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

QUESTION FOUR (20 MARKS)

a) Differentiate between connection oriented communication and connectionless communication. (4 marks)

b) Explain two roles a timer plays during the execution of a process. (4 marks)

c) Briefly explain what IO subsystem is and describe its role in a computer system. (6 marks)

d) Write a program in C/C++ which maliciously access file named studentfee.txt and clear all existing content and replace it with your nickname. Explain working of your program. (6 marks)

QUESTION FIVE (20 MARKS)

a) With aid of a diagram differentiate between local and remote procedure call.(4 marks)

b) Using a suitable diagram and the von Neumann architecture of computers as a reference; describe how the execution of system call takes place in a dual mode operation. (6 marks)

c) Below is a set of processes available for execution in a multi-programmed environment:

Process	Burst Time (Relative Units)	Arrival time at Ready State
A	10	0
B	6	1
C	4	3
D	1	4

d) Show that using Shortest Time Next (SRTN) scheduling algorithm will result in better values for waiting time and turnaround time for each of the process compared to First Come First Served (FCFS). (6 marks)

e) Discuss any two facilities to handle system calls errors. (4 marks)

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