KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2011/2012

SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE

SCT 302: COMPUTER OPERATING SYSTEMS

DATE: Wednesday 11th April, 2012 **TIME:** 11.00 a.m. – 1.00 p.m.

Instructions

1. Attempt Question **ONE** and any other **TWO** questions:
   All questions attract equal marks
2. Total Marks = 60
3. Time = 2 hours

Question one (General and Compulsory)

a) Describe the following terms

i) What is the purpose of system calls?

ii) Interrupt Controlled I/O **(1 marks)**

iii) Partitioning and Formatting of hard disk **(2 marks)**

iv) 32-bit operating system **(1 marks)**

v) What is a Kernel in computer operating system **2 marks)**

b) List TWO objectives for any disk scheduling algorithm: **(2 Marks)**

c) Identify these memory management techniques. **(2 marks)**

i) fixed partitioning:

ii) dynamic partitioning

d) Using an appropriate example, differentiate between a thread and a process **(2 marks)**

e) Distinguishing the old Operating Systems like Ms-DOS and Win 95 with modern Operating systems like Linux and Windows 7, discuss how the The Operating System acts as police or government (2 marks)

f) Typical pages sizes on current computers are 4K and 8K. Describe the advantages and disadvantages of having a large page size. **(2 marks)**

i) A system using fixed allocation 3 page frames are assigned to a program Given a program refers to the following pages in sequence

0,9,0,1,8,1,8,7,8,7,1,2,8,2,7,8,2,3,8,3

How many page faults will occur if the replacement policy used is LRU **(4 marks)**

Question Two (PM)

a. Discuss the process life cycle phases. In the discussion , explain clearly how multiprocessing takes place. Illustrate with a diagram to show how the processes interact (9 marks)

b. Consider the following set of processes, with the length of the CPU-burst time given in milliseconds:

Process	Burst Time	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

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

i) Draw four Gantt charts illustrating the execution of these processes using FCFS, SJF, and RR (quantum = 1) scheduling. **(6 marks)**

ii) Compute the turnaround time for SJF scheduling algorithms ? **(2 marks)**

iii) What is the waiting time of each process for SJF scheduling algorithms ? **(3 marks)**

Question Three (MM)

(a) Assume that you have free memory partitions of size 100KB, 500KB, 200KB, 300KB, and 600KB (in this order) and that memory requests for 212KB, 417KB, 112KB, and 426KB arrive.

i)Show how a First-Fit allocation algorithm would assign the requests to free memory. (Do NOT assume rotating First-Fit). Clearly show the size of each piece of memory after each request arrives. (3 marks)

ii) Show how a Best-Fit allocation algorithm would assign the same requests. Clearly show the size of each piece of memory after each request arrives. (3 marks)

iii) Show how a Worst-Fit allocation algorithm would assign the same requests. Clearly show the size of each piece of memory after each request arrives. (3 marks)

(b) How does the kernel ensure memory security in a computer. Clearly explain showing also how it protects the memory (11 marks

Question Four (General)

a) What is the difference between a field and a record? **(4 marks)**

b) What is a file-management system? **(2 marks)**

c) Differentiate between Spooling and buffering **(4 marks)**

d) Supporters of Microkernel OS architecture – like Andrew Tanunbaum argue that the microkernel provides more security in a computer than a monolithic kernel. Assume you agree with this argument. Discuss how the microkernel is more secure than monolithic architecture. **(4 marks)**

e) Discuss how active directory works (6 marks)

Question Five (I/O)

A) Give two reasons why Polled I/O is unsatisfactory (2 marks)

B) Define and explain two limitations of programmed I/O (2 marks)

C) What is the a disk controller and how does it differ from disk drive? (4 marks)

D) Discuss briefly working and importance of **Redundant Array of Independent Disks (RAID)** **(4 marks)**

E) The **Capacity** or size of a hard drive refers to how many bytes of data the drive can store. Capacity is determined by drive geometry. Other details of disk geometry include: Seek time, rotational latency access time among othere. Assume the following details about a hard disk are provided:

- 181.6 GB, 3.5 inch disk; 12 platters, 24 surfaces; 24,247 cylinders; 7,200 RPM; (4.2 ms avg. latency); 7.4/8.2 ms avg. seek (r/w); 64 to 35 MB/s (internal); 0.1 ms controller time; 10.3 watts (idle)

Required:

- Calculate time to read 64 KB (128 sectors) for hard disk using advertised performance noting that sector is on outer track **(6 marks)**