UGANDA MARTYRS UNIVERSITY
NKOZI

UNIVERSITY EXAMINATIONS

END OF SEMESTER FINAL EXAMINATIONS
SEMESTER II, 2015/16

FACULTY OF SCIENCE

DEPARTMENT OF COMPUTER SCIENCE & INFORMATION SYSTEMS

FIRST YEAR EXAMINATION FOR BECHELOR OF SCIENCE IN INFORMATION TECHNOLOGY, SCIENCE GENERAL & EDUCATION

Operating Systems
CSC1202

DATE: TUESDAY MAY 3rd, 2016

TIME: 9:30 AM – 12:30 PM

DURATION: 3 HOURS

Instructions:

1. *Carefully read through ALL the questions before attempting*
2. ***ANSWER Questions according to instructions in each section***
3. *No **names** should be written anywhere on the examination book.*
4. *Ensure that your **Reg Number** is indicated on all pages of the examination answer booklet.*
5. *Ensure your work is **clear** and **readable**. Untidy work shall be penalized*
6. *Any type of examination Malpractice will lead to automatic disqualification*
7. *Do not write anything on the questions paper.*

SECTION A (20 MARKS). ANSWER ALL QUESTIONS

Q1) All the following are functions of an operating system except?
A. Memory management
B CPU management
C. I/O management
D. Developing new programs

Q2) The following represent different levels at which the operations of a computer system are controlled except?
a) Kernel
b) Library services
c) Application
d) User

Q3) Identify the correct operational mode and example of a task that may be performed in it
a) Kernel mode: reading time of the day on the system clock
b) User mode: deleting memory allocations
c) Kernel mode: allocating memory space
d) User mode: resetting the system clock

Q4) Which of the following does not completely represent operating system design goals?
a) Usability, portability, security, and convenience
b) Reliability, compatibility, and cost-effectiveness
c) Usability, portability, and complexity
d) Reliability, security, and portability

Q5) Identify the correct statement about operating system kernels
a) A monolithic kernel is easy to understand and has low inter-module interaction overhead
b) The main function of the micro-kernel is to provide communication facility between client programs and various services running in user space
c) A micro-kernel is easier to debug/modify but is less secure/reliable than a monolithic kernel
d) A micro-kernel and a monolithic kernel have similar structural design

Q6) A process has an address space in memory made up of at least four elements which include:
a) Text section, data section, stack, and process control block (PCB)
b) Text section, data section, stack, and process control method (PCM)
c) Text section, data section, stock, and process control method (PCM)
d) Text section, data section, stock, process control block (PCB)

Q7) Which of the following statements is correct about process states?
a) New: A process is being executed
b) Running: Instructions are being created
c) Waiting: The process is waiting for some event to occur, such as I/O
d) Ready: The process has been assigned to the CPU

Q8) Which of the following does not represent a method for interprocess communication?
a) Message passing b) Shared memory c) Socket d) Remote procedure method

Q9) Select one statement about computer memory that is correct
a) Virtual memory can improve computer performance by providing a seemingly large amount of RAM but when poorly implemented, it can degrade system performance
b) The two types of fragmentation are internal fragmentation and extra-ordinary fragmentation
c) Garbage is an operating system technique to alleviate fragmentation
d) Memory sharing is not a mechanism for process communication

Q10) Which of the statements below is not correct?
a) A search path is a list of directories, separated by colons (:) or semi-colon (;) that indicate directories in which to look for a given file
b) Two types of file path are relative path e.g. home/test and absolute/full path e.g. /etc/syslog/hosts
c) The three types of file access methods are: random access, sequential access, and indexed access
d) The three types of file access permissions are: read, run, and write

SECTION B (30 MARKS). ANSWER ONLY TWO QUESTIONS

QUESTION ONE
a) Explain five functions of an operating system in managing computing resources **[5 Marks]**
b) Using a diagram for illustration, explain the architecture of a Linux operating system **[5 Marks]**
c) Explain five goals of operating system design **[5 Marks]**

QUESTION TWO
a) Using an example for each, differentiate between a program and a process **[3 Marks]**
b) For each of the machine-level instructions below, indicate whether it should be executed in kernel mode (supervisor mode) or user mode, and explain why **[12 Marks]**
i. Disable all interrupts
ii. Read the time-of-day clock
iii. Switch from user to supervisor mode
iv. Change memory allocation for a process

QUESTION THREE
a) Explain the following process states: new, waiting, running, terminated, and ready **[5 Marks]**
b) Describe two methods used by processes to communicate with each other **[4 Marks]**
c) Explain the use of the following process tools: kill, top, echo, jobs, pstree, bg/fg **[6 Marks]**

QUESTION FOUR
a) Explain why CPU scheduling is an important function of the operating system **[1 Marks]**
b) Explain four criteria for evaluating the efficiency of CPU scheduling algorithms **[4 Marks]**
c) Given the set of processes below with the CPU-burst lengths and arrival times: **[10 Marks]**

Process	CPU burst	Arrival time
P0	3	0
P1	9	2
P2	5	4
P3	2	6

Draw Gantt charts to illustrate the execution of these processes using first come first serve, non-preemptive shortest job first, preemptive SJF, and round robin (quantum=4) scheduling algorithms.

QUESTION FIVE
a) Explain how processes are loaded and swapped **[4 Marks]**
b) Explain how processes compete for resources to cause deadlock **[3 Marks]**
c) Describe methods of deadlock prevention and avoidance **[8 Marks]**

END