



FreeExams.co.ke

**UNIVERSITY EXAMINATIONS
2022/2023 ACADEMIC YEAR**

**END OF SEMESTER EXAMINATIONS
YEAR ONE SEMESTER TWO EXAMINATIONS**

**FOR THE DEGREE OF
MASTER OF SCIENCE IN COMPUTER SCIENCE**

COURSE CODE : MCS 821

**COURSE TITLE : ADVANCED OPERATING
SYSTEMS**

DATE: 10/02/2023

TIME: 02:00 A.M – 05:00 A.M.

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTIONS ONE AND ANY OTHER TWO.

QUESTION ONE [20 MARKS]

- a) What is an operating System? Explain the abstract view of the components of a computer system. [6 marks]
- b) Describe the roles of Operating System as an extended machine and as a Resource Manager. [7 marks]
- c) Why must the operating system be more careful when accessing input to a system call when the data is in memory instead of registers? [4 marks]
- d) Identify three ways in which the processor can transition from user mode to kernel mode? [3 marks]

QUESTION TWO [20 MARKS]

- a) How is Networking a key network Operating System function. [2 marks]
- b) Discuss the following Multi-protocol, packet-oriented network research frameworks
 - i. Object-oriented [3 marks]
 - ii. Packet-oriented [3 marks]
- c) Describe the memory flow in hardware and software implementation of systems. [6 marks]
- d) Discuss the reliability mechanism embedded in TCP principle of three-way handshake protocol. [6 marks]

QUESTION THREE [20 MARKS]

- a) What is the main difficulty that a programmer must overcome in writing an operating system for a real-time environment? [4 marks]
- b) How does the distinction between kernel mode and user mode function as a rudimentary form of protection (security) system? [6 marks]
- c) There has been a continued disagreement on whether distributed file system servers and window systems 'belong' in user space or the kernel. Justify your answer. [6 marks]
- d) As an operating system programmer, how do you differentiate between the Hypervisors and Containers. [4 marks]

QUESTION FOUR [20 MARKS]

- a) What is a process? What are attributes of a process? [6 marks]
- b) Multi-programming or multi-tasking enables more than a single process to apparently execute tasks simultaneously. How is this achieved on a uniprocessor? [4 marks]
- c) Discuss the Process Model [7 marks]
- d) Where can we find scheduler-activation-based concurrent programming models today? [3 marks]

QUESTION FIVE [20 MARKS]

- a) DTrace is a dynamic Tracing and observability tool that enable users to observe the software running on their systems in an unprecedented manner.
 - i. Explain why DTrace and how it is achieved in the execution of this functionality? [8 marks]
 - ii. Discuss the Uses and Users of DTrace in system software, performance analysis, and troubleshooting software bugs. [8 marks]
- b) The probe effect is the unintended alteration of system behaviour that arises from measurement. In practice how is it achieved? [4 marks]