



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**SCHOOL OF INFORMATICS AND INNOVATIVE SYSTEMS**

**DEPARTMENT OF COMPUTER SCIENCE AND SOFTWARE ENGINEERING**

**UNIVERSITY EXAMINATION FOR THE DEGREE OF MASTER OF SCIENCE IN  
INFORMATION TECHNOLOGY SECURITY AND AUDIT**

**1<sup>ST</sup> YEAR 1<sup>ST</sup> SEMESTER 2023/2024 ACADEMIC YEAR**

**KISUMU CAMPUS**

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**COURSE CODE: IIT 5111**

**COURSE TITLE: COMPUTER OPERATING SYSTEMS AND VIRTUALIZATIONS**

**EXAM VENUE: STREAM: MSC**

**DATE: 02/05/2024 EXAM SESSION: 9.00 – 12.00 NOON**

**TIME: 3.00 HOURS**

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**INSTRUCTIONS:**

- 1. Answer ANY three questions**
- 2. Candidates are advised not to write on the question paper**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room**

### QUESTION ONE

Think of a situation where a client expressed interest in a real-time system. Discuss the considerations you would make in an attempt to guide them in the most appropriate type (hard, firm, soft, etc). (20 marks)

### QUESTION TWO

Describe how virtualization and cloud computing are often used together in building a public and private cloud infrastructure in an enterprise network. (10 marks)

Briefly explain any five reasons for and five advantages of adopting virtualization by an academic institution. (10 marks)

### QUESTION THREE

[20 MARKS]

- (a) The following four jobs arrive at the same time in the run queue.

JOB	RUNTIME	PRIORITY
A	5	1
B	10	4
C	7	3
D	11	2

Jobs can be scheduled under three scheduling policies: 1) shortest job first without preemption, 2) priority without preemption, and 3) round robin with preemption and a small-time quantum.

- (b) Give the completion order of the jobs under each of three scheduling policies. (10 marks)
- (c) Which policy gives the shortest average response time. (10 marks)

### QUESTION FOUR

Presented with an opportunity to make modifications on certain OS management algorithms, elaborate on any two. Clearly demonstrate and defend the changes you would recommend.

(20 marks)

### QUESTION FIVE

With a 32-bit virtual address space, 4KB page, and 4 bytes per page table entry in virtual memory, answer the following questions.

- (a) Compute the number of page table entries. (5 marks)
- (b) Compute the total size of the page table. (5 marks)
- (c) In the above virtual memory system, a running program accesses the 4MB physical memory with the following virtual addresses in order: 0x283802, 0x2848C2, 0x283142, 0x285478, 0x38580A, 0x2839E0, 0x2848C2. We assume that the physical memory is initially empty and pages in virtual memory do not share same frame in physical memory. Pages are replaced with LRU scheme. What is the number of page faults? (5 marks)
- (d) Describe how the OS handles the page fault exception. Include architectural support (if any) in your answer. (5 marks)