



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

**SCHOOL OF INFORMATICS AND INNOVATIVE SYSTEMS**

**DEPARTMENT OF INFORMATION SYSTEMS**

**UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF**

**INFORMATION SYSTEMS**

**2<sup>ND</sup> YEAR 1<sup>ST</sup> SEMESTER 2015/2016 ACADEMIC YEAR**

**KISUMU LC**

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**COURSE CODE: IIT 3211**

**COURSE TITLE: OPERATING SYSTEMS**

**EXAM VENUE:**

**DATE:**

**TIME:**

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### **INSTRUCTIONS**

- 1. Answer Question 1 (Compulsory) and ANY other TWO 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 30 MARKS**

- a) Define the term operating system and give two examples of operating systems. (3 marks)
- b) Explain any five functions of the operating system. (5 marks)
- c) In a given system, there are five processes, P<sub>0</sub> to P<sub>4</sub>, and three resource types A (with 10 instances), B (with 5 instances) and C (with 7 instances). At a given time t, the system looked as shown below.

	<u>Allocation</u>			<u>Max</u>		
	A	B	C	A	B	C
P <sub>0</sub>	1	1	0	7	5	3
P <sub>1</sub>	2	0	0	3	2	2
P <sub>2</sub>	3	1	2	9	2	2
P <sub>3</sub>	2	1	1	2	2	2
P <sub>4</sub>	1	0	2	4	3	3

- i. Determine the safe sequence for the above system. (5 marks)
  - ii. Can a request for (3, 2, 1) of A, B, C by P<sub>0</sub> be granted? (4 marks)
  - iii. Suppose P<sub>2</sub> request for (1, 0, 0) of A, B, C respectively. Can such an allocation be made? (4 marks)
- d)
- c) How does the relocation register carry out memory protection (2marks)
  - d) The following table gives the arrival and burst times of processes P<sub>1</sub> through P<sub>5</sub>.

Process	Arrival Time	Burst Time
P <sub>1</sub>	0	9
P <sub>2</sub>	3	8
P <sub>3</sub>	6	4
P <sub>4</sub>	9	4
P <sub>5</sub>	10	2

Create a Gantt chart for each of the scheduling algorithms below, show when each process will be scheduled, and determine the average waiting time. For simplicity, ignore the context switch time.

- i. First come first served (2 marks)
- ii. Shortest job first (Non-preemptive) (2 marks)
- iii. Shortest job first (preemptive) (2 marks)

## QUESTION TWO 20 MARKS

- a) If virtual memory can be implemented via Demand paging, briefly explain how demand paging works (5 marks)
- b) What causes a page fault error? Describe the steps taken to service a page fault error. (10 marks)
- c) What is thrashing? Explain the effect of thrashing on multiprogramming. (5marks)

## QUESTION THREE 20 MARKS

- a) Why do you think it is better to bind data and instructions to memory at execution time than doing it at compile time? (3 marks)
- b) What is the difference between a logical address space and a physical address space? (2 marks)
- c) Explain the concept of overlays. (3 marks)
- d) Provide a brief description of the following. (@ 4marks)
- a) Contiguous memory allocation
  - b) Paging
  - c) Segmentation

## QUESTION FOUR 20 MARKS

- a) A process goes through several steps as it executes. With the help of a diagram, describe these process states. (10 marks)
- b) In what circumstance is DMA most applicable? (2 Marks)
- c) What is a process control block, and why do you think it is important? (2 marks)
- d) Differentiate between direct and indirect communication, hence define synchronous and asynchronous communication with respect to both sender and receiver. (6 marks)

## QUESTION FIVE 20 MARKS

- a) Differentiate between an interrupt and a trap. (2 marks)
- b) Explain the conditions that must hold for a deadlock to occur. Thus, explain how deadlock prevention can be carried out. (10marks)
- c) Explain why the medium-term scheduler is important. (4 marks)
- d) What are the advantages of having cooperating processes? (4 marks)