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

2ND YEAR 1ST SEMESTER 2015/2016 ACADEMIC YEAR

KISUMU LC

COURSE CODE: IIT 3211

COURSE TITLE: OPERATING SYSTEMS

EXAM VENUE:

DATE:

TIME:

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_0 to P_4, 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.

	Allocation	Max
	A B C	A B C
P_0	1 1 0	7 5 3
P_1	2 0 0	3 2 2
P_2	3 1 2	9 2 2
P_3	2 1 1	2 2 2
P_4	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_0 be granted? (4 marks)

   iii. Suppose P_2 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_1 through P_5.

Process	Arrival Time	Burst Time
P_1	0	9
P_2	3	8
P_3	6	4
P_4	9	4
P_5	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)