



JARAMOGI OGINGA ODINGA UNIVERSITY OF SVIENCE AND TECHNOLOGY

SCHOOL OF INFORMATICS AND INNOVATIVE

COURSE CODE: IIT3211

COURSE TITLE: OPERATING SYSTEMS

ACADEMICS YEAR 2013/2014

PERIOD: JAN-APRIL 2014

DURATION: 2 HOURS

INSTRUCTIONS

- 1 This Paper Contains Five Questions**
- 2 Question ONE is Compulsory and ANY other TWO Questions**
- 3 Write all your answers in the booklet provided**

QUESTION ONE 30 MARKS (COMPULSORY)

- a) Differentiate between pre-emptive and non-pre-emptive scheduling 4 Marks
- b) CPU burst time indicates the time, the process needs the CPU. The following are the set of processes with their respective CPU burst time (in milliseconds). Processes CPU-burst time: P1- 10; P2 -5; P3 -5
Calculate the average waiting time if the process arrived in the following order:
(i) P1, P2 & P3 (ii) P2, P3 & P1 6 Marks
- c) Briefly explain the four necessary conditions of deadlock prevention? 6 Marks
- d) Explain the term race condition and state how a critical section avoids this condition.
What are the properties which a data item should possess to implement a critical section?
6 Marks
- e) Differentiate between protection and security as they apply to operating systems. Explain the techniques used for protection of user files. 8 Marks

QUESTION TWO 20 MARKS

- a) Briefly explain the following terms and appropriately state their components 8 Marks
 - (i) Process;
 - (ii) Process Control Block; (PCB)
 - (iii) Multi programming;
 - (iv) Time sharing.
- b) Explain any three policies for process scheduling that uses resource consumption information. State their advantages 6 Marks
- c) What is meant by inter process communication? Explain the two fundamental models of inter process communication. 6 Marks

QUESTION THREE 20 MARKS

- a) Briefly explain any **FOUR** typical functions of an operating system 6 Marks
- b) Define interrupts and explain how they are handled by an operating system 4 Marks
- c) Consider the following set of jobs with their arrival times, execution time (in minutes), and deadlines.

	Arrival Time	Execution time	Deadline
1	0	5	5
2	1	15	25
3	3	12	10
4	7	25	50
5	10	5	12

Calculate the mean turn-around time, the mean weighted turn-around time and the throughput for FCFS, SJN and deadline scheduling algorithms. 10 Marks

QUESTION FOUR 20 MARKS

- a) Discuss the concept of segmentation; state its main problem and solution. 5 Marks
- b) Explain the differences between: 6 Marks
 - (i) Logical and physical address space.
 - (ii) Internal and external fragmentation.
 - (iii) Paging and segmentation.
- c) The issue of resource utilization shows up in different forms in different types of operating systems. List what resources must be managed carefully in the following settings: 3 Marks
 - a. Mainframe or minicomputer systems
 - b. Workstations connected to servers
 - c. Handheld computers
- d) Briefly explain the main advantage of the microkernel approach to system design. 2 Marks
- e) How do user programs and system services interact in microkernel architecture? 2 Marks
- f) What are the disadvantages of using the microkernel approach? 2 Marks

QUESTION FIVE 20 MARKS

- a) Describe the differences among short-term, medium-term, and long-term scheduling. 6 Marks
- b) Compare the main memory organization schemes of contiguous-memory allocation, pure segmentation, and pure paging with respect to the following issues: 9 Marks
 - a. external fragmentation
 - b. internal fragmentation
 - c. ability to share code across processes
- d) List five advantages of Kerberos 5 Marks