



UNIVERSITY EXAMINATIONS

EXAMINATION FOR SEPTEMBER –DECEMBER 2019/2020 FOR BACHELOR OF SCIENCE IN COMPUTER SCIENCE

COURSE CODE RCS 205 :COURSE UNIT OPERATING SYSTEMS

DATE _____ TIME: 2 HOURS

GENERAL INSTRUCTIONS:

Students are NOT permitted to write on the examination paper during examination time.

This is a closed book examination. Text book/Reference books/notes are not permitted.

SPECIAL INSTRUCTIONS:

This examination paper consists Questions in Section A followed by section B.

Answer **Question 1 and any Other Two** questions.

QUESTIONS in ALL Sections should be answered in answer booklet(s).

1. **PLEASE** start the answer to EACH question on a NEW PAGE.
2. **Keep your phone(s) switched off at the front of the examination room.**
3. **Keep ALL bags and caps at the front of the examination room and DO NOT refer to ANY unauthorized material before or during the course of the examination.**
4. **ALWAYS** show your working.
5. **Marks indicated in parenthesis i.e. () will be awarded for clear and logical answers.**
6. **Write your REGISTRATION No. clearly on the answer booklet(s).**
7. **For the Questions, write the number of the question on the answer booklet(s) in the order you answered them.**
8. **DO NOT** use your **PHONE** as a **CALCULATOR**.
9. **YOU** are **ONLY ALLOWED** to leave the exam room **30minutes** to the end of the **Exam**.
10. **DO NOT** write on the **QUESTION PAPER**. Use the back of your **BOOKLET** for any calculations or rough work.

SECTION A (Compulsory)

Question #1 [30 Marks]

- a) Riara University ICT Department would like to add the newly established campus in Nairobi CDB to their distributed Operating systems ,describe any two types of OS they are likely to consider and their structure **(6 marks)**
- b) Discuss any four conditions are that necessary for any good solution to the critical section problem **(4 marks)**
- c) The Kenya High School would like to automate its operations by introducing computers and a network that would be connected to the Internet. What advice would you give to the organization regarding operating systems that should meet their needs? **(2 marks)**
- d) In certain circumstances, a processes need to exchange some information with other processes. The operating systems provides the necessary inter-process communication (IPC) mechanisms. Name any two common approaches of IPC **(2 marks)**
- e) Describe the following scheduling algorithms **(6 Marks)**
 - a) Round Robin:
 - b) Shortest Job First:
 - c) FCFS (also called FIFO)'
- f) Safaricom limited has multiple storage systems which are distributed , discuss any four properties of their distributed storage systems **(4 marks)**
- g) During system calls, Information is passed in form of *parameters*. Explain THREE methods used to pass parameters to the Operating system. **(6 marks)**

SECTION B (Answer any two options)

Question #2 [20 Marks]

- a) State and explain any five of the activities that the Operating system (process management component) is responsible for in connection with file management **(10 marks)**
- b) Process Resilience mask process failures by replication in fault tolerance which is divided in to groups differentiate using a diagram between Flat Groups versus Hierarchical Groups **(4 marks)**
- c) When deciding to have a good scheduling algorithm there are various consideration to make. Briefly explain THREE of these considerations **(6 marks)**

Question #3 [20 Marks]

- a) Direct Memory Access (DMA) and the Cache are two I/O devices that can be used to improve the efficiency of a computer. Describe how these two devices achieves this? **(5 marks)**
- b) State and explain any four types of distributed storage systems **(4 marks)**
- c) Briefly describe any of the following scheduling algorithms **(6 marks)**
- Exponential Queue
 - Priority Scheduling
 - Shortest Job First:
- d) Discuss the importance Page Replacement Algorithms **(5 marks)**

Question #4 [20 Marks]

- a) Define the term deadlock with regard to a process and briefly describe TWO conditions that are necessary for deadlocks to occur in an operating system. **(6 marks)**
- b) An operating system has five major responsibilities for managing memory **(5 marks)**
- c) Explain any two problems associated with full Mutual Exclusion/Synchronization in Distributed Coordination **(4 marks)**
- d) Differentiate between the Layered Systems and the Monolithic Systems of the operating systems **(5 marks)**

Question #5 [20 Marks]

- a) State two reasons for process creation and three conditions that lead to process termination. **(5 marks)**
- b) State and explain any five features for the modern OS design for multi processors **(5 marks)**
- c) Describe five phases in performing a client request in the active replication **(5 marks)**
- d) Use the figure below to answer the following questions.

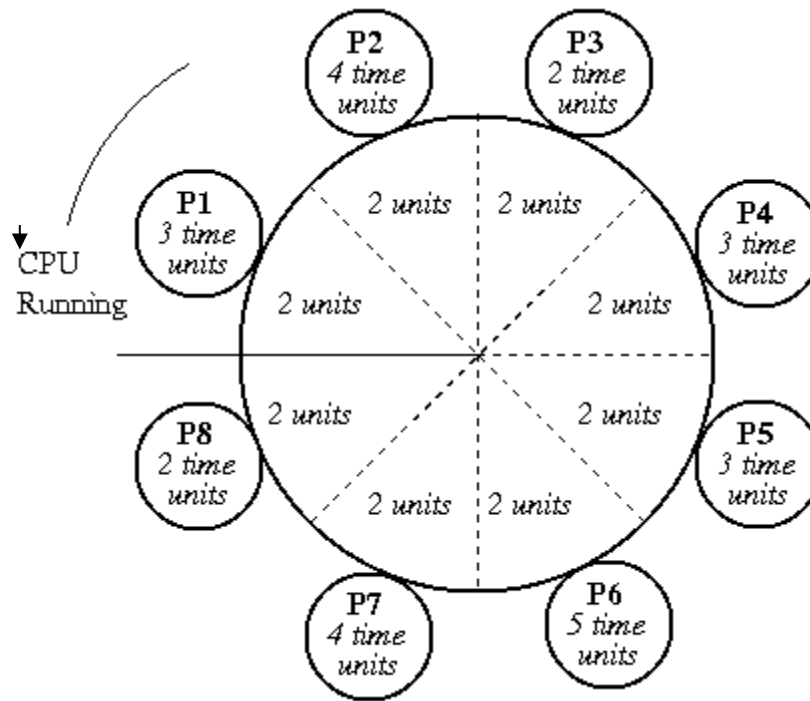


Figure 1: Round Robin scheduling

In each case draw a tabulated statistics to show

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|------|-------------------|------------------|
| i. | Quantum time of 2 | (1 mark) |
| ii. | Quantum time of 4 | (2 marks) |
| iii. | Quantum time of 1 | (2 mark) |