



MACHAKOS UNIVERSITY

University Examinations for 2020/2021

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

THIRD YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)

SIT 304: OPERATING SYSTEMS

DATE: 10/8/2021

TIME: 2:00 – 4:00 PM

INSTRUCTIONS: Answer Question ONE and any other TWO Questions

QUESTION ONE (COMPULSORY) (30 MARKS)

- a) Discuss any two roles played by operating system while implementing the following functions associated with computer based systems.
- (i) Programs and subroutines loading (2 marks)
 - (ii) Processor Management (2 marks)
 - (iii) Main Memory Management (2 marks)
- b) Critically discuss any three reasons that would cause an executing process to terminate i.e. relinquish the CPU. (6 marks)
- c) Explain how priority scheduling algorithm deals with the problem of indefinite blocking process with lower priority. (2 marks)
- d) Suppose we have 4 processes that arrived in the order P3, P1, P4 and P2 and their burst times is as provided.

Process	Burst Time
P1	5
P2	8
P3	4
P4	1

Considering the First Come First Served (FCFS) scheduling algorithm,

- (i) Draw the Gantt chart or the schedule (3 marks)
 - (ii) Calculate the waiting time for each process (1 mark)
 - (iii) Calculate the average turnaround time for the four processes (2 marks)
- e) While preventing deadlock from happening, explain how the hold and wait condition can be eliminated. (2 marks)
- f) With reference to variable partition, discuss any two techniques which can be employed by Operating System to handle external Fragmentation. (4 marks)
- g) Explain two ways through which one-time password can be implemented by systems. (4 marks)

QUESTION TWO (20 MARKS)

- a) With the help of a diagram, explain the various process states. (8 marks)
- b) Operating system employs a number of strategies to determine where to place incoming process. Critically discuss any two memory placement strategies that can be employed to achieve this. (4 marks)
- c) Priority scheduling algorithm is both pre-emptive and non-preemptive. Explain how this is achieved. (4 marks)
- d) Explain any two queues associated with system processes. (4 marks)

QUESTION THREE (20 MARKS)

- a) Suppose we have 4 processes with the following their burst times.

Process	Burst Time
P1	8
P2	9
P3	5
P4	2

Considering the round robin scheduling algorithm with a Quantum time of 3,

- (i) Draw the Gantt chart for the schedule (3 marks)
 - (ii) Explain any two limitations associated with Shortest Job First(SJF). (4 marks)
- b) Critically discuss any Four conditions that must exist for a deadlock to hold (8 marks)
- c) Differentiate between contiguous and non-contiguous memory allocation. (4 marks)

QUESTION FOUR (20 MARKS)

- a) Consider the following set of processes, with the length of the CPU-burst time given in milliseconds. The processes are assumed to have arrived in the order P1, P2, P3, P4, P5 all at time 0.

Process	Burst time	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

- i) Draw four Gantt charts illustrating the execution of these processes using FCFS, SJF, a non-preemptive priority (a smaller priority number implies a higher priority), and RR (quantum = 1) scheduling.. (8 marks)
- ii) Calculate the average turnaround time for the five Jobs. (4 marks)
- b) Critically discuss the two major categories of scheduling algorithms giving an example for each. (4 marks)
- c) List any TWO program threats and TWO system Threats as used with Operating systems. (4 marks)

QUESTION FIVE (20 MARKS)

- a) Critically discuss any three-page replacement techniques used by operating system to determine which page needs to be allocated. (6 marks)
- b) Each process which is executing in a system is represented by operating system using the Process Control Block(PCB). Discuss three major contents found in the PCB and their role. (6 marks)
- c) Critically discuss how the Round Robin (RR) scheduling algorithm works. (8 marks)