



MACHAKOS UNIVERSITY

University Examinations for 2020/2021 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

FIRST YEAR FIRST TERM EXAMINATION FOR

DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOGY

2920/105 : OPERATING SYSTEMS

DATE: 3/6/2021

TIME: 11.30-2.30 PM

INSTRUCTIONS

Answer any FIVE questions

Don't write on this question paper

QUESTION ONE

- a) Explain the following with reference to inter-process communication
 - i. Critical sections
 - ii. Busy waiting
 - iii. kernel
 - iv. Message passing (8 marks)
- b) With the aid of a diagram, describe the three-state process transitions as applied in process management (8 marks)
- c) State **four** objectives of process management (4 marks)

QUESTION TWO

- a) A group of ICT module 1 students in Machakos University College were carrying out an assignment about causes of process termination in operating systems. Explain **four** possible causes they may have written in their report. (8 marks)
- b) Describe **three** benefits of multiprogramming. (6 marks)
- c) Explain the term *Swapping* as used in memory management. (2 marks)
- d) Describe the **four main** functions of an operating system. (4 marks)

QUESTION THREE

- 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) The following series of processes with the given estimated run-times arrives in the READY queue in the order shown

Process	Arrival time	Estimated run time
A	0	10
B	1	50
C	3	2
D	4	100
E	7	5

Assuming FCFS and SJF scheduling policies are used, for each policy:-

- i. Draw a Gantt chart to show the order of executions.
- ii. Calculate the waiting time for each process.
- iii. Calculate the wait-time/run-time ratio for each process.
- iv. Calculate the average turn around time.
- v. Identify **one** disadvantage of each of the policies (14 marks)

QUESTION FOUR

- a) Distinguish between *command Language* and *Job control Languages* (4 marks)
- b) Describe the use of *semaphores* in management of concurrent process (4 marks)
- c) Define the term *virtual machine* as used in operating systems (4 marks)
- d) The table below shows the arrival time and required CPU burst time for three processes. Use it to answer the questions that follow

process	Arrival time (ms)	CPU burst (ms)
A	0	8
B	1	5
C	4	1
D	5	3

Assuming that the operating system uses SRTN algorithm

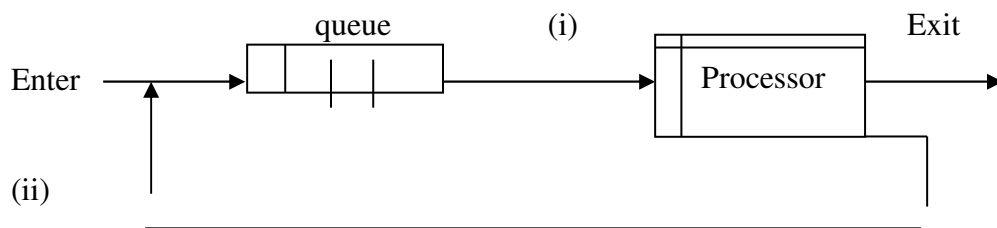
- i. Draw a Gantt chart to show the order of executions
- ii. Calculate Average waiting time
- iii. Calculate Average turnaround time (8 marks)

QUESTION FIVE

- a) Explain the following terms with reference to process management:
 - i. Thread
 - ii. Process
 - iii. Dispatcher
 - iv. Scheduling algorithm (8 marks)
- b) Explain the following types of operating systems:
 - i. Server operating systems
 - ii. Embedded operating systems
 - iii. Multiprocessor operating systems
 - iv. Network operating systems (8 marks)
- c) Differentiate between interrupt and system call as used in operating systems. (4 marks)

QUESTION SIX

- a) Explain the layered structure of an operating system. (4 marks)
- b) Distinguish between preemptive and non-preemptive scheduling policies. (4 marks)
- c) Beth intends to select a back up scheme for her computer file system. Outline four factors she should consider when selecting the backup scheme. (4 marks)
- d) A lecturer described the requirements for *mutual exclusion* during a lesson. Outline **four** requirements that he could have mentioned. (4 marks)
- e) The figure below shows a block diagram of a two state process diagram. Outline the role of the parts labelled (i) and (ii)



(4 marks)

QUESTION SEVEN

- a) The table below shows the arrival time and required CPU burst time for three processes. Use it to answer the questions that follow

process	Arrival time (ms)	CPU burst (ms)
A	0	8
B	1	5
C	4	1

Assuming that the operating system uses SJF algorithm

Calculate;

- i. Draw a Gantt chart to show the order of executions; (2 marks)
 - ii. Average waiting time; (4 marks)
 - iii. Average turnaround time; (4 marks)
 - iv. Throughput. (2 marks)
- b) Explain how priority scheduling algorithm deals with the problem of starvation on processes with lower priority. (2 marks)
- c) Kenny, a lecturer intends to prepare lecture notes on the objectives of process scheduling in operating systems. Describe **three** objectives that he could include in his notes. (6 marks)

QUESTION EIGHT

- a) Suppose we have 4 processes that arrived in the order P1, P2, P3 and P4 and their burst times is as provided.

Process	Arrival Time	Burst Time
P1	0	5
P2	2	8
P3	3	4
P4	4	1

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

- i. Draw the Gantt chart; (2 marks)
 - ii. Calculate the average waiting time for the processes; (2 marks)
 - iii. Calculate the average turn around time. (2 marks)
- b) Explain any two limitations associated with Shortest Job First scheduling algorithm. (4 marks)
- c) Outline **four** features of the graphical user interface of an operating system. (4 marks)
- d) With the aid of a diagram, describe the *monolithic architecture* of an operating system. (4 marks)
- e) Outline **two** disadvantages of using command-line interface in a computer system. (2 marks)