



MACHAKOS UNIVERSITY

University Examinations for 2020/2021

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

FIRST YEAR SECOND SEMESTER EXAMINATION FOR

DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOGY

2920/105: OPERATING SYSTEMS

DATE: 30/8/2021

TIME: 11:30 – 2:30 PM

Instructions:

Answer any FIVE questions

Don't write on this question paper

Question 1

- a) Define the term *virtual memory* as used in memory management. (2 marks)
- b) Explain **four** conditions necessary for a deadlock to take place. (8 marks)
- c) The table below shows the CPU burst time for different processes.

<u>Process</u>	<u>Burst time</u>
P ₁	12
P ₂	25
P ₃	6
P ₄	9
P ₅	15

Determine:

- i. The average waiting time using shortest job first scheduling algorithm. (4 marks)
- ii. The waiting time for process P₁ and P₄ using FCFS scheduling algorithm. (4 marks)
- iii. Outline **two** disadvantages of Priority scheduling algorithm. (2 marks)

QUESTION TWO

- a) Explain **two** circumstances under which a pre-emptive scheduling decision would be made by the operating system during inter-process communication. (4 marks)
- b) Describe **one** function of a job control language as used in operating systems. (2marks)
- c) The following options are displayed while installing operating system software on a computer:
 - a. Custom;

- b. Full.
State the function of each of the options when selected. (4 marks)
- d) Outline **four** disadvantages of using command-line interface in a computer system. (4 marks)
- e) Jesse has realized that all the active tasks on his computer system are deadlocked. Explain **three** approaches he could employ to recover from this situation. (6 marks)

QUESTION THREE

- a) Explain **four** objectives of operating systems in computers. (8 marks)
- b) Process synchronization is important during execution. Explain **four** methods employed by operating systems to achieve it. (8 marks)
- c) The operating systems are continuously evolving. Explain **two** ways of coping with this trend. (4 marks)

QUESTION FOUR

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

process	Arrival time (ms)	CPU burst (ms)
A	0	1
B	1	9
C	2	1
D	3	6

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 (10 marks)
- b) With the aid of a diagram, describe *swapping* technique as applied in memory management. (4 marks)
- c) Describe **three** main characteristics of the 3rd generation operating systems. (6 marks)

QUESTION FIVE

- a) Describe **four** scheduling criteria that an operating system could use to select a scheduling algorithm for a particular situation and environment. (8 marks)
- b) With the aid of a diagram describe *fixed size partition* memory management technique. (4 marks)
- c) A running process can be terminated by an operating system depending on the prevailing circumstances. Explain **four** such circumstances. (8 marks)

QUESTION SIX

- a) Monica intends to design an operating system with desirable fetching from the available memory. Describe **two** fetch policies she could consider. (4 marks)
- b) Differentiate between *reserved* and *committed* pages as used in virtual memory management. (4 marks)
- c) Distinguish between kernel and shell as used in operating systems. (4 marks)
- d) Describe **two** free space management techniques used in memory management. (4 marks)
- e) The efficiency of a system using *round robin scheduling* scheme is dependent on the size of the quantum. Explain why this is the case. (4 marks)

QUESTION SEVEN

- a) The cleaning policy ensures modified pages are removed to create space for others. With the aid of an example, explain **two** such policies used by the operating systems. (6 marks)
- b) Walter would like to design an operating system for a multi-level process scheduling system. Explain three parameters he should consider to guarantee efficiency in the system. (6 marks)
- c) Explain two advantages of dynamic linking as used in memory management. (4 marks)
- d) With the aid of a diagram, describe the memory hierarchy in a computer system. (4 marks)

QUESTION EIGHT

- a) Differentiate between *virtual and physical* memory addressing as used in operating systems. (4 marks)
- b) With the aid of a diagram, describe the *paged* memory management technique. (6 marks)
- c) Describe the term *thrashing* as used in memory management. (2 marks)
- d) Differentiate between *first fit* and *best fit* policies as used in memory management. (4 marks)
- e) Explain the following file operations as used in operating systems.
 - a. Append;
 - b. Write. (4 marks)