



MACHAKOS UNIVERSITY

University Examinations 2020/2021

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

FIRST YEAR FIRST SEMESTER EXAMINATION FOR

CERTIFICATE IN INFORMATION COMMUNICATION TECHNOLOGY

CODE 1920/106: OPERATING SYSTEM

DATE:

TIME: 8:30-10:30 AM

Instructions:

Answer any five (5) questions

QUESTION ONE

- a) Outline **four** features of the graphical user interface of an operating system. (4 marks)
- b) Joel had the following options displayed as he shut down the computer
 - i. *Sleep*;
 - ii. *Log off*.Outline the outcome of each of the options if selected. (4 marks)
- c) With the aid of a diagram, describe the *memory hierarchy* in computer systems. (4 marks)
- d) Critically discuss the **four** conditions that must exist for a deadlock to take place. (8 marks)

QUESTION TWO

- a) State the function of each of the following keyboard keys:
 - i. *Escape*;
 - ii. *Control*.(2 marks)
- b) Distinguish between *Manual and automatic software installation* as used in systems. (4 marks)
- c) The following options are displayed while installing operating system software on a computer:
 - i. *Custom*;
 - ii. *Full*.State the function of each of the options when selected. (4 marks)

- d) Explain **two** circumstances under which a pre-emptive scheduling decision would be made by the operating system during inter-process communication. (4 marks)
- e) Describe **three** technical factors that should be considered before installing operating system in a computer system. (6 marks)

QUESTION THREE

- 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 scheduler (3 marks)
 - ii. Calculate the average waiting time for the processes; (2 marks)
 - iii. Calculate the average turnaround time. (2 marks)
 - iv. Calculate the throughput of the system. (1 mark)
- b) Differentiate between *contiguous and non-contiguous* memory allocation. (4 marks)
 - c) A race condition occurs when multiple processes or threads compete for resources in an operating system. Outline **four** examples of such resources. (4 marks)
 - d) Explain each of the following term as used in memory management;
 - i. frame; (2 marks)
 - ii. Page. (2 marks)

QUESTION FOUR

- a) Distinguish between *roll-back* and *starvation* as used in process management. (4 marks)
- b) Process scheduler is a basic component of an operating system. Explain **two** types of process schedulers that could be found in typical operating systems. (4 marks)
- c) While preventing deadlock from happening, explain how the *hold and wait* condition can be eliminated. (4 marks)
- d) With the aid of a diagram describe *fixed size partition* memory management technique. (4 marks)
- e) Differentiate between *virtual and physical memory addressing* as used in operating systems. (4 marks)

QUESTION FIVE

- a) Describe **two** free space management techniques used in memory management. (4 marks)
- b) Differentiate between *worst fit* and *best fit* policies as used in memory management. (4 marks)

- c) 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)
- d) Differentiate between *reserved* and *committed* pages as used in virtual memory management. (4 marks)
- e) Outline the function of the following utility programs in operating systems:
 - i. *Disk defragmenter*;
 - ii. *Disk Clean up*. (4 marks)

QUESTION SIX

- a) Table 1 shows **four** processes with their corresponding arrival and service times in a particular system. Use it to answer question that follow.

Process	Arrival time	Service time (sec)
A	0	1
B	1	9
C	2	1
D	3	6

Table 1

- Assuming SRTN process *scheduling algorithm*. Determine the *average turn-around time* for the system. (6 marks)
- b) With the aid of a diagram, describe *multiprogramming processing* as applied in operating systems. (4 marks)
- c) Explain each of the following terms with reference to inter-process communication:
 - i. *Critical sections*;
 - ii. *Busy waiting*;
 - iii. *Kernel*; (6 marks)
- d) Outline **four** activities that the operating system performs under process management. (4 marks)

QUESTION SEVEN

- a) Describe where the following types of operating systems can be applied:
 - i. Real time
 - ii. Distributed (4 marks)
- b) Owana, a lecturer, discussed operations that the operating system performs in file management, outline **four** operations he might have mentioned. (4 marks)
- c) With the aid of a diagram, describe the three-state process *transitions* as applied in process management (4 marks)
- d) Javesh Company Ltd. Would like to implement a client-server operating system. Outline **two** benefits the company will derive from this decision. (2 marks)
- e) Explain the term *dispatcher* as used in operating systems. (2 marks)
- f) Explain any **two** limitations associated with Shortest Job First scheduling algorithm. (4 marks)

QUESTION EIGHT

- 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) ICT module 1 students in Machakos University were carrying out an assignment on objectives of memory management in operating systems. Explain **four** objectives that they could have mentioned. (4 marks)
- c) Differentiate between *monolithic and non-monolithic* operating systems. (4 marks)
- d) Priority scheduling algorithm is both pre-emptive and non-pre-emptive. Explain how this is achieved. (4 marks)
- e) Explain how priority scheduling algorithm deals with the problem of starvation on processes with lower priority. (2 marks)