



Machakos University

University Examinations 2017/2018 Academic year
SUPPLEMENTARY/SPECIAL EXAMINATIONS
SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY
**SECOND SEMESTER EXAMINATION FOR THE DIPLOMA OF
INFORMATION AND COMMUNICATION TECHNOLOGY
DIT 105: OPERATING SYSTEM**

Date: 28/8/2018

Time: 2:00-4:00 PM

Instructions

This Paper consists of FIVE questions

Answer question ONE and any other TWO questions in this paper

Question One (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) Describe any **three** reasons that would cause an executing process to terminate. (6 marks)

(c) Explain how priority scheduling algorithm deals with the problem of starvation on processes 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	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 mark)
 - (iii) Calculate the average turn around time. (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) Outline **four** ways in which external devices mainly differ in reference to device management (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-pre-emptive. Explain how this is achieved. (4 marks)
- (d) Assuming a 2 kb page size and the virtual page 2 is mapped onto the physical page frame 4, identify the physical address which will be accessed when a program tries to access address 5002. (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) Calculate the average waiting time for the processes; (2 mark)
- (iii) Calculate the average turn around time. (2 marks)
- (iv) Calculate the throughput of the system. (1 mark)

(b) Critically discuss the **four** conditions that must exist for a deadlock to take place.

(8 marks)

(c) Differentiate between contiguous and non-contiguous memory allocation.(4 marks)

Question Four (20 marks)

(a) Explain each of the following with reference to inter-process communication:

- i. Critical sections;
- ii. Busy waiting;
- iii. Kernel.

(6 marks)

(b) Explain any **two** limitations associated with Shortest Job First scheduling algorithm.

(4 marks)

(c) In a paged-segmented system we have the virtual address space of 32 KB, with 8 segments and a page size of 512 bytes. Calculate:-

- a. The number of bits for the page number;
- b. The maximum number of pages in a segment;
- c. The maximum segment size;
- d. Draw how the logical address is partitioned.

(8 marks)

(d) Describe the use of *semaphores* in management of concurrent process.

(2 marks)

Question Five (20 marks)

(a) Maendeleo Institute is experiencing data privacy problems within its file system. Explain **three** measures that the institute can put in place to mitigate this problem. (6 marks)

(b) Access to disk is much slower than access to memory, as a result of this difference many file systems have been designed with various optimizations to improve performance. Describe any **two** of this optimization techniques. (4 marks)

(c) Explain the following file operations:

- a. Append;
- b. Write;
- c. Seek.

(6 marks)

(d) Differentiate between *one level* and *two level* directory systems.

(4 marks)