



MACHAKOS UNIVERSITY

University Examinations for 2018/2019

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

FIRST YEAR SECOND SEMESTER EXAMINATION

DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOGY

DIT 105: OPERATING SYSTEM

DATE: 8/5/2019

TIME: 8.30-10.30 AM

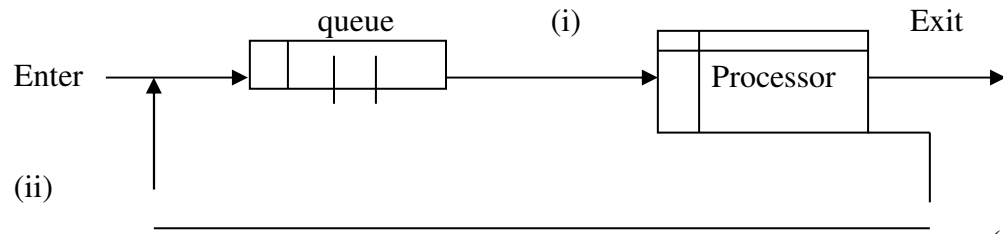
INSTRUCTIONS

Answer **question ONE** and any other **TWO** questions.

QUESTION ONE (30 MARKS)

- a) Explain the following types of operating systems:
 - i. Embedded operating systems;
 - ii. Multiprocessor operating systems . (4 marks)
- b) A lecturer described the requirements for *mutual exclusion* during a lesson. Outline **four** requirements that he could have mentioned. (4 marks)
- c) June was required to list objectives for a proposed file system in her company, outline **four** objectives that she was likely to list. (4 marks)
- d) Outline **four** possible reasons for suspending a process during processing. (4 marks)
- e) In a paged-segmented system we have the virtual address space of 64 KB, with 16 segments and a page size of 4 KB. Calculate:-
 - i. The number of bits for the page number;
 - ii. The maximum number of pages in a segment;
 - iii. The maximum segment size;
 - iv. Draw how the logical address is partitioned. (8 marks)

- f) 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)

- g) Outline **two** characteristics of the third generation operating systems. (2 marks)

QUESTION TWO (20 MARKS)

- a) Explain each of the following terms as used in I/O operations:
- Spooling;
 - Device controller;
 - Device driver. (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:
- Append
 - Write
 - Seek (6 marks)
- d) Differentiate between *one level* and *two level* directory systems. (4 marks)

QUESTION THREE (20 MARKS)

- a) Explain each of the following terms with reference to inter-process communication:
- Critical sections;
 - Busy waiting;
 - Kernel;
 - Message passing. (8 marks)

- b) A group of ICT module 1 students in Machakos University College were carrying out an assignment on objectives of memory management in operating systems. Explain **four** objectives that they could have mentioned. (4 marks)
- c) Outline two features of NTFS file system. (2 marks)
- d) For each of the following statements, identify the most appropriate computer memory that could be used in the following situations justifying your answer:
- Faster access time, greater cost per bit. (2 marks)
 - Greater capacity, smaller cost per bit. (2 marks)
 - Greater capacity, slower access speed. (2 marks)

QUESTION FOUR (20 MARKS)

- a) Explain the following terms with reference to process management as used in operating systems:
- Thread
 - Through put (4 marks)
- b) Study the following algorithm of concurrent memory requests by two processes and answer the questions that follow

<i>Time</i>	<i>process 1</i>	<i>process 2</i>
T1	No request	No request
T2	Request and hold 80 kb	Request and hold 70kb
T3	No request	No request
T4	Request 110kb	Request 120kb

Assuming a total of 250kb is available for allocation:

- Identify the most probable time at which a deadlock may occur. Justify your answer (2 marks)
 - Suggest **two** ways of avoiding the deadlock. (2 marks)
 - Explain **four** conditions that must apply for a deadlock to take place in a computer system. (4 marks)
- c) Differentiate between *virtual* and *physical* memory addressing as used in operating systems. (4 marks)

- d) With the aid of a diagram. Explain the *layered structure* of an operating system.(4 marks)

QUESTION FIVE (20 MARKS)

- a) The following series of processes with the given estimated run-times arrive 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 SJF and SRTF scheduling policies are used, FOR EACH POLICY:-

- Draw a Gantt chart to show the order of executions;
 - Calculate the waiting time for each process;
 - Calculate the wait-time/run-time ratio for each process;
 - Calculate the average turn around time;
 - Identify **one** disadvantage of each of the policies. (16 marks)
- b) Differentiate between *absolute* and *relative* path names as used in file management. (4 marks)