



MACHAKOS UNIVERSITY

University Examinations for 2018/2019

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

THIRD YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR
BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)

SIT 304: COMPUTER OPERATING SYSTEMS

DATE:

TIME:

INSTRUCTIONS

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

QUESTION ONE (30 marks)

- a) Discuss the following terms as used in Operating Systems (10 Marks)
 - i) Kernel
 - ii) Job control language (JCL)
 - iii) Process
 - iv) Virtual memory
 - v) Paging
- b) Using a relevant example, describe what is meant by the following terms
 - i) Operating system (3 Marks)
 - ii) Turnaround time (4 Marks)
 - iii) Thread (3 Marks)
- c) Describe the process states available for an operating system (10 Marks)

QUESTION TWO (20 marks)

- a) Explain how caching improve system performance (4 Marks)
- b) Explain what is meant by process swapping (2 Marks)

- c) Operating systems may be defined in terms of their thread to process ratio. Discuss the meaning of the following thread:process ratios: 1:1, M:1, 1:M, M:M, giving examples of Operating Systems that use a particular ratio (8 Marks)
- d) Discuss the concept of Cache when applied to Operating Systems and processors and show how this concept is used in the Unix Buffer Cache (6 Marks)

QUESTION THREE (20 marks)

- a) Discuss the concept of a memory hierarchy as applied to computer hardware including registers, caches, RAM, Disks, and CD – ROMs (6 Marks)
- b) Discuss why some thread:process ratios are not found in commercial operating systems environments (4 Marks)
- c) Caching plays a very important role in modern computer systems. Discuss the basic workings of a cache and explain the terms cache hit and cache miss (6 Marks)
- d) Distinguish between pre-emptive and non-pre-emptive scheduling (4 Marks)

QUESTION FOUR (20 marks)

- a) For the caches below, indicate where they are located, what items are stored in them and what happens when a cache miss occurs (8 Marks)
 1. The L1 Buffer cache on the Pentium
 2. The Translation lookaside Buffer (TLB)
 3. The UNIX Buffer cache
 4. A web cache
- b) I have a disk on my laptop that has 10 Gigabytes.
 - i) Assuming that all disk references by the computer programs are random, what size must I set my disk cache to have a cache ratio of 0.5%? (5 Marks)
 - ii) If the time taken to access the disk block when it is in the UNIX buffer cache is 2 microseconds and the time needed to access that same block when it is on the disk (i.e. not in the UNIX buffer cache) is 10 milliseconds, what is the average access time for a disk block if it is randomly accessed as described above? (5 Marks)
- c) What is a deadlock? (2 Marks)

QUESTION FIVE (20 marks)

- a) Describe how micro kernels promote portability (2 Marks)
- b) What is meant by the term semaphore and why are they important to an Operating system (5 Marks)
- c) Explain why user-level thread should promote portability (4 Marks)
- d) When a process performs a blocking send, it must receive an acknowledgement to unblock. What problem might arise in this scheme and how can it be avoided? (5 Marks)
- e) Why must processes issue system calls to request operating system services? (4 Marks)