2920/105
OPERATING SYSTEMS
November 2017
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN INFORMATION AND COMMUNICATION TECHNOLOGY

MODULE I

OPERATING SYSTEMS

3 hours

INSTRUCTIONS TO CANDIDATES

This paper consists of EIGHT questions.
Answer any FIVE of the EIGHT questions in the answer booklet provided.
All questions carry equal marks.
Candidate should answer the questions in English

This paper consists of 4 printed pages.

**Candidates should check the question paper to ascertain that all the
pages are printed as indicated and that no questions are missing.**

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1. (a) Outline **three** functions of the *job control language* in a computer system. (3 marks)

   (b) Explain each of the following terms as used in operating systems:

   (i) spooling;

   (ii) warm boot;

   (iii) context switch. (6 marks)

   (c) A disk has the following head movement queue 95, 190, 40, 115, 18, 123, 52, 60 with the read-write head initially at track 40 and the tail track at 210. With the aid of a Gantt graph, determine the *total seek time* using each of the following disk scheduling algorithms:

   (i) shortest seek time first;

   (ii) elevator assuming the head moves towards 0. (7 marks)

   (d) Explain **two** reasons why application programs are temporarily stored in the main memory of a computer system. (4 marks)

2. (a) Outline **three** examples of systems calls for each of the following:

   (i) file manipulation;

   (ii) communication. (6 marks)

   (b) Explain **two** modes of processing supported by multiprocessing operating system. (4 marks)

   (c) Several programs can be run simultaneously using a *multiprogramming* operating system.

   (i) Explain the objective of this mode of processing. (2 marks)

   (ii) Explain the problem associated with this mode of processing. (2 marks)

   (d) Joseph intends to acquire an operating system for his company's network system. Explain **three** factors he should consider other than cost. (6 marks)

3. (a) The operating system uses various approaches of interfacing with users. Describe **three** such approaches. (6 marks)

   (b) Explain each of the modes of programmable clocks as used in I/O device management:

   (i) one-shot;

   (ii) square-wave. (4 marks)

   (c) Distinguish between the *CPU bound* and *I/O bound* jobs during inter process communication. (4 marks)

   (d) Files can be stored on a directory using various *logical structures*. Describe **three** such structures that the operating system supports. (6 marks)

4. (a) Outline **three** objectives of I/O scheduling in a computer system. (3 marks)

(d) A system disk has been diagnosed to be having low access speed. Explain **three** ways in which the operating system could improve the performance of such a disk. (6 marks)

7. (a) Outline **two** examples for each of the following types of interrupts within a computer system:

   (i) external;

   (ii) internal. (4 marks)

   (b) With the aid of a diagram, describe **three** of the *layered structures* of a file system as used in operating systems. (8 marks)

   (c) Differentiate between *deadlock avoidance* and *deadlock prevention* as used in operating systems. (4 marks)

   (d) Explain **two** circumstances under which a *preemptive scheduling* decision would be made by the operating system during inter-process communication. (4 marks)

8. (a) Explain **two** disadvantages associated with *linked file allocation* method. (4 marks)

   (b) Distinguish between *page* and *frame* as used in memory management. (4 marks)

   (c) A deadlock can be eliminated by either of the following methods:

   (i) aborting deadlocked processes all at once;

   (ii) aborting one process at a time until the deadlock is eliminated.

   Describe a disadvantage associated with each elimination method. (4 marks)

   (d) Distinguish between each of the following *process states* as used in process control:

   (i) *running state* and *ready state*;

   (ii) *blocked state* and *terminated state*. (8 marks)

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