061005T4ICT

ICT TECHNICIAN LEVEL 5

IT/OS/ICT/CR/6/5

MANAGE OPERATING SYSTEM

Mar. /Apr. 2023

Time: 3 Hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

WRITTEN ASSESSMENT

3 Hours

INSTRUCTIONS TO CANDIDATES:

*The paper consists of **THREE** sections: **A**, **B** and **C.***

Answer questions as per instructions in each section

You are provided with a separate answer booklet

Candidates should answer the questions in English

This paper consists of SEVEN (7) printed pages

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

Section A (20 marks)

*Answer **ALL** questions in this section*

1. Which of the following contains a list of network operating systems? (1 Mark)
   A. Microsoft Windows Server 2008, Novell NetWare, Mac OS X
   B. Mac OS X, Red Velvet Cate (OS 11), Tizen OS
   C. Red Velvet Cate (OS 11) ¸ Tizen OS, Microsoft Windows Server 2008
   D. Novell NetWare, Red Velvet Cate (OS 11), Kai OS 3.0
2. Which of the following information is **not** part of the Process Control Block (PCB)? (1 Mark)
   A. The CPU scheduling information for the process.
   B. Memory management information regarding the process.
   C. Possible accounting information for this process.
   D. Operating system information
3. Which one of the following are the four sections which a program can be divided into when it is loaded into the memory? (1 Mark)
   A. Word, text, data, page
   B. Stack, heap, text, data
   C. Byte, text, data, word
   D. Bit, data, text, word
4. Select the statement that best defines a thread among the statements listed below? (1 Mark)
   A. An entity that represents the basic unit of work to be implemented in a system
   B. An abstract data type that is used for process synchronization.
   C. A single sequence stream within in a process
   D. A data structure maintained by the Operating System for every process.
5. Which one of the following is a pre-emptive scheduling algorithm? (1 Mark)
   A. First-Come, First-Served (FCFS) Scheduling
   B. Shortest-Job-Next (SJN) Scheduling
   C. Priority Scheduling
   D. Shortest Remaining Time Next

6. Under the normal mode of operation, identify the right sequence through which a process may utilize a resource? (1 Mark)
    A. Request – Use – Release
    B. Request – Hold – Use – Release
    C. Hold – Use – Release
    D. Request – Hold – Release
7. The following are advantages of demand paging in memory management, which one is not? (1 Mark)
    A. Large virtual memory.
    B. The amount of processor overhead for handling page interrupts is less than for simple paging
    C. More efficient use of memory.
    D. There is no limit on degree of multiprogramming.
8. Which one of the following are the three approaches through which the CPU communicates with hardware devices? (1 Mark)
    A. Special Instruction I/O, Batch Instruction I/O, Direct memory access (DMA)
    B. Memory-mapped I/O, Batch Instruction I/O, Direct memory access (DMA)
    C. Batch Instruction I/O, Special Instruction I/O, Memory-mapped I/O
    D. Direct memory access (DMA), Memory-mapped I/O, Special Instruction I/O
9. What does rotational latency refer to in Disk Operations? (1 Mark)
    A. The time required to move the disk arm to the required track.
    B. The amount of time required for the desired sector to rotate around and come under the read-write head.
    C. The time required to move the data electronically from the disk to the computer
    D. The time required to move the heads from one cylinder to another, and for the heads to settle down after the move.
10. Which are the two functions that can be used to modify the value of semaphore? (1 Mark)
    A. Wait() and Run()
    B. Signal () and Exit()
    C. Wait() and Exit()
    D. Wait() and signal()

11. Which one of the following is the most accurate description of monitors? (1 Mark)

A. An abstract data type that is used for process synchronization.
B. An integer variable which indicate the number of resources available in the system
C. A queue for which multiple processes are waiting for a particular I/O device.
D. Mechanisms an operating system provides to allow the processes to manage shared data.

12. Which are the important process scheduling queues maintained by the Operating System? (1 Mark)

A. Job queue, Wait Queue, Device queues
B. Wait Queue, Device queues, Ready queue
C. Ready queue, Device queues, Job queue
D. Device queues, Wait Queue, Ready queue

13. Which of the following is **not** a way reimage helps in operating system recovery (1 Mark)

A. Reimage repairs and replaces all critical Windows system files needed to run and restart correctly, without harming your user data.
B. Reimage restores compromised system settings and registry values to their default Microsoft settings.
C. Reimage reverses the damage done to the operating system.
D. Reimage creates an image of the operating system for effective recovery in case of a serious problem

14. The following are reasons for process termination in a computer system except? (1 Mark)

A. Sprung by existing process
B. Data misuse
C. Normal completion
D. Time limit exceeded

15. When does a page fault occur? (1 Mark)

A. When resources are not available
B. When a deadlock occurs.
C. When the page is not present in memory
D. When buffering occurs

16. Which of these files contain a list of file names and their related information? (1 Mark)
    A. Ordinary files
    B. Special files
    C. Directory files
    D. System files
17. Which of the following are methods of accessing files? 1 Mark)
    A. Sequential access, Direct/Random access, Indexed sequential access
    B. Direct/Random access, Indexed Serial Access, Scheduled Access
    C. Indexed sequential access, Indexed Serial Access, Unscheduled access
    D. Indexed Serial Access, Direct/Random access, Scheduled Access
18. Which one of the following is a list of the three types of addresses used in a program before and after memory is allocated? (1 Mark)
    A. Symbolic addresses, Relative addresses, Page Address
    B. Page Address, Physical addresses, Symbolic addresses
    C. Symbolic addresses, Physical addresses, Relative addresses.
    D. Physical addresses, Relative addresses, Page Address
19. Which of the following statements describes Low level formatting?
    A. Low level formatting is done by the end users
    B. Disk must not be formatted before storing data.
    C. Low level formatting is marking of cylinders and tracks of a disk.
    D. Low level formatting is done by erasing the hard disk.
20. From the statements below, choose a key limitation of Batch Operating System? (1 Mark)
    A. CPU is often idle
    B. Frequent interaction between the user and the job.
    C. It is easy to provide the desired priority.
    D. Jobs with similar needs are batched together and run as a group.

Section B (40 marks)

*Answer **ALL** questions in this section*

21. Define an operating system. (2 Marks)
22. List **four** functions that can be performed by a kernel. (2 Marks)
23. Differentiate between *static* and *dynamic* loading of a computer program. (2 Marks)
24. Explain **two** memory allocation strategies used in operating systems. (4 Marks)
25. State **two** disadvantages of paging in memory management. (2 Marks)
26. Distinguish between *hard real-time* and *soft real-time* operating System. (3 Marks)
27. Outline **three** key differences between *processes* and *threads* as used in Operating Systems. (3 Marks)
28. Briefly describe the **four** conditions that must hold for a deadlock situation to occur. (4 Marks)
29. Identify the **two** main options for recovering from a deadlock. (2 Marks)
30. State **three** jobs performed by the device drivers. (3 Marks)
31. Explain **four** services related to I/O provided by operating system. (4 marks)
32. List **three** file attributes. (3 Marks)
33. Identify **two** functions of the computer clock. (2 Marks)
34. Differentiate between a *shell* and a *kernel* as used in operating Systems. (4 Marks)

Section C (40 marks)

*Answer **any two** questions in this section.*

35. A Process Scheduler schedules different processes to be assigned to the CPU based on particular scheduling algorithms. Five processes arrived for scheduling for execution by the CPU as outlined in the table below.

Process	Arrival Time (ms)	Execution Time (ms)
P0	0	4
P1	1	3
P2	2	7
P3	3	5
P4	4	2

a) Assuming that the process scheduler uses a First-Come First-Served (FCFS) Scheduling algorithm,

a) Draw a Gantt chart (3 Marks)

b) Calculate the average Waiting Time (2 Marks)

c) Calculate the average turnaround time (2 Marks)

b) Assuming that the CPU scheduling policy is Round Robin with time quantum = 3, Calculate:

a) The exit time of each process. (3 Marks)

b) Average waiting time. (4 Marks)

c) Average turnaround time. (4 Marks)

c) By comparing the average waiting time of the two algorithms, identify which of the two algorithms is more efficient. (2 Marks)

36. a) Compare the **three** types of schedulers used in handling process scheduling. (12 Marks)

b) Explain **four** process states in a five state process model. (8 Marks)

37. Discuss **five** functions of the operating system. (20 Marks)

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