**TEST 1-PART I**

**(Review – Theory)**

Remember the following instructions:

1) Fill in your ID, UCNJ, first name, and last name.

2) Carefully read each question and choose the correct answer.

3) Write at least two lines to explain your answer to each question.

4) Save the document using the format: TEST1-I\_LASTNAME

5) Email the document to jose.escajadillo-mun@ucc.edu with the subject:

“Test1-I\_CST226\_LASTNAME

1. Test1-I allows the use of open notes
2. Limit time: 60 minutes; extra time: 30 minutes

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| **ID-UCNJ:** | 0663178 |
| **NAME & LASTNAME:** | Vargas Popoca Christopher |

**Questions:**

1. Which of the following is an essential function all computers perform? (Choose three.)

a. processing

b. Internet access

c. graphics

d. input

e. email

f. output

**Answer: A, D, F**

**Explanation: These functions are fundamental to how computers operate: they process data, receive input, and produce output. Internet access, graphics, and email are additional capabilities but not essential functions of all computers.**

2. Which of the following executes instructions provided by computer programs?

a. NIC

b. USB

c. CPU

d. drive

**Answer: C**

**Explanation:**  **The CPU (Central Processing Unit) executes instructions provided by computer programs. It is the primary component responsible for processing data and running software.**

3. You are asked to develop a process that runs in the background and handles network communications. What type of process should you develop?

a. service

b. ISR

c. kernel

d. foreground

**Answer: A**

**Explanation: A service is a background process that typically handles tasks like network communications, file serving, and other essential system functions without direct user interaction.**

4. Which of the following features an operating system typically provides? (Choose two.)

a. file system

b. spreadsheet

c. database app

d. kernel

**Answer: A, D**

**Explanation: The file system manages how data is stored and retrieved on disks, while the kernel is the core component of the operating system that manages hardware resources and system processes. Spreadsheet and database apps are software applications, not core OS features.**

5. A friend of yours described a program he is writing that runs on a microcontroller and will read sensors and write to devices that control industrial equipment. What type of system is his program most likely working with?

a. general-purpose operating system

b. multiuser operating system

c. embedded system

d. multitasking system

**Answer: C**

**Explanation: An embedded system is designed to run specific tasks, often with real-time constraints, and is typically used in devices like microcontrollers to interact with sensors and control industrial equipment**

6. While on a coffee break, your colleague asserts that cooperative multitasking is the best operating system design. What is your response? (Choose three.)

a. A disadvantage of cooperative multitasking is that it relies on each program to decide when to give control back to the operating system.

b. Cooperative multitasking can be faster than other forms of multitasking because it increases the processor's clock speed.

c. Cooperative multitasking OSs can freeze due to a process getting stuck in an infinite loop.

d. Modern operating systems use preemptive multitasking so that the operating system is fully in control.

e. Cooperative multitasking is best used on real-time operating systems.

**Answer: A, C, D**

**Explanation: Cooperative multitasking has the downside of relying on programs to voluntarily yield control, which can lead to issues like freezing if a program does not give control back. Modern operating systems typically use preemptive multitasking, where the OS controls task scheduling to prevent these kinds of problems.**

7. You have been asked to recommend an operating system for a project that requires precise timing of I/O devices and deterministic response times to events. Which OS should you recommend?

a. Android

b. VxWorks

c. Linux

d. PDP-10

**Answer: B**

**Explanation: VxWorks is a real-time operating system (RTOS) designed for embedded systems that require precise timing, deterministic response times, and reliable handling of I/O devices, making it ideal for such projects.**

8. Which is best to run on a client operating system?

a. DHCP server

b. Active Directory

c. virtualization

d. Web browser

**Answer: D**

**Explanation: A web browser is commonly run on a client operating system. The other options (DHCP server, Active Directory, virtualization) are typically services or features associated with server operating systems or more advanced setups.**

9. Which operating system component gets called when a process must be allocated memory and scheduled to run?

a. kernel

b. user interface

c. file system

d. application

**Answer: A**

**Explanation: The kernel is the core component of the operating system responsible for managing memory allocation, process scheduling, and hardware resources. It handles tasks like assigning memory to processes and deciding when they get to run.**

10. The new application you are installing is critical to business operations, and downtime must be avoided. Fast response times are also necessary, so performance must be scaled when more users start using the system. What OS and server hardware feature should you consider implementing on the system on which the application is installed?

a. single-tasking

b. interrupts

c. real-time

d. clustering

**Answer: D**

**Explanation: Clustering allows multiple servers to work together to ensure high availability, improve performance, and provide fault tolerance. This is ideal for critical business applications, as it minimizes downtime and can scale to handle more users by distributing the load across multiple systems.**

11. Which of the following best describes the MS-DOS operating system?

a. client

b. real-time

c. standalone

d. embedded

**Answer: C**

**Explanation: MS-DOS is a standalone operating system, meaning it is designed to run on personal computers and does not require a network or another operating system to function. It operates independently on a single machine.**

12. Which of the following are you most likely to find in firmware?

a. kernel

b. bootstrap

c. LILO

d. ISR

**Answer: B**

**Explanation: The bootstrap is typically found in firmware. It is the initial code that runs when a computer is powered on, responsible for starting up the system and loading the operating system into memory.**

13. A colleague asks you where the code for the power-on self-test is located. What do you tell her?

a. bootloader

b. hard disk

c. non-volatile memory

d. random access memory

**Answer: C**

**Explanation: The code for the Power-On Self-Test (POST) is stored in non-volatile memory, typically in the system's ROM (Read-Only Memory) or EEPROM (Electrically Erasable Programmable Read-Only Memory), which retains its data even when the system is powered off.**

14. You’re writing a program that must enable and disable interrupts. In which CPU mode must your program operate?

a. user mode

b. real-time mode

c. POST mode

d. kernel mode

**Answer: D**

**Explanation: Interrupts are low-level operations that involve direct interaction with the hardware and system resources. To enable or disable interrupts, a program must have privileged access to the CPU and system resources, which is only available in kernel mode. In contrast, user mode restricts access to such critical operations to ensure system stability and security. Therefore, your program must operate in kernel mode to control interrupts.**

15. Your manager has asked you to terminate a process running on a Linux server. What information do you need before you can do so?

a. the PID

b. the file handle

c. the IRQ number

d. the I/O address

**Answer: A**

**Explanation:** To terminate a process on a Linux server, you need the **Process ID (PID)**, which uniquely identifies the process running on the system. You can use commands like ps, top, or htop to find the PID, and then use the kill command followed by the PID to terminate the process.

16. Which of the following are ways that a process is created? (Choose two.)

a. by the bootloader

b. by the BIOS POST routine

c. by a file handle

d. by the user

**Answer: A, D**

**Explanation:  
 By the bootloader: When a system starts up, the bootloader is responsible for loading the operating system and initiating essential system processes**

**By the user: Users can create processes by executing programs or commands in a system.**

**The BIOS POST routine is involved in hardware checks, not process creation, and file handles are related to file access, not process creation.**

17. Which of the following is performed by the BIOS? (Choose two.)

a. runs the power-on self-test

b. starts the operating system

c. manages the file system

d. allocates memory to applications

**Answer: A , B**

**Explanation:**   
 **a. Runs the power-on self-test (POST)**: The BIOS (Basic Input/Output System) performs the POST to check the hardware components and ensure they are functioning properly before starting the operating system.

**b. Starts the operating system**: After the POST, the BIOS locates the bootloader on the system's storage device and hands off control to it to load the operating system.

18. Which method of I/O handling uses a round-robin technique?

a. interrupts

b. NMI

c. polling

d. RTOS

**Answer: C**

**Explanation: Polling is an I/O handling method where the CPU continuously checks each device in a round-robin fashion to see if it requires attention. This method uses a loop to "poll" devices in sequence, hence fitting the round-robin technique.**

**Interrupts, NMI (Non-Maskable Interrupt), and RTOS (Real-Time Operating System) do not use this round-robin technique. Interrupts and NMI rely on external signals to notify the CPU when an event occurs, while RTOS manages I/O through more sophisticated scheduling techniques.**

19. Which operating system type is most likely to be part of an embedded system?

a. task-switching

b. cooperative multitasking

c. real-time

d. batch processing

**Answer: C**

**Explanation: Real-time operating systems (RTOS) are most commonly used in embedded systems, where tasks must be executed within strict time constraints. Embedded systems often control hardware directly and need predictable response times, making real-time OS the best fit for such applications.**

20. Which security and protection services aspect verifies an account has permission to act on an operating system?

a. authentication

b. determinism

c. preemption

d. authorization

**Answer: D**

**Explanation:**

Authorization is the process of verifying whether an account or user has the correct permissions to perform certain actions on an operating system. After authentication (confirming the identity of the user), the system checks what resources or operations the user is allowed to access or execute, which is the role of authorization.

* Authentication verifies the identity of the user.
* Determinism and preemption are related to system scheduling and operations, not security.

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