4.5 Real-Time operating and Control System (ACtE0405)

1. Which of the following is a characteristic of an open-loop control system?

- A) Feedback is used
- B) Output is independent of control action
- C) System automatically adjusts based on output
- D) System responds to external disturbances

2. In an open-loop control system, the output is:

- A) Dependent on feedback
- B) Unaffected by system disturbances
- C) Affected by changes in input
- D) Independent of the system input

3. Which of the following is an example of an open-loop control system?

- A) Electric iron
- B) Temperature-controlled air conditioner
- C) Cruise control in a car
- D) Automatic washing machine

4. A feedback element is present in which type of control system?

- A) Open-loop control system
- B) Closed-loop control system
- C) Both open-loop and closed-loop control systems
- D) None of the above

5. In a closed-loop control system, feedback is used to:

- A) Increase system complexity
- B) Maintain the desired output by adjusting the input
- C) Decrease system stability
- D) Amplify the input signal

7. A control system without feedback is known as:

- A) Closed-loop system
- B) Open-loop system
- C) Proportional system
- D) Automatic control system

8. The main advantage of a closed-loop control system over an open-loop control system is:

- A) Simplicity
- B) Low cost
- C) Increased accuracy and reduced sensitivity to disturbances
- D) Faster operation

9. Which of the following is an example of a closed-loop control system?

- A) Light switch
- B) Motor speed controller using tachometer feedback
- C) Electric fan
- D) Hand dryer

10. In an open-loop control system, the accuracy of the output depends on:

- A) System feedback
- B) Input signal only
- C) External disturbances
- D) Comparison of output with reference input

11. In a closed-loop control system, the reference signal is compared with the:

- A) Input signal
- B) Disturbance
- C) Output signal
- D) Controller output

12. Which of the following is a disadvantage of a closed-loop control system?

- A) Reduced accuracy
- B) High sensitivity to noise
- C) Increased complexity and cost
- D) Slow response

13. Open-loop systems are generally:

- A) More complex
- B) Less reliable
- C) Easier to design and implement
- D) More sensitive to system disturbances

14. A closed-loop control system is also known as a:

- A) Feedback control system
- B) Non-feedback system
- C) Direct control system
- D) Feedforward system

15. In a closed-loop system, which component detects the error between the output and the reference signal?

- A) Controller
- B) Feedback element
- C) Comparator
- D) Sensor

16. The output of an open-loop control system depends primarily on:

- A) Feedback signal
- B) The desired setpoint
- C) The input and the system's characteristics
- D) Error correction mechanism

17. Which of the following systems uses feedback to correct errors automatically?

- A) Open-loop control system
- B) Closed-loop control system
- C) Feedforward control system
- D) On-off control system

18. Which control system is preferred when precise output control is required in the presence of disturbances?

- A) Open-loop system
- B) Closed-loop system
- C) Uncontrolled system
- D) Manual control system

19. An open-loop control system is often preferred for:

- A) Systems requiring high precision
- B) Simple, cost-effective applications
- C) Systems with high sensitivity to disturbances
- D) Complex control processes

20. The main role of the feedback in a closed-loop control system is to:

- A) Reduce system complexity
- B) Control external disturbances
- C) Compare the output with the reference input
- D) Decrease the system's stability

22. Which of the following is not a feature of open-loop control systems?

- A) Simplicity
- B) Automatic error correction
- C) Low cost
- D) Less complex design

23. In closed-loop control systems, feedback is used to:

- A) Stabilize the system
- B) Disrupt the system operation
- C) Remove all disturbances
- D) Increase the output signal strength

25. Which of the following can lead to instability in a closed-loop control system?

- A) Properly tuned feedback loop
- B) Excessive gain in the feedback loop
- C) Slow response time
- D) Use of feedforward control

26. Which system type generally offers better performance in the presence of noise?

- A) Open-loop system
- B) Closed-loop system
- C) Hybrid system
- D) Nonlinear system

27. In which system is the output not fed back to the input for control purposes?

- A) Open-loop control system
- B) Closed-loop control system
- C) Adaptive control system
- D) Digital control system

29. Which of the following factors is usually ignored in an open-loop control system?

- A) External disturbances
- B) Input signal
- C) System characteristics
- D) Output signal

30. In a feedback control system, the difference between the desired setpoint and the actual output is called:

- A) Gain
- B) Error
- C) Feedback
- D) Control signal

<u>Multiprocessing</u>

31. What is Multiprocessing?
    - A) Running multiple threads in a single process
    - B) Running multiple processes on a single processor
    - C) Using multiple processors to execute multiple processes simultaneously
    - D) Running a single process across multiple processors

32. Which of the following is a type of Multiprocessing?
    - A) Symmetric Multiprocessing (SMP)
    - B) Cooperative Multiprocessing
    - C) Clustered Multiprocessing
    - D) Both A and C

33. In Symmetric Multiprocessing (SMP),
    - A) All processors share the same memory
    - B) Processors work independently with separate memory
    - C) Only one processor is active at a time
    - D) None of the above

34. Which of the following is an advantage of Multiprocessing?
    - A) Reduced power consumption
    - B) Increased computation speed
    - C) Simplified debugging
    - D) Lower cost

35. Asymmetric Multiprocessing (AMP) involves:
    - A) Processors using shared memory
    - B) Processors sharing tasks equally
    - C) One master processor controlling others
    - D) All of the above

36. A system with multiple processors that operate independently is called:
    - A) Asymmetric Multiprocessing
    - B) Symmetric Multiprocessing
    - C) Parallel Processing
    - D) Single-core Processing

37. Which of the following is NOT a characteristic of Multiprocessing?
    - A) Concurrent execution of processes
    - B) Requires multiple CPUs or cores
    - C) Always uses shared memory
    - D) Increases system reliability

38. What is the main challenge in Multiprocessing systems?
    - A) Processor speed
    - B) Memory management
    - C) Task synchronization and coordination
    - D) Power consumption

39. Which term refers to dividing a task into smaller subtasks that can be executed simultaneously in a multiprocessing system?
    - A) Multitasking
    - B) Context Switching
    - C) Parallelism
    - D) All of the above

40. In which of the following scenarios would multiprocessing provide the least benefit?
    - A) Scientific computations
    - B) Single-threaded applications
    - C) Real-time video rendering
    - D) Complex data processing

41. Which operating system feature is critical for managing multiprocessing systems?
    - A) Virtual memory
    - B) Scheduler
    - C) File system
    - D) User interface

42. Which of the following statements about multiprocessing is true?
    - A) It is only applicable to supercomputers.
    - B) It requires distributed memory.

- C) It enables simultaneous execution of processes.
- D) It does not improve system performance.

43. What is the role of a processor affinity in multiprocessing?
    - A) Assigning multiple processes to the same processor
    - B) Assigning processes to specific processors
    - C) Distributing tasks evenly among processors
    - D) None of the above

Multitasking

44. What is Multitasking?
    - A) Running multiple processes simultaneously on multiple processors
    - B) Running multiple tasks seemingly simultaneously on a single CPU
    - C) Running a single task on multiple CPUs
    - D) Running multiple threads in one process

45. Which type of multitasking does the operating system control the CPU time for each task?
    - A) Cooperative Multitasking
    - B) Preemptive Multitasking
    - C) Symmetric Multitasking
    - D) Asymmetric Multitasking

46. In cooperative multitasking:
    - A) The OS controls task switching
    - B) Tasks voluntarily yield control of the CPU
    - C) The OS preempts tasks
    - D) Tasks run simultaneously on different CPUs

47. Which multitasking method is more common in modern operating systems?
    - A) Cooperative Multitasking
    - B) Preemptive Multitasking
    - C) Manual Multitasking
    - D) Symmetric Multitasking

48. What is the primary difference between multitasking and multiprocessing?
    - A) Multitasking requires multiple processors
    - B) Multiprocessing requires task switching
    - C) Multitasking simulates parallelism, multiprocessing achieves actual parallelism
    - D) Multitasking involves distributed systems

49. Which of the following is an example of multitasking in a computer system?
    - A) Running a single-threaded application
    - B) Executing commands in a batch job
    - C) Having a web browser, music player, and text editor open simultaneously
    - D) Running multiple processes on different CPUs

50. In a preemptive multitasking system, tasks are switched based on:
    - A) User input
    - B) Time slices allocated by the OS
    - C) Voluntary yielding of tasks

- D) Task priority

51. In multitasking, what does the term "context switch" refer to?
    - A) Switching between different user accounts
    - B) Switching from one task to another
    - C) Switching between different operating systems
    - D) Switching between different networks

52. Which term refers to the rapid switching between tasks in multitasking?
    - A) Process scheduling
    - B) Context switching
    - C) Threading
    - D) Synchronization

53. Which operating system feature is critical for effective multitasking?
    - A) File system management
    - B) Memory management
    - C) Scheduling
    - D) User interface

54. Multitasking is most effective in systems that:
    - A) Have a single core CPU
    - B) Are I/O bound
    - C) Are CPU-bound
    - D) Have limited memory

55. Which of the following is a disadvantage of multitasking?
    - A) Increased efficiency
    - B) Better resource utilization
    - C) Higher overhead due to context switching
    - D) Improved user experience

56. In which type of multitasking does the CPU allow a task to run for a fixed time period before switching to the next task?
    - A) Cooperative
    - B) Preemptive
    - C) Symmetric
    - D) Asymmetric

57. Which of the following is a benefit of multitasking?
    - A) Reduces memory usage
    - B) Maximizes CPU utilization
    - C) Increases power consumption
    - D) Simplifies program development

58. What does the operating system use to manage task priorities in multitasking?
    - A) Task queue
    - B) Process scheduler
    - C) Interrupt handler
    - D) Memory allocator

59. Which of the following systems heavily relies on multitasking for efficiency?
    - A) Batch processing systems
    - B) Embedded systems

- C) Real-time systems
- D) Desktop operating systems

60. Which of the following is NOT a type of multitasking?
    - A) Cooperative
    - B) Preemptive
    - C) Interrupt-driven
    - D) Time-sharing

61. Which component of the operating system is responsible for managing multitasking?
    - A) File system
    - B) Kernel
    - C) User interface
    - D) Device driver

62. Multitasking improves system responsiveness by:
    - A) Reducing the number of running applications
    - B) Allowing the user to switch between tasks quickly
    - C) Decreasing CPU usage
    - D) Increasing memory consumption

Device Drivers

63. What is a Device Driver?
    - A) A program that controls the system's memory
    - B) A hardware component that connects devices to the motherboard
    - C) Software that allows the operating system to communicate with hardware devices
    - D) A firmware component that manages storage devices

64. Which of the following is a primary function of a device driver?
    - A) Compiling code
    - B) Managing hardware communication
    - C) Scheduling tasks
    - D) Managing user accounts

65. What is a Plug and Play (PnP) driver?
    - A) A driver that must be manually installed
    - B) A driver that configures hardware automatically
    - C) A driver that requires a reboot to function
    - D) A driver that is only used for networking devices

66. Which type of device driver runs with the highest level of privilege?
    - A) User-mode driver
    - B) Kernel-mode driver
    - C) Virtual device driver
    - D) Plug and Play driver

67. Why are device drivers needed?
    - A) To connect the OS directly to the hardware
    - B) To provide a consistent interface for different hardware devices
    - C) To manage multitasking
    - D) To schedule processes in the operating system

68. How are device drivers typically installed in modern operating systems?
    - A) Manually by the user
    - B) Automatically during hardware detection
    - C) Via the command line
    - D) They do not require installation

69. Which of the following is NOT a characteristic of a device driver?
    - A) It is hardware-specific
    - B) It is operating system-specific
    - C) It can work with any hardware
    - D) It facilitates communication between the OS and hardware

70. What is the consequence of a missing or faulty device driver?
    - A) The device may not function correctly or at all
    - B) The operating system may crash
    - C) System performance may degrade
    - D) All of the above

71. Which component of the operating system loads device drivers during the boot process?
    - A) File system
    - B) Kernel
    - C) User interface
    - D) Memory manager

72. What is a common method for updating device drivers?
    - A) Automatic updates through the OS
    - B) Reinstalling the operating system
    - C) Deleting the existing drivers
    - D) Manually editing the driver code

73. What is the role of a printer driver?
    - A) To manage print jobs in the operating system
    - B) To connect the printer to the network
    - C) To convert application data into a format the printer can understand
    - D) To install the printer's hardware

74. Which of the following statements about device drivers is true?
    - A) They are part of the hardware
    - B) They are required for the OS to interact with hardware
    - C) They are optional in modern systems
    - D) They are only needed for external devices

75. Which driver allows the OS to communicate with the graphics card for rendering images?
    - A) Printer driver
    - B) Network driver
    - C) Graphics driver
    - D) Sound driver

76. Device drivers can cause system instability when:
    - A) They are not optimized
    - B) They are outdated or incompatible with the OS
    - C) They are written for different hardware
    - D) All of the above

77. What is the purpose of a network driver?
    - A) To allow the OS to manage multiple devices
    - B) To enable communication between the OS and network hardware (e.g., Ethernet or Wi-Fi adapter)
    - C) To control access to storage devices
    - D) To optimize CPU performance

78. Which of the following is NOT an example of a device that typically requires a driver?
    - A) Keyboard
    - B) Web browser
    - C) Mouse
    - D) Sound card

79. Device drivers are usually provided by:
    - A) The operating system developer
    - B) The hardware manufacturer
    - C) The system administrator
    - D) The software developer

80. A Plug and Play (PnP) driver helps with:
    - A) Device security
    - B) Automatic device detection and configuration
    - C) Manual device installation
    - D) Speeding up device performance

81. Which of the following is a risk associated with outdated device drivers?
    - A) Enhanced security
    - B) Improved performance
    - C) Potential system crashes and vulnerabilities
    - D) Decreased power consumption

82. What happens when a device driver is uninstalled?
    - A) The device continues to work normally
    - B) The device may stop functioning
    - C) The device's performance improves
    - D) The device's firmware is deleted

83. Which tool is commonly used to troubleshoot driver issues in Windows?
    - A) Task Manager
    - B) Device Manager
    - C) Disk Management
    - D) Control Panel

84. What is the relationship between device drivers and the OS?

- A) Device drivers are a part of the hardware
- B) The OS depends on device drivers to handle hardware-specific tasks
- C) Device drivers function independently of the OS
- D) All of the above