May, 23 2024

Time allotted: 3:00hrs

Jimma University

Jimma Institute of Technology

Faculty of Computing and Informatics

Computer Science program

Mock Exit Exam

Name: _____ID/No: _____

1. Which type of attack involves an attacker intercepting and modifying communication between two parties?
   A. Denial of Service (DoS)
   B. Man-in-the-Middle (MitM)
   C. Phishing
   D. Trojan Horse
2. Which cryptographic technique is used to ensure the integrity and authenticity of a message?
   A. Encryption
   B. Hashing
   C. Steganography
   D. Digital Signature
3. Which authentication factor requires something the user knows?
   A. Something you are
   B. Something you have
   C. Something you do
   D. Something you know
4. Which of the following principle of cyber security restricts how privileges are initiated whenever any object or subject accesses a resource?
   A. Least Privilege
   B. Fail-Safe Defaults
   C. Economy of Mechanism
   D. Complete Mediation
5. Which of the following is a common method used by attackers to exploit buffer overflow vulnerabilities?
   A. Injecting malicious code into input fields
   B. Sending large amounts of data to overrun a buffer's boundary
   C. Manipulating URLs to execute unauthorized commands
   D. Intercepting communication between two parties
6. Which type of vulnerability occurs when software developers unintentionally expose sensitive information in error messages?
   A. Buffer Overflow
   B. Information Disclosure
   C. Cross-Site Scripting (XSS)
   D. Privilege Escalation
7. You are creating a use case model for an online library system. Which of the following is the MOST appropriate use case description for the "Borrow a Book" functionality?
   A. The user logs in to the system and searches for a book. They then click on the "Borrow" button and the book is borrowed.

B. The system verifies user credentials, retrieves book information, updates loan status, and sends a confirmation email.
C. The user selects a book they want to borrow and the system handles the loan process.
D. The system interacts with the database to update borrowing information and generates a loan receipt.

8. When creating requirements using use case modeling concepts, which of the following activities involves identifying the actors, their goals, and the interactions between them and the system?
   A. Writing detailed pseudocode for system functionalities
   B. Defining the database schema for data storage
   C. Developing test cases for system validation
   D. Creating use case diagrams to depict system functionality
9. What is the main difference between Agile and Waterfall development methodologies?
   A) Agile is faster and more iterative, while Waterfall is more linear and plan-driven.
   B) Agile focuses on user interface design, while Waterfall prioritizes code quality.
   C) Agile requires extensive documentation, while Waterfall is more flexible.
   D) Agile is only for small projects, and Waterfall is better for large-scale systems.
10. You are analyzing user requirements for a new e-commerce platform. Which of the following is the most relevant technique to gather user feedback?
   A. Reviewing existing code from similar platforms
   B. Conducting user interviews to understand their needs and shopping habits.
   C. Directly coding the core functionalities based on assumptions
   D. Analyzing competitor websites' user interfaces
11. After implementing a new software update, you notice an increase in user complaints about bugs. What is the MOST appropriate course of action?
   A. Ignore the complaints and wait for user feedback to stabilize.
   B. Release a new update with completely different functionalities.
   C. Delete the update and revert to the previous version of the software.
   D. Analyze the complaints, identify the bugs, and release a hotfix update
12. A software system experiences performance issues during peak usage times. How can you analyze the problem to identify the root cause?
   A. Identify bottlenecks in the code and optimize resource usage.
   B. Change the user interface to a simpler design.
   C. Increase the hardware specifications of the system without further analysis.

D. Rewrite the entire system from scratch using a different programming language.

13. The recurrence relation for the Merge Sort algorithm is:

A) T(n) = 2T(n/2) + O(n)
C. T(n) = T(n/2) + O(n)
B) T(n) = 2T(n/2) + O(1)
D. T(n) = T(n-1) + O(n)

14. Which of the following is true about the dynamic programming approach?

A) It always uses recursion
B) It solves each sub-problem only once and stores the result
C) It is always more efficient than greedy algorithms
D) It is used only for optimization problems

15. Which of the following problems can be solved using the greedy algorithm approach?

A) Longest Common Subsequence
C. Fractional Knapsack Problem
B) Traveling Salesman Problem
D. Matrix Chain Multiplication

16. Which technique is used in dynamic programming to solve optimization problems?

A) Divide and Conquer
C. **Memoization**
B) Greedy Approach
D. Heuristics

17. The main idea behind the divide-and-conquer algorithm is to:

A) Break the problem into smaller sub problems, solve them independently, and combine their solutions.
B) Solve the problem directly without dividing.
C) Use a single loop to find the solution.
D) Use dynamic programming to store results of sub problems.

18. What is the time complexity of Kruskal's algorithm for finding the minimum spanning tree?

A) O(n^2)
B. O(E log E)
C. O(V^2)
D. O(V log V)

19. What is the primary function of the Data Link Layer in the OSI model?

A. Routing packets across networks
B. Ensuring reliable transmission of data across a physical link
C. Providing end-to-end communication between devices
D. Establishing and maintaining communication sessions

20. Which layer of the OSI model is responsible for converting data packets from the Network layer into electrical signals for transmission over the physical medium?

A. Physical Layer
B. Data Link Layer
C. Network Layer
D. Transport Layer

21. What is the primary function of the ARP (Address Resolution Protocol)?
    A. Translates domain names to IP addresses
    B. Determines the MAC address of a device based on its IP address
    C. Routes packets between different networks
    D. Establishes a secure connection between client and server
22. How many host addresses are available in a subnet with a subnet mask of 255.255.255.248 (CIDR notation /29)?
    A. 2 B. 6 C. 14 D. 30
23. Which wireless technology is commonly used for local area networking and internet access within buildings?
    A) Bluetooth B. Cellular C. Wi-Fi D. NFC (Near Field Communication)
24. What is the broadcast address in a subnet with the address range 192.168.1.0 - 192.168.1.31?
    A. 192.168.1.0 B. 192.168.1.31 C. 192.168.1.255 D. 192.168.0.255
25. Which principle ensures that critical systems remain operational in case of hardware failure?
    A. Load balancing C. Data normalization
    B. Failover D. Denial of Service (DoS) prevention
26. What network service provides centralized authentication and authorization for users and devices?
    LDAP B. DNS C. DHCP D. SNMP
27. What service allows users to access files stored on a central server from their local computers?
    A. Email C. File Transfer Protocol (FTP)
    B. Remote Desktop Protocol (RDP) D. Domain Name System (DNS)
28. Which of the following is an example of proactive troubleshooting?
    A. Waiting for a system failure before taking action
    B. Regularly monitoring system performance
    C. Reacting to security breaches after they occur
    D. Ignoring user complaints about slow network speeds
29. Which of the following is NOT a common component of a security policy?
    A. Data encryption C. Hardware maintenance
    B. User training D. Incident response procedures
30. Which iptables rule is used to allow outgoing HTTP connections?

A. iptables -A OUTPUT -p tcp --dport 80 -j ACCEPT
B. iptables -A OUTPUT -p http -j ACCEPT
C. iptables -A OUTPUT -dport 80 -j ACCEPT
D. iptables -A OUTPUT -s 80 -j ACCEPT

31. Which of the following operating system functions contributes to the efficient utilization of system resources by preventing conflicts and bottlenecks?
A) Security and protection
B) Device management
C. Process management and memory management
D. Inter-process communication

32. Which of the following functions of a contemporary operating system contributes most directly to its ability to evolve and adapt to changing requirements and technological advancements?
A) Providing a user-friendly graphical interface
B) Ensuring efficient process and memory management
C) Offering a centralized software installation and management system
D) Implementing a modular design with hardware abstraction layers

33. Which of the following is the primary reason why the Hold and Wait condition can lead to deadlock?
A. It creates a situation where processes can't make progress
B. It allows processes to acquire resources in a specific order
C. It prevents processes from releasing resources they no longer need
D. It forces processes to wait indefinitely for resources

34. Which of the following is the primary advantage of non-preemptive scheduling algorithms over preemptive algorithms?
A. Improved real-time performance
B. Reduced task starvation
C. Simpler implementation and reduced overhead
D. Better support for dynamic workloads

35. When evaluating the suitability of preemptive and non-preemptive scheduling algorithms for real-time systems, which of the following is the most important consideration?
A. Fairness in resource allocation
B. Responsiveness and ability to meet deadlines
C. Simplicity of implementation
D. Overall system throughput

36. Which file system is commonly used in windows operating system?
A. NTFS B. FAT32 C.HFS+ D. Ext4 E. exFAT_

37. Consider a class hierarchy with interfaces and abstract classes. Which of the following statements is CORRECT about implementing polymorphism in this scenario?
A) All concrete subclasses must override methods declared in abstract classes.
B) Interfaces can only define abstract methods, while abstract classes can have concrete implementations.

C) Polymorphism is achieved solely through method overloading within the same class.
D) Interfaces promote tight coupling, allowing unrelated classes to share functionality.

38. When designing complex software systems with multiple interacting objects, what design principle is crucial for maintainability and scalability?
A) Loose coupling, where objects interact through well-defined interfaces
B) Code duplication to avoid unnecessary complexity.
C) Tight coupling between objects, creating dependencies.
D) Global variables for easy access to data across different parts of the system.

39. Which feature of OOP is indicated by the following code?

```
Class Student {
        int marks;
}
class Topper extends Student{
        private int age;
        public topper(int age){
                this.age=age;
}}
```

A. Encapsulation and Inheritance
B. Polymorphism
C. Inheritance and polymorphism

40. What will be output of the following Java program?

```
class exception_handling {
    public static void main(String args[]){
        try {
            int a = args.length;
            int b = 10 / a;
            System.out.print(a);
        }
        catch (ArithmeticException e)
        {
            System.out.println("1");
```

```
        } } }
```

A. 0 B. 1 C. Compilation Error D. Runtime Error

41. Which of the following handles exception in Java when a catch is not used?

A) Finally B. throw handler C. default handle D. Java run time system

42. Which of the following statement is INCORRECT about the Final key word in Java?

A) A value of Final variable cannot be changed. C. A Final method cannot be inherited

B) A Final method cannot be overridden D. A Final class cannot be extended

43. Which of the following is the first step in database design?

A. Identifying entities and attributes C. Creating a conceptual schema

B. Defining database requirements D. choosing a database management system

44. You have been tasked with designing a database for a library system that will track books, borrowers, and borrowings. Which of the following database concepts should you apply?

A. Big data C. Normalization

B OLTP (Online Transaction Processing) D. Data warehousing

45. A company wants to create a database to track employee schedules, hours worked, and pay rates. They also want the database to calculate employee pay based on hours worked and pay rates. Which of the following database concepts should be applied to this database?

A. Triggers B. Functions C. Views D. Stored Procedures

46. A company wants to analyze their sales data to identify which products sell well together. Which SQL join would be used to accomplish this task?

A. Inner join B. Outer join C. Left join D. Right join

47. A company wants to track employee performance by department and job title. Which SQL operation would be used to accomplish this task?

A. SELECT B. FROM C. JOIN D. GROUP BY

48. Precedence graphs help to find a.

A. Recoverable schedule . C. Serializable schedule.

B. Deadlock-free schedule D. Cascade less schedule

49. In SQL the statement select * from R, S is equivalent to

A. Select * from R natural join S.
C. Select * from R union join S.
B. Select * from R cross join S.
D. Select * from R inner join S.

50. Using Relational Algebra the query that finds customers, who have a balance of over 1000 is

A. σ Customer_name(Π balance >1000(Deposit))
B. Π Customer_name(σ balance >1000(Borrow))
C. Π Customer_name(σ balance >1000(Deposit))
D. σ Customer_

51. Consider the following action:
Transaction….. Commit; Rollback; what does Rollback do?

A. Undoes the transactions before commit
C. Redoes the transactions before commit
B. Clears all transactions
D. No action

52. In an E-R, Y is the dominant entity and X is a subordinate entity. Then which of the following is incorrect :

A. Operationally, if Y is deleted, so is X
C. Operationally, if X is deleted, so is Y.
B. Existence is dependent on Y.
D. Operationally, if X is deleted

53. Among the Components of DDBMS which one receives and processes the application requests?
A. Data processor B. Transaction processor C. DDBMS protocol
D. Workstations

54. Which of the following operations is used if we are interested in only certain columns of a table?
A. PROJECTION B. SELECTION C. UNION D. JOIN

55. Which one of the following is commonly used by lexical analyzers to define patterns for tokens?

A. Parse Tree B. Symbol Table C. Regular Expressions D. Abstract Syntax Tree

56. What role does a type system play in the type-checking process?

A. It defines the syntax rules of the programming language.
B. It specifies the set of all valid tokens in the language.
C. It determines the type of each expression and enforces type rules.
D. It generates machine code from intermediate code.

57. Which principle of compiler design ensures that the generated code runs efficiently on the target platform?

A. Lexical Analysis B. Syntax Analysis C. Semantic Analysis D. Code Optimization

58. Which of the following is NOT a role of a lexer in a compiler?

A. Identifying tokens
B. Performing semantic analysis
C. Ignoring whitespace and comments
D. Generating errors for invalid tokens

59. Which parsing technique uses a predictive approach and can handle recursive descent parsing without backtracking?

A. LR Parsing B. LL(1) Parsing C. Bottom-Up Parsing D. Top-Down Parsing

60. Analyze the following code snippet and identify the phase in which an undeclared variable error would be detected:

```
int main() {

    int a = 5;

    b = a + 10;

    return 0;}
```

A. Lexical Analysis
B. Syntax Analysis
C. Semantic Analysis
D. Code Generation

61. What should be the output of the code below?

```
#include<iostream>
using namespace std;
int main()
{
int a=5;
int b=6;
int c;
c= (a>b) ? a : b;
cout<<c;
return 0;
}
```

a) 5
b) 4
c) 7
d) 6

62. How many times will the following loop ex
```
int i = 0;
while (i < 5) {
    cout << i << " ";
    i += 2;
}
```
A. 3
B. 4
C. 5
D. 6

63. What is the purpose of a function prototype in C++?
A. To define the body of a function
B. To declare the existence of a function
C. To specify the return type of a function
D. To provide the input parameters for a function

64. Which loop structure is suitable when the number of iterations is known in advance?
A. for loop B. while loop C. do-while loop D. switch statement

65. What is the output of the following code snippet?
```
#include <iostream>
using namespace std;
int main() {
    int x = 10;
    int& ref = x;
    int* ptr = &ref;
    *ptr = 20;
    cout << x << endl;
    return 0;
}
```
A. 10
B. 20
C. Compiler error
D. Runtime

66. What will be the output of the following code snippet?
```
#include <iostream>
using namespace std;
void printEvenNumbers(int arr[], int size) {
    for (int i = 0; i < size; i++) {
        if (arr[i] % 2 == 0) {
            cout << arr[i] << " ";
        } }}
int main() {
    int numbers[] = {1, 2, 3, 4, 5, 6};
    printEvenNumbers(numbers, 6);
    return 0;
}
```
A. 2 4 6
B. 1 3 5
C. 1 2 3 4 5 6
D. 0 0 0 0 0 0

67. What is the role of the instruction decode (ID) stage in pipelining?

A. To execute the instruction
B. To write the result back to the register
C. To fetch the instruction from memory
D. To translate the instruction into signals for the other stages

68. Which of the following is a characteristic of a hardwired control unit?
A. Flexibility in implementing control logic
B. Ease of modifying the control logic
C. Faster execution of control actions
D. Complex design

69. What is the primary function of memory management unit in computer system?

A. To map physical memory address to cache location
B. To store the resent address translation and minimize access time
C. To map logical address generated by CPU onto physical memory
D. All

70. What is the key difference between a serial and a parallel interface?

A. Serial interfaces transmit data one bit at a time, while parallel interfaces transmit multiple bits simultaneously
B. Serial interfaces are faster than parallel interfaces
C. Serial interfaces are more commonly used for input devices, while parallel interfaces are more commonly used for output devices
D. Both A and C

71. Which register is responsible to facilitate the communication between CPU and memory?

A. Memory Data Register
B. Program Counter
C. Memory address Register
D. A and C

72. How does the CPU's control unit coordinate the execution of instructions?

A. The control unit manages the allocation and translation of virtual memory addresses to physical memory addresses.
B. The control unit retrieves instructions from memory, interprets them, and then coordinates the execution of those instructions.
C. The control unit provides connectivity and integration for the computer's components.
D. The control unit manages input/output operations.

73. Which of the following is an example of a propositional logic statement?

A. All cats are mammals.
B. If it rains, the streets will be wet.
C.A and B are both true.
D. John is taller than Mary.

74. An agent that chooses its actions based on how satisfied or successful it will be in different situations, aiming for the most desirable outcome. Which type of agent is this?

A. Model-based agent
B. Simple Reflex agent
C. Utility-based agent
D. Goal-based agent

75. Which of the following search type is known by the use of heuristic search algorithm?

A. Breadth-First Search (BFS)
B. Depth-First Search (DFS)
C. A* search
D. Binary search

76. A social media platform aims to forecast whether a user will engage with an advertisement. With access to user demographic information and historical advertisement interaction data, they choose to employ Logistic Regression algorithm for the prediction task. What is the primary objective of the social media company in this scenario?

A. Forecasting user demographics.
B. Predicting past advertisement click behavior.
C. Anticipating user engagement with advertisements.
D. Clustering users with similar characteristics.

77. Which algorithm is commonly used for classification tasks?

A. Linear regression
B. Logistic Regression
C. K-means clustering
D. Association mining

78. Which of the following situations incorporates the application of reinforcement learning?

A. Educating a chatbot to interpret and interact with user inquiries.
B. Examining customer data to recognize market segments.
C. Instructing a robot to traverse a maze and determine the most efficient route.
D. Grouping news articles according to their content characteristics.

79. Consider a situation where a swap operation is very costly. Which of the following sorting algorithms should be preferred so that the number of swap operations is minimized in general?

A. Quick sort B. Merge sort C. Bubble sort D. Shell sort

80. For the linked list implementation of the queue, where are the enqueue and dequeues performed?

A. Enqueue in front of the first element, dequeue the first element
B. Enqueue after the last element, dequeue the last element
C. Enqueue after the last element, dequeue the first element
D. Enqueue in front of the first element, dequeue the last element

81. Which data structure is most efficient for implementing a priority queue?

A. Binary search tree B. Hash table C. Binary heap D. Linked list

82. If the function T (n) = Ω(g(n), which statements are true?

A. T(n) <= cg(n) for all n >= n 0 , for positive c, n 0
B. T(n) >= cg(n) for all n >= n 0 , for positive c, n 0
C. T(n) = cg(n) for all n >= n 0 , for positive c, n 0
D. T(n) > cg(n) for all n >= n 0 , for positive c, n 0

83. The code segment below has time complexity?

```
for (int i = 0; i < n; i++){
        for (int j = 1; j < n: j=j
        ∗2){
                int val = ( j ∗ i ) ;
                cout<< val;
        }
}
```

A. O(1)
B. O(n)
C. O(n^2)
D. O(n log n)

84. Which sorting algorithm has the same average and worst-case time bounds (in Big-Oh) as heapsort?

A. insertion sort B. merge sort C. quicksort D. shell sort

85. Which of the following sorting algorithm is of divide-and-conquer type?

A. Bubble sort B. Insertion sort C. Quick sort D. Selection sort

86. Which of the following is best describe the relationship between formal languages, formal grammars, and automata?

A. Formal languages are subsets of formal grammars, and automata can process both.

B. Automata generate formal languages, and grammars define the rules for these generated languages.

C. Formal languages are used to build automata, and grammars translate between them.

D. Formal grammars define the rules for formal languages, and automata can recognize strings generated by those grammars.

87. Which of the following is the most powerful type of machine?

A. Deterministic finite automata (DFA) C. Turing machine

B. Non-deterministic finite automata (NFA) D. Pushdown automata

88. The Kleene star operation "*" in regular expressions represents:

A. Concatenation B. Union C. One or more repetitions D. Zero or more repetitions

89. Regular expression for all strings starts with 01 and ends with 110 is.

A. 010*1*110 B. 01(01)*110 C. 01(0+1)*110 D. 01110

90. Consider the grammar S → aS | b. Which of the following strings can be generated from S?

A. abab B. aaab C. aabb D. bba

91. Which complexity class represents decision problems that can be solved by a deterministic Turing Machine in polynomial time?

A. P B. NP C. Co-NP D.PSPACE

92. What is the reason JavaScript is called loosley typed language?

A. Because you can do arithmetic and logic operations on the variables

B. Because in JavaScript it is possible to convert one datatype to the other.

C. Because in JavaScript the keyword “var” is used to declare variables

D. Because in JavaScript a variable can hold any type of data.

93. If you set background image that is not large enough to cover the device's whole screen, which property allows you to repeat the picture to fill the space?

A. background-repeat: repeat; C. background-position: repeat;

B. background-image: repeat; D. Background-fill: repeat;

94. Which one of the following is NOT the characteristics of CSS?

A. Makes web page documents smaller and faster to download.

B. Enables to create dynamic content

C. Less work

D. Better type and layout control

95. Which attribute of input tag is used to group radio buttons?

A. title B. type C. name D. group

96. One of the following is server-side scripting

A. HTML B. CSS C. JavaScript D. PHP

97. Which one of the following function is used to connect PHP with MySQL database

A. mysqli_create_connection() C. mysqli_connect()

B. mysqli_select_db() D. mysql_query()

98. What is the purpose of a domain name system?

A. To translate a domain name into IP address C. To host website documents

B. To get a new domain name or IP address D. All of the above.

99. In which of the following JavaScript line of code implicit casting will occur?

A. parseInt("2"+"7") B. 2+7.0 C. 2+7 D. 2.0+7.0

100. What type of communication architecture WWW uses?

A. Peer - to- peer B. Client-server C. Hybrid D. All of the above