

IBPS SO IT Officer Mains Memory Based 2023 Held on 28 January 2024

Q1. In indirect addressing mode, what does the address field of an instruction contain?

- (a) The effective address of the operand directly
- (b) The operand value itself
- (c) The address of a memory location that stores the effective address
- (d) The address stored in the program counter
- (e) The register number containing the operand

Ans.(c)

Q2. What will be the output of the following Java code snippet that calculates the length of a string without using the built-in length() method?

```
public class StringLengthCalculator {  
  
    public static int customStringLength(String str) {  
  
        if (str == null) {  
            throw new IllegalArgumentException("String cannot be null");  
        }  
  
        int length = 0;  
  
        for (char c : str.toCharArray()) {  
            length++;  
        }  
  
        return length;  
    }  
  
    public static void main(String[] args) {  
  
        String testString = "Hello, World!";  
  
        int length = customStringLength(testString);  
  
        System.out.println(  
            "The length of the string \"" +  
            testString +  
            "\" is: " +  
            length  
        );  
    }  
}
```

- (a) The length of the string "Hello, World!" is: 13
- (b) The length of the string "Hello, World!" is: 12
- (c) Compilation Error
- (d) Runtime Error: String cannot be null
- (e) The length of the string "Hello, World!" is: 14

Ans.(a)

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Q3. Which process is used to convert a grayscale image into a binary image, and which edge detection algorithm is well known for using gradient calculation along with non-maximum suppression and hysteresis thresholding?

- (a) Thresholding, Laplacian
- (b) Quantization, Sobel
- (c) Sampling, Prewitt
- (d) Thresholding, Canny
- (e) Compression, Roberts

Ans.(d)

Q4. Which grayscale conversion approach generates a grayscale image by assigning equal importance to all three RGB components?

- (a) Weighted luminance transformation
- (b) Unweighted averaging of the RGB channels
- (c) Edge-based grayscale transformation
- (d) Alpha-transparency mapping
- (e) Contrast-normalized grayscale encoding

Ans.(b)

Q5. Which of the following statements correctly describe the return values of the fork() system call in a Unix-like operating system?

- (a) 0 to the child process and a positive value (child's PID) to the parent process
- (b) 1 to the child process and 0 to the parent process
- (c) A negative value if the fork fails
- (d) Both (a) and (c)
- (e) None of the above

Ans.(d)

Q6. Convert the hexadecimal number 1B0 into its binary equivalent.

- (a) 000110110000
- (b) 001011100000
- (c) 000101110000
- (d) 000110101000
- (e) 000100110000

Ans.(a)

Q7. Which of the following operators has the highest precedence in C++?

- (a) Addition (+)
- (b) Logical AND (&&)
- (c) Multiplication (*)
- (d) Function call operator (())
- (e) Assignment (=)

Ans.(d)

Q8. What will be the output of the following C++ code snippet?

```
#include <iostream>
using namespace std;
int main() {
int a = 25, b = 14;
cout << a << " + " << b << " = " << a + b;
return 0;
}
```

- (a) $14 + 12 = 25$
- (b) $14 - 0 = 14$
- (c) $25 + 14 = 39$
- (d) Compilation Error
- (e) Syntax Error

Ans.(c)

Q9. Assuming each arithmetic and output operation takes constant time, what is the overall time complexity of the following code?

```
#include <iostream>
#include <vector>
using namespace std;

int main() {
    int n;

    cout << "Enter the size of the 3D matrix (n x n x n): ";
    cin >> n;

    vector<vector<vector<int>>> matrix(
        n,
        vector<vector<int>>(n, vector<int>(n))
    );

    cout << "3D Matrix with sums at each coordinate (i, j, k): " << endl;

    for (int i = 0; i < n; i++) {
        for (int j = 0; j < n; j++) {
            for (int k = 0; k < n; k++) {

                matrix[i][j][k] = i + j + k;

                cout << "Value at ("
                    << i << ", "
                    << j << ", "
                    << k << ") = "
                    << matrix[i][j][k]
                    << endl;
            }
        }
    }

    return 0;
}
```

- (a) $O(n)$
- (b) $O(n^2)$
- (c) $O(n^3)$
- (d) $O(n \log n)$
- (e) $O(\log n)$

Ans.(c)

Q10. Which TCP port is traditionally assigned as the standard default port for unencrypted SMTP communication between mail servers?

- (a) 80
- (b) 25
- (c) 110
- (d) 143
- (e) 465

Ans.(b)

Q11. Which data structure is most commonly used to support Last-In-First-Out (LIFO) behavior required for UNDO and REDO operations in text editors?

- (a) Queue
- (b) Stack
- (c) Linked List
- (d) Heap
- (e) Hash Table

Ans.(b)

Q12. What is the process of converting a grayscale or color image into a binary image containing only two possible pixel intensity values called?

- (a) Binarization
- (b) Image Enhancement
- (c) Grayscale Conversion
- (d) Quantization
- (e) Segmentation

Ans.(a)

Q13. Which of the following statements is TRUE regarding the COCOMO?

- (a) COCOMO completely ignores cost drivers such as hardware and personnel factors.
- (b) COCOMO is mainly designed for managing Agile sprint backlogs and scrum cycles.
- (c) Intermediate COCOMO refines software effort estimation using cost drivers.
- (d) COCOMO estimates software quality using normalization and dependency analysis only.
- (e) COCOMO is primarily used for real-time packet scheduling in operating systems.

Ans.(c)

Q14. Which command in Linux is used to estimate and display the disk space usage of files and directories?

- (a) ls

- (b) df
- (c) du
- (d) top
- (e) mkdir

Ans.(c)

Q15. Which of the following statements is true regarding a Foreign Key in a relational database?

- (a) A foreign key uniquely identifies every record in a table.
- (b) A foreign key is primarily used to sort records in ascending order.
- (c) A foreign key establishes a relationship between two tables using referenced values.
- (d) A foreign key must always contain only unique values.
- (e) A foreign key cannot contain duplicate or NULL values.

Ans.(c)

Q16. What is the maximum file size supported by the original Macintosh Hierarchical File System (HFS)?

- (a) 2 GB
- (b) 4 GB
- (c) 8 GB
- (d) 16 GB
- (e) 32 GB

Ans.(a)

Q17. Which of the following is primarily classified as a high-level scripting language rather than a low-level or system programming language?

- (a) Assembly
- (b) C
- (c) Perl
- (d) C++
- (e) Machine Language

Ans.(c)

Q18. A software company is developing a banking application where all requirements are finalized before development begins, and client involvement after the requirement phase is minimal. The development process follows a strictly linear sequence in which each phase must be completed before the next phase starts.

Which software development model is most suitable for this project?

- (a) Agile
- (b) Waterfall
- (c) Spiral
- (d) V-Model
- (e) Prototyping

Ans.(b)

Q19. What will be the output of the following C++ program?

```
#include <iostream>
#include <stack>
using namespace std;
void insertBottom(stack<int>& s, int x) {
    if (s.empty()) {
        s.push(x);
        return;
    }
    int t = s.top();
    s.pop();
    insertBottom(s, x);
    s.push(t);
}
void reverseStack(stack<int>& s) {
    if (s.empty())
        return;
    int t = s.top();
    s.pop();
    reverseStack(s);
    insertBottom(s, t);
}
void printStack(stack<int> s) {
    while (!s.empty()) {
        cout << s.top() << " ";
        s.pop();
    }
}
int main() {
    stack<int> s;
    s.push(34);
    s.push(25);
    s.push(58);
    s.push(96);
    s.push(12);
    reverseStack(s);
    cout << "Reversed Stack: ";
    printStack(s);
    return 0;
}
```

- (a) Reversed Stack: 12 96 58 25 34
- (b) Reversed Stack: 34 25 58 96 12
- (c) Reversed Stack: 25 34 58 96 12
- (d) Reversed Stack: 96 58 25 34 12
- (e) Compilation Error

Ans.(b)

Q20. Consider the following processes, all arriving at time 0, with their respective burst times:

Process	Burst Time (ms)
P1	6
P2	8
P3	7
P4	3

Using Non-Preemptive Shortest Job First (SJF) scheduling, calculate the average waiting time.

- (a) 7.0 ms
- (b) 5.5 ms
- (c) 6.25 ms
- (d) 5.0 ms
- (e) 6.0 ms

Ans.(a)

Q21. If two attributes, P and Q, satisfy the functional dependencies $P \rightarrow Q$ and $Q \rightarrow P$, then they exhibit:

- (a) Partial Dependency
- (b) Full Functional Dependency
- (c) Transitive Dependency
- (d) Multivalued Dependency
- (e) Mutual Functional Dependency

Ans.(e)

Q22. Which primary function of a hypervisor (Virtual Machine Manager) involves ensuring efficient distribution and management of CPU, memory, and storage resources among virtual machines?

- (a) Virtual Machine Isolation
- (b) Hardware Emulation
- (c) Resource Allocation
- (d) Network Virtualization
- (e) Snapshot Management

Ans.(c)

Q23. In an operating system, where are newly submitted processes typically stored before they are admitted into main memory for execution?

- (a) Job Pool
- (b) Process Table
- (c) Ready Queue
- (d) Cache Memory
- (e) Stack

Ans.(a)

Q24. Which SQL operator is used to filter rows by checking whether a value matches any value in a specified list?

- (a) BETWEEN
- (b) IN
- (c) LIKE
- (d) EXISTS
- (e) DISTINCT

Ans.(b)

Q25. Which of the following statements regarding mutual exclusion in operating systems is false?

- (a) No two processes can execute in their critical sections simultaneously.
- (b) Multiple processes can safely access a shared critical resource simultaneously without synchronization.
- (c) Processes outside the critical section should not interfere with processes inside the critical section.
- (d) Mutual exclusion helps prevent race conditions during shared resource access.
- (e) Only one process is allowed to access a critical resource at a time.

Ans.(b)

Q26. According to Fitts's Law, what factor significantly affects the time required to move a cursor to a target on the screen?

- (a) The color of the target
- (b) The size of the cursor
- (c) The distance to the target and the size of the target
- (d) The screen resolution
- (e) The type of input device used

Ans.(c)

Q27. Which of the following is the most fundamental benefit provided by inheritance in object-oriented programming?

- (a) Faster execution of programs
- (b) Enhanced code readability
- (c) Increased code reusability
- (d) Simplified debugging process
- (e) Improved memory management

Ans.(c)

Q28. Which of the following best describes the function of the z-index property in CSS?

- (a) It determines the horizontal position of an element.
- (b) It specifies the vertical position of an element.
- (c) It controls the stacking order of elements along the z-axis.
- (d) It adjusts the opacity of an element.
- (e) It sets the font size of an element.

Ans.(c)

Q29. Which of the following is an aggregate function in SQL?

- (a) CONCAT()
- (b) AVG()

- (c) SUBSTRING()
- (d) LENGTH()
- (e) NOW()

Ans.(b)

Q30. Which of the following statements regarding Super Key and Primary Key is incorrect?

- (a) Every primary key is a super key.
- (b) A super key may contain additional attributes not required for unique identification.
- (c) A table can have multiple super keys.
- (d) Every super key is selected as the primary key of a table.
- (e) A primary key uniquely identifies each record in a table.

Ans.(d)

Q31. Which of the following is a valid use of the netsh command in Windows?

- (a) To modify network interface settings.
- (b) To create a new directory.
- (c) To open the Task Manager.
- (d) To install a software application.
- (e) To check the system temperature.

Ans.(a)

Q32. Consider the following Java code snippet:

```
public class Main
{
    public static void main(String[] args)
    {
        String str = "2237\u003456\u007891" + "011";
        int length = str.length();

        System.out.println("Length of the string : " + length);
    }
}
```

What will be the output of the program?

- (a) Length of the string : 19
- (b) Length of the string : 13
- (c) Length of the string : 17
- (d) Length of the string : 9
- (e) Compilation Error

Ans.(d)

Q33. Which type of DDoS attack uses spoofed ICMP echo requests sent to broadcast addresses, causing multiple systems to flood the victim with ICMP reply packets?

- (a) SYN Flood
- (b) Ping of Death

- (c) Smurf Attack
- (d) DNS Amplification
- (e) UDP Flood

Ans.(c)

Q34. Which of the following statements regarding the #define directive in C is incorrect?

- (a) #define can be used to create symbolic constants.
- (b) #define can define function-like macros with parameters.
- (c) Macros created using #define are expanded by the preprocessor before compilation.
- (d) #define can be used to create multi-line macros using the backslash \ continuation character.
- (e) #define macros provide automatic type checking similar to C functions.

Ans.(e)

Q35. Which of the following commands in Linux is primarily used for network scanning and security auditing?

- (a) netset
- (b) tcpdump
- (c) ifconfig
- (d) nmap
- (e) traceroute

Ans.(d)

Q36. In MongoDB, which feature is particularly useful for ensuring data availability and reliability in case of hardware failure or network issues?

- (a) Sharding
- (b) Indexing
- (c) Replication
- (d) Aggregation
- (e) Caching

Ans.(c)

Q37. Identify the local link address from the following IPv6 addresses:

- (a) 2001:0db8:abcd:0012:0000:0000:0000:0001
- (b) FE80:0000:0000:0000:0202:B3FF:FE1E:8329
- (c) FF02:0000:0000:0000:0000:0000:0000:0001
- (d) ::1
- (e) 2001:4860:4860::8888

Ans.(b)

Q38. If set A has 4 elements and set B has 5 elements, then find the total number of elements in the Cartesian product $A \times B$:

- (a) 9
- (b) 45
- (c) 20

- (d) 54
- (e) None of the above

Ans.(c)

Q39. Salesforce CRM is an example of which cloud service model?

- (a) Infrastructure as a Service (IaaS)
- (b) Platform as a Service (PaaS)
- (c) Software as a Service (SaaS)
- (d) Database Management System (DBMS)
- (e) None of the above

Ans.(c)

Q40. How is the salting technique used in hashing for enhanced security?

- (a) It converts plain text into hashed text using the MD5 algorithm without adding any extra data.
- (b) It adds a random value to the input data before hashing to make each hash unique.
- (c) It encrypts the hashed data using a symmetric encryption algorithm.
- (d) It stores the hash directly without any modification or additional data.
- (e) It compresses the hash to reduce storage space.

Ans.(b)

Q41. If you are unable to connect to a website despite having a working internet connection, which of the following is most likely the reason?

- (a) DNS server is down or misconfigured
- (b) The website's IP address has changed recently
- (c) Browser cache is not cleared
- (d) Incorrect firewall settings
- (e) Outdated operating system

Ans.(a)

Q42. What happens during a cache hit in a computer system?

- (a) Data is transferred directly to the hard drive
- (b) Data is fetched from main memory into the cache
- (c) Requested data is retrieved directly from the cache memory
- (d) Data is permanently stored in the cache
- (e) The cache memory is cleared

Ans.(c)

Q43. Which of the following Excel formulas performs a calculation only when cell A1 contains a value-type entry, and otherwise returns 0?

- (a) =IF(CELL("contents",A1)="v",A1*2,0)
- (b) =IF(CELL("format",A1)="v",A1*2,0)
- (c) =IF(CELL("type",A1)="v",A1*2,0)
- (d) =IF(CELL("address",A1)="v",A1*2,0)
- (e) =IF(CELL("col",A1)="v",A1*2,0)

Ans.(c)

Q44. Which of the following is a condition that occurs in computer systems when the system spends more time in swapping data between RAM and the hard drive than executing actual tasks?

- (a) Deadlock
- (b) Thrashing
- (c) Starvation
- (d) Fragmentation
- (e) Bottleneck

Ans.(b)

Q45. Under standard DBMS transaction theory used in basic SQL classification, which of the following commands is generally rollback-able before COMMIT?

- (a) SELECT
- (b) COMMIT
- (c) DELETE
- (d) CREATE
- (e) ALTER

Ans.(c)

Q46. What is the tcpdump command in Linux used for?

- (a) To capture and analyze network packets.
- (b) To display disk usage statistics.
- (c) To monitor CPU and memory usage.
- (d) To manage user accounts.
- (e) To create and manage cron jobs.

Ans.(a)

Q47. In a relational database, which term represents a missing, unknown, or unavailable attribute value?

- (a) Empty table
- (b) Derived value
- (c) Null value
- (d) Default value
- (e) Zero value

Ans.(c)

Q48. Consider the following C code snippet:

```
#include <stdio.h>

int main() {

    FILE *file = fopen("example.txt", "r");

    if (file == NULL) {
        printf("Error opening file.\n");
        return 1;
    }

    int ch;

    while ((ch = fgetc(file)) != EOF) {
        putchar(ch);
    }

    if (feof(file)) {
        printf("\nEnd of file reached.\n");
    }

    fclose(file);

    return 0;
}
```

What is the purpose of the feof(file) function call in this program?

- (a) To read the next character from the file stream
- (b) To determine whether the end-of-file indicator for the file stream has been set
- (c) To close the file after all characters are read
- (d) To move the file pointer to the beginning of the file
- (e) To open the file in read mode

Ans.(b)

Q49. A Class B network with default mask /16 is subnetted using the mask /20. Assuming modern subnetting rules where subnet-zero is allowed, how many subnets are created?

- (a) 8
- (b) 16
- (c) 32
- (d) 64
- (e) 256

Ans.(b)

Q50. Which feature of an L2 switch allows network administrators to segment a network into multiple broadcast domains, each behaving like a separate network?

- (a) Spanning Tree Protocol (STP)
- (b) Port Mirroring
- (c) VLAN (Virtual Local Area Network)
- (d) Link Aggregation
- (e) QoS (Quality of Service)

Ans.(c)

Q51. Which of the following RF connectors is commonly used with coaxial cables for high-frequency signal transmission?

- (a) BNC
- (b) HDMI
- (c) RJ45
- (d) DVI
- (e) PS/2

Ans.(a)

Q52. A repeater works at which of the following layers in the OSI model?

- (a) Physical Layer
- (b) Data Link Layer
- (c) Network Layer
- (d) Transport Layer
- (e) Application Layer

Ans.(a)

Q53. Which statement correctly describes the functionality of the `var_dump()` function in PHP?

- (a) It assigns default values to one or more variables during execution.
- (b) It dumps information about one or more variables, including their type and value.
- (c) It formats and logs error messages for debugging purposes.
- (d) It creates a new variable and sets its data type automatically.
- (e) It initializes arrays and objects for further processing.

Ans.(b)

Q54. Which of the following functions is not declared in `<stdio.h>`?

- (a) `printf()`
- (b) `scanf()`
- (c) `fopen()`
- (d) `sqrt()`
- (e) `fprintf()`

Ans.(d)

Q55. Which sorting algorithm has a worst-case time complexity of $O(n^2)$?

- (a) Merge Sort

- (b) Radix Sort
- (c) Bubble Sort
- (d) Heap Sort
- (e) None of the above

Ans.(c)

Q56. What is the maximum number of elements present simultaneously in the operand stack while evaluating the postfix expression:

$6\ 2\ 3\ +\ -\ 3\ 8\ 2\ /\ +\ *$

- (a) 1
- (b) 2
- (c) 3
- (d) 4
- (e) None of the above

Ans.(d)

Q57. Which of the following algorithms is not used for finding a Minimum Spanning Tree ?

- (a) Kruskal's Algorithm
- (b) Prim's Algorithm
- (c) Borůvka's Algorithm
- (d) Bellman-Ford Algorithm
- (e) Reverse-Delete Algorithm

Ans.(d)

Q58. Which ACID property ensures that a transaction brings the database from one valid state to another, maintaining all predefined rules?

- (a) Atomicity
- (b) Consistency
- (c) Isolation
- (d) Durability
- (e) None of the above

Ans.(b)

Q59. Which schema model is widely used in traditional data warehouse design for organizing fact tables and dimension tables?

- (a) Star schema
- (b) Mesh schema
- (c) Hierarchical schema
- (d) Graph schema
- (e) None of the above

Ans.(a)

Q60. Which authorization framework is commonly used in modern web applications to enable token-based access and is often integrated into Single Sign-On (SSO) systems?

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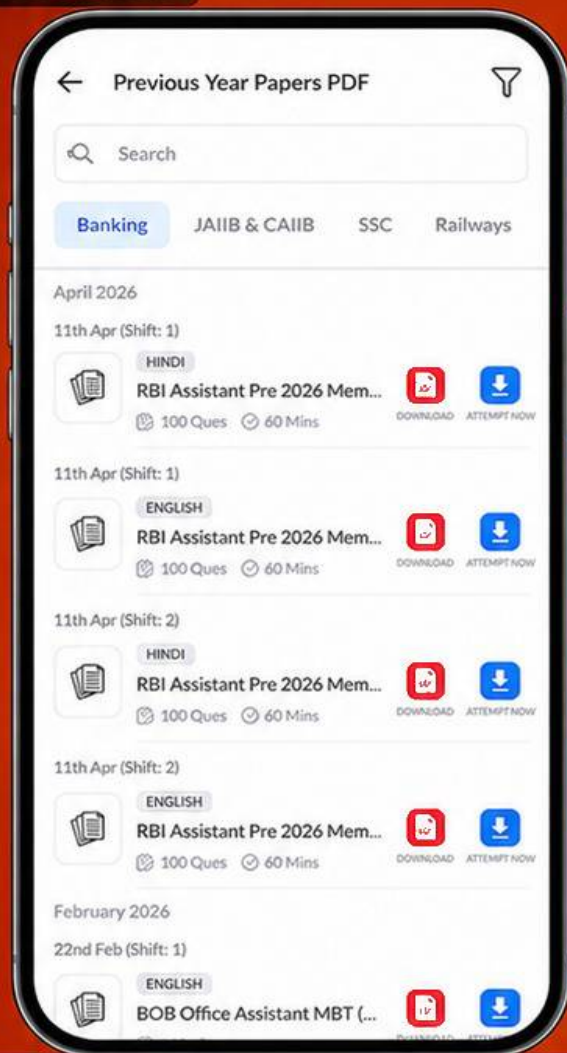
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-
- (a) Secure Sockets Layer
 - (b) Kerberos
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Ans.(c)