093/2025

Question Booklet Alpha Code **A**

Question Booklet Serial Number

Total No. of questions : 100 Time : 1 Hour 30 Minutes

Maximum : 100 Marks

INSTRUCTIONS TO CANDIDATES

1. The question paper will be given in the form of a Question Booklet. There will be four versions of question booklets with question booklet alpha code viz. A, B, C & D.
2. The Question Booklet Alpha Code will be printed on the top left margin of the facing sheet of the question booklet.
3. The Question Booklet Alpha Code allotted to you will be noted in your seating position in the Examination Hall.
4. If you get a question booklet where the alpha code does not match to the allotted alpha code in the seating position, please draw the attention of the Invigilator IMMEDIATELY.
5. The Question Booklet Serial Number is printed on the top right margin of the facing sheet. If your question booklet is un-numbered, please get it replaced by new question booklet with same alpha code.
6. The question booklet will be sealed at the middle of the right margin. Candidate should not open the question booklet, until the indication is given to start answering.
7. Immediately after the commencement of the examination, the candidate should check that the question booklet supplied to him contains all the 100 questions in serial order. The question booklet does not have unprinted or torn or missing pages and if so he/she should bring it to the notice of the Invigilator and get it replaced by a complete booklet with same alpha code. This is most important.
8. A blank sheet of paper is attached to the question booklet. This may be used for rough work.
9. **Please read carefully all the instructions on the reverse of the Answer Sheet before marking your answers.**
10. Each question is provided with four choices (A), (B), (C) and (D) having one correct answer. Choose the correct answer and darken the bubble corresponding to the question number using Blue or Black Ball-Point Pen in the OMR Answer Sheet.
11. **Each correct answer carries 1 mark and for each wrong answer 1/3 mark will be deducted. No negative mark for unattended questions.**
12. No candidate will be allowed to leave the examination hall till the end of the session and without handing over his/her Answer Sheet to the Invigilator. Candidates should ensure that the Invigilator has verified all the entries in the Register Number Coding Sheet and that the Invigilator has affixed his/her signature in the space provided.
13. Strict compliance of instructions is essential. Any malpractice or attempt to commit any kind of malpractice in the Examination will result in the disqualification of the candidate.

093/2025

Maximum : 100 marks

Time : 1 hour and 30 minutes

1. Let p and q be two propositions. Then $\neg(p \rightarrow q)$ is logically equivalent to :

(A) $p \wedge q$ (B) $p \wedge \neg q$

(C) $\neg p \wedge q$ (D) $\neg p \wedge \neg q$

2. The number of students who take both the subjects mathematics and chemistry is 30. This represents 10% of the enrollment in mathematics and 12% of the enrollment in chemistry. How many students take atleast one of these two subjects?

(A) 520 (B) 490

(C) 560 (D) 480

3. Let $A = \{x : x \in \mathbb{R},\ |x| < 1\}$, $B = \{x : x \in \mathbb{R},\ |x - 1| \geq 1\}$ and $A \cup B = \mathbb{R} - D$, where $\mathbb{R}$ is the set of real numbers, then the set D is

(A) $\{x : x \in \mathbb{R},\ 1 < x < 2\}$ (B) $\{x : x \in \mathbb{R},\ 1 \leq x \leq 2\}$

(C) $\{x : x \in \mathbb{R},\ 1 \leq x < 2\}$ (D) $\{x : x \in \mathbb{R},\ 1 < x \leq 2\}$

4. Let $\mathbb{Z}$ be the set of all integers. Define a relation R on $\mathbb{Z}$ by

$R = \{(a, b) : a - b \text{ is divisible by } 3\}$

and a relation S on $\mathbb{Z}$ by

$S = \{(a, b) : a + b \text{ is divisible by } 3\}$

Then which of the following statements is true?

(A) R and S are equivalence relations

(B) R is an equivalence relation but S is not

(C) S is an equivalence relation but R is not

(D) R and S are not equivalence relations

5. If A and B are two sets having 3 and 4 elements respectively and they are having 2 elements in common, then the number of relations which can be defined from A to B is :

(A) 2^7 (B) 2^{12}

(C) $2^7 - 2$ (D) $2^{12} - 2$

6. Three light bulbs are chosen at random from 15 bulbs of which 5 are defective. Then the probability of getting exactly one is defective is :

(A) $\frac{24}{91}$ (B) $\frac{27}{91}$

(C) $\frac{45}{91}$ (D) $\frac{67}{91}$

7. The probability that a student will pass the final examination in both the subjects English and Hindi is 0.5 and the probability of passing neither of the subjects is 0.1. If the probability of passing the English examination is 0.75, then what is the probability of passing the Hindi examination?

(A) 0.65 (B) 0.9

(C) 0.6 (D) 0.95

8. Two digits are selected at random from the digits 1 through 9. If the sum is even, then the probability that both numbers are odd is :

(A) $\frac{2}{9}$ (B) $\frac{2}{5}$

(C) $\frac{5}{9}$ (D) $\frac{5}{8}$

9. A man is known to speak truth 3 out of 4 times. He throws a die and reports that it is a six. Then the probability that it is actually a six is :

(A) $\frac{3}{8}$ (B) $\frac{1}{6}$

(C) $\frac{5}{6}$ (D) $\frac{3}{4}$

10. If the variables X and Y are connected by the equation $3X + 4Y + 5 = 0$, then the coefficient of correlation between them is :

(A) 1 (B) –1

(C) 0 (D) $\frac{1}{2}$

11. The coefficient of correlation between the variables X and Y is 0.6 and their covariance is 4.8. If the variance of X is 9, then the S.D. of Y is :

(A) $\frac{0.6}{4.8 \times 3}$ (B) $\frac{3}{4.8 \times 0.6}$

(C) $\frac{4.8}{3 \times 0.6}$ (D) $\frac{4.8}{9 \times 0.6}$

12. Let $X_1, X_2, ..., X_n$ be a random sample taken from a population with mean value μ and standard deviation σ. Then the variance of the sample mean $\overline{X}$ is :

(A) $\frac{\sigma}{\sqrt{n}}$ (B) $\frac{\sigma}{n}$

(C) $\frac{\sigma^2}{n^2}$ (D) $\frac{\sigma^2}{n}$

13. A simplified sum of product expression for the Boolean function $f(A, B, C, D) = \sum(1, 3, 7, 11, 15) + d(0, 2, 5)$, where d stands for dont-care conditions, is :

(A) $A'B + CD$ (B) $A'D + CD$

(C) Both (A) and (B) (D) None of the above

14. A decoder circuit with an enable input can also work as a :

(A) Multiplexer (B) Demultiplexer

(C) Encoder (D) None of the above

15. An SR flip-flop with an inverter in the R input is :

(A) JK flip-flop (B) T flip-flop

(C) D flip-flop (D) Master-slave flip-flop

16. The hexadecimal number 23.6A is equivalent to :

(A) $(103.322)_8$ (B) $(42.324)_8$

(C) $(43.326)_8$ (D) $(42.326)_8$

17. The sign-magnitude and 2's complement representations of –114 are :

(A) 11110010 and 10001110 (B) 11110010 and 11001110

(C) 01110010 and 10001110 (D) None of the above

18. Average cache memory access time is measured using the formula :

(A) Number of misses * miss penalty (B) Hit time + miss rate * miss penalty

(C) Hit time + miss penalty (D) Hit rate + miss time * miss penalty

19. The bit associated with a cache block that signifies that the cache block is modified is called :

(A) Flag bit (B) Status bit

(C) Dirty bit (D) Reference bit

20. Which among the following processor registers facilitates the communication between the processor and the memory?

(A) PC (B) IR

(C) MAR (D) PC and MAR

21. When handling interrupts from multiple devices, which among the following methods is easy to implement?

(A) Interrupt nesting
(B) Polling
(C) Priority schemes
(D) Vectored interrupt

22. The interrupt handling mechanism where the device requesting the service identifies itself to the processor is called :

(A) Daisy chaining
(B) Polling
(C) Vectored interrupt
(D) Interrupt nesting

23. A highly encoded representation of control words that uses compact codes to specify control signals is called :

(A) Horizontal organization
(B) Vertical organization
(C) Hardwired organization
(D) None of the above

24. Which among the following page replacement algorithms suffers from Belady's anomaly?

(A) LRU
(B) Optimal page replacement
(C) FIFO
(D) LRU and FIFO

25. Banker's algorithm is used for :

(A) Deadlock avoidance
(B) Deadlock prevention
(C) Recovering from deadlock
(D) None of the above

26. The atomic operations performed by semaphores are :

(A) Wait, signal
(B) Wait, stop
(C) Signal, stop
(D) Signal, wake

27. During context switch the following information need not be saved?

(A) Program counter
(B) Translation look ahead buffer
(C) General purpose registers
(D) All of the above

28. The sorting technique in which the smallest element from the unsorted sublist is swapped with the element at the beginning of the unsorted sublist is :

(A) Selection Sort
(B) Insertion Sort
(C) Quick Sort
(D) Bubble Sort

29. Assume that a stack is implemented with an array of size SIZE. If the array index starts from 0, the stack underflow can be identified using the condition :

(A) top = SIZE
(B) top = SIZE –1
(C) top = 0
(D) top = –1

30. Which among the following linked lists suffers from the problem of infinite traversal?

(A) Single linked list
(B) Circular linked list
(C) Double linked list
(D) Linked list with header node

31. Depth first algorithm can be implemented using :

(A) Heap
(B) Stack
(C) Queue
(D) Deque

32. Assume that a complete binary tree is represented using an array. For a node whose position is k, its right child can be found at position _____ (Assume that the array index begins from 1).

(A) $k + 1$
(B) $2k$
(C) $2k - 1$
(D) $2k + 1$

33. A binary search tree is constructed out of the keys 5, –1, 12, 30, 15, 2, –87. The inorder traversal of this tree is :

(A) 5, –1, 2, 30, 15, 12, –87
(B) 5, 2, –1, 15, 30, 12, –87
(C) –87, –1, 2, 5, 12, 15, 30
(D) –1, 2, 5, 30, 12, 15, –87

34. All macro substitutions in a C program are carried out :

(A) Before compilation of the program
(B) After compilation
(C) During the execution of the program
(D) None of the above

35. Which of the following is not a logical operator?

(A) &&
(B) !
(C) |
(D) ||

36. Which of the following is not a storage class specifier in C?

(A) auto
(B) volatile
(C) register
(D) static

37. The indirection operator used in C is :

(A) &
(B) ->
(C) *
(D) ?:

38. Assuming that a pointer to a structure variable is declared, the operator used to access the members of the structure variable using the pointer is :

(A) .
(B) ->
(C) –
(D) ^

39. Which among the following statements are correct?

I. In C++, by default all data items defined in a class are Public

II. In C++, by default all data items defined in a class are Private

III. In Java, by default all data items defined in a class are Private within the class.

(A) I and III (B) II only

(C) II and III (D) III only

40. What is the output of the following C++ program?

```
#include <iostream>
using namespace std;
class A {
    int a;
    public:
      A(int j) {
          a = j;
      }
     int geta() {
      return a;
     }
};
int main()
{
     A ob = 17;
     cout <<ob.geta();
     return 0;
}
```

(A) Compilation error (B) Runtime error

(C) 17 (D) 0

41. Which among the following statements about a static member function in C++ is wrong?

I. A static member function can be declared as **const** or **volatile**

II. A static member function does not have a **this** pointer

III. Static member functions are used to pre-initialize private static data before any object is actually created.

(A) I only (B) II and III

(C) II only (D) None of the above

42. Which among the following statements about the dynamic memory allocation in C++ are true?

I. C++ does not support **malloc()** and **free()**; instead of them C++ provide **new()** and **delete()** operators.

II. C++ supports **malloc()** and **free()**, as well as **new()** and **delete()** operators.

III. The **new()** operator automatically allocates enough memory to hold an object of the specified type.

(A) II only
(B) I and III
(C) II and III
(D) I only

43. Consider the following C++ code :

```
#include<iostream>
using namespace std;
class A{
        protected;
            int i;
        public:
            void seti(int x){
                i = x;
            }
};
class B : protected A{
};
int main() {
            B b;
            b.seti(20);
            cout<<"Hai \n";
            return 0;
}
```

What will be the output of the above program?

(A) Hai
(B) Compilation Error
(C) 0
(D) 20

44. Consider the following C++ code :

```
#include<iostream>
using namespace std;
class A{
    public:
        virtual void vf(){
            cout<<"Hello from Base Class\n";
        }
};
class B : public A{
   public :
      void vf(){
         cout<<"Hello from Derived class \n";
      }
};
int main(){
   A *p;
   B b;
   p = &b;
   p->vf();
   return 0;
}
```

What will be the output of the above program?

(A) Hello from Base Class
(B) Compilation Error
(C) Run Time Error
(D) Hello from Derived Class

45. Which of the following statements are true about input-output operations in Java?

I. The two abstract classes at the top of the byte stream class hierarchy are **InputStream** and **OutputStream**.

II. The two abstract classes at the top of the character stream class hierarchy are **Reader** and **Writer**.

III. The **System** class in the **java.lang** package contains a stream variable **err**, which is defined as **final** in this class.

(A) All the above
(B) I and II
(C) I and III
(D) II and III

46. Which of the following statements are true about serialization in Java?

I. Serialization is the process of writing the state of an object to a byte stream.

II. Variables that are declared static or transient can be saved by the process of serialization.

III. Variables that are declared static or transient are not saved by the process of serialization.

(A) I only
(B) I and III
(C) I and II
(D) III only

47. Which of the following statements are true about multi-threading in Java?

I. Multi-threaded programming in Java can be implemented by implementing the Runnable interface.

II. Multi-threaded programming in Java can be implemented by extending the Thread class.

III. Inter-thread communication in Java is implemented with the help of **wait()**, **notify**() and **notifyAll()** methods.

(A) I only
(B) I and II
(C) II and III
(D) All the above

48. Which of the following statements are true about applets in Java?

I. AWT-based applets inherit from the Applet class, whereas Swing-based applets inherit from the JApplet class.

II. The execution of an applet begins with the main() method.

III. Both <APPLET> and <OBJECT> tags in HTML can be used to deploy a Java applet.

(A) I only
(B) II and III
(C) I and III
(D) All the above

49. Which of the following statements are true about applets in Java?

I. The init() method in an applet is called only once during its lifetime.

II. The start() method is used to restart an applet after it has been stopped.

III. The destroy() method is called when an applet is inactive.

(A) I and II
(B) I only
(C) II and III
(D) All the above

50. Which of the following statements are true about multi-threaded programming in Java?

I. Thread synchronization in Java is primarily implemented using **monitors**.

II. Thread synchronization in java is primarily implemented using **semaphores**.

III. The **sleep()** method in a multithreaded Java program is used to pause the currently executing thread for a specified amount of time in milliseconds and optionally, in nanoseconds

(A) I only
(B) II and III
(C) I and II
(D) I and III

51. You are modeling a "Works_On" relationship between employee and project. Each employee can work on multiple projects and each project can have multiple employees. If the relationship includes an attribute "hours_worked", how should this be represented?

(A) Add "hours_worked" as an attribute of employee
(B) Add "hours_worked" as a derived attribute of project
(C) Add "hours_worked" as an attribute of the works_On relationship
(D) Create a new entity called "Hours"

52. Let $R(A,B,C,D)$ be a relation with A and B together forming the primary key. Which of the following statement is true?

(A) A and B individually are also candidate keys
(B) A or B must be foreign keys
(C) A and B together form a super key
(D) C and D can never be part of any key

53. A relation $R(A,B,C)$ has FDs:

$A \rightarrow B$

$B \rightarrow C$

$C \rightarrow A$

Which of the following is true?

(A) A is the only candidate key
(B) Any attribute can be a candidate key
(C) The relation is in 1NF but not in 2NF
(D) The relation violate BCNF due to transitive dependencies

54. Which of the following will not help in avoiding update anomalies?

(A) Eliminating multivalued dependencies
(B) Removing partial dependencies
(C) Having foreign keys
(D) Decomposing into BCNF relations

55. Which of the following SQL queries will **return NULL** if there are no matching rows?

(A) SELECT COUNT (*) FROM Orders WHERE status = 'delivered';

(B) SELECT SUM (amount) FROM Orders WHERE status = 'cancelled';

(C) SELECT COUNT (amount) FROM Orders WHERE status = 'cancelled';

(D) SELECT COUNT (1) FROM Orders WHERE status = 'cancelled';

56. Which is true about this query?

SELECT department, SUM (salary)

FROM employees

GROUP BY department

WHERE salary > 50000;

(A) Returns total salary per department for salaries > 50000

(B) Gives syntax error due to WHERE after GROUP BY

(C) Executes successfully

(D) WHERE must be replaced with HAVING to work

57. Given:

SELECT COUNT (*), COUNT (column_name)

FROM table_name;

Which is always true, regardless of table content?

(A) COUNT () = COUNT (column_name)

(B) COUNT (column_name) ≥ COUNT ()

(C) COUNT (*)≥ COUNT (column_name)

(D) They are always equal if column is not nullable

58. Which of the following queries returns employees who earn more than some employee in department 10?

(A) salary > ALL (SELECT salary FROM Employees WHERE dept_id = 10)

(B) salary = (SELECT MIN (salary) FROM Employees WHERE dept_id = 10)

(C) salary > ANY (SELECT salary FROM Employees WHERE dept_id = 10)

(D) salary IN (SELECT salary FROM Employees WHERE dept_id = 10)

59. Which of the following best describes a materialized view?

(A) A view stored as a permanent index

(B) A temporary result that is discarded after execution

(C) A physically stored copy of the result set that is periodically refreshed

(D) A system view provided by the DBMS

60. Consider the query:

SELECT * FROM A LEFT JOIN B ON A. id = B. id WHERE B. id IS NULL;

What does this return?

(A) Rows common to both A and B

(B) Rows in A with no matching row is B

(C) Rows in B with no matching row in A

(D) Rows in A and B with NULLs in both

61. Which of the following schedules is conflict-serializable?

(A) T1 reads A; T2 writes A

(B) T1 writes A; T2 read A

(C) T1 writes A; T2 writes A

(D) T1 read A; T2 reads A

62. Consider the schedule:

T1 : Read (A), Write (A)

T2 : Read (A), Write (A)

If both transactions execute concurrently and commit, which anomaly may occur?

(A) Phantom read

(B) Lost update

(C) Dirty read

(D) Deadlock

63. In a three-tier web application, which of the following is a valid reason for using a middle tier?

(A) To increase the response time of the database

(B) To allow direct access to the database from the client

(C) To enforce business rules and isolate client from data logic

(D) To avoid session management

64. Consider the following HTML code:

<form method = “post” action = “process.php”>

<input type = “text” name = “user”/>

<input type = “submit”/>

</form>

What is the way in PHP to retrieve the value of user?

(A) $ user = $_GET [‘user’];

(B) $ user = $_POST [‘user’];

(C) $ user = $_REQUEST [‘user’];

(D) Both (B) and (C)

65. In *VBScript*, what is the scope of a variable declared with Dim inside a procedure?

(A) Global
(B) Static
(C) Procedure-level
(D) Object-level

66. In JSP, which object is not implicitly available?

(A) Request
(B) Session
(C) Config
(D) Application context

67. In AJAX, which of the following best describes the use of

XMLHttpRequest. readyState = = 4 &&

XMLHttpRequest. status = = 200

(A) Data is being sent
(B) The server is unreachable
(C) Request completed successfully
(D) Request failed

68. Which of the following PHP functions is used to prevent SQL injection in form data?

(A) addslashes ()
(B) mysqli_real_escape_string()
(C) stripslashes()
(D) htmlspecialchars()

69. Which of the following correctly represents a benefits of using *SignalR* over traditional polling in web applications?

(A) It provides real-time two-way communication using transport negotiation
(B) It uses only WebSockets for communication
(C) It reduces the server load by keeping connections open forever
(D) It automatically scales across databases

70. What does the following *JavaScript* code output?

```
let a = [1, 2, 3];
let b = a. map (x => x * x);
console. log (type of b == typeof a &&
Array.isArray (b));
```

(A) True
(B) False
(C) Object
(D) Error

71. In XML, which of the following will cause a well-formedness error?

(A) Attribute values not enclosed in quotes
(B) Use of comments
(C) Having multiple root elements
(D) Both (A) and (C)

72. In AJAX with fetch( ), what happens if the server returns a 404 status code?

(A) The then( ) block is still executed, with response.ok as false

(B) The catch block is invoked automatically

(C) An exception is thrown

(D) The browser redirects to an error page

73. What is the output of the following *Javascript* expression?

console.log("5" + 1 * "2");

(A) 511 (B) 52

(C) 7 (D) NaN

74. Which of the following ASP.NET features allows state to be preserved across page requests without using cookies or URL rewriting?

(A) Session (B) ViewState

(C) TempData (D) QueryString

75. Consider a TCP connection where the sender has a Maximum Segment Size (MSS) of 1500 bytes. The Round-Trip Time (RTT) is 200 milliseconds. The initial congestion window is set to 1 MSS and the receiver's advertised window size is 12,000 bytes. Assuming slow start phase, how many Round-Trip Times (RTTs) will it take for the congestion window to reach the size of the receiver's advertised window?

(A) 16 (B) 8

(C) 4 (D) 2

76. Which scenario best illustrates the benefit of using the Kerberos protocol for authentication in a networked environment?

(A) A user can access multiple network services securely without needing to repeatedly enter their credentials.

(B) The network administrator can manually distribute passwords to all users.

(C) A user can directly connect to another user's device without any intermediary.

(D) The system can automatically detect and remove unauthorized devices from the network.

77. An email client uses the IMAP protocol to access a mail server. The user checks their email every 10 minutes. Each email synchronization session transfers an average of 200 KB of data. The user is active for 8 hours a day. How many synchronization sessions occur in one day and how much data is transferred in total during these sessions in one day?

(A) 19.2 MB (B) 9.6 MB

(C) 4.8 MB (D) 2.4 MB

78. Which of the following best explains how the Domain Name System (DNS) improves the user experience on the internet?

(A) DNS encrypts user data to ensure secure communication between clients and servers.

(B) DNS provides direct connections between user devices, bypassing servers for faster communication.

(C) DNS monitors and regulates internet traffic to prevent network congestion.

(D) DNS translates human-readable domain names into IP addresses, allowing users to access websites using easy-to-remember names.

79. Consider a CSMA/CD networks that transmits data at a rate of 80 Mbps (1 Mbps $=10^6$ bits per second) over a 1 kilometer cable with no repeaters. If the minimum frame size is 1 KB (kilobyte), what is the signal speed in the cable (in kilometres/second) :

(A) 20000 (B) 10000

(C) 5000 (D) 4000

80. Assume you have a plaintext block of 8 bits that you want to encrypt using DES. The initial permutation is as follows :

2 4 6 8 3 5 1 7

If the plaintext block is P = 10101010 (binary), what text is obtained by performing the initial permutation (IP) on P?

(A) 00100111 (B) 11100100

(C) 11001010 (D) 00001111

81. In a TFTP implementation using UDP sockets, which statements best describes how the protocol handles reliability and error recovery?

(A) TFTP relies on TCP for reliable data delivery and error recovery.

(B) TFTP uses UDP for fast data transfer and relies on application-layer acknowledgements and retransmissions for reliability.

(C) TFTP ensures reliability by encrypting data packets to prevent loss during transmission.

(D) TFTP utilizes IP checksums to verify packet integrity and ensures error-free data transfer.

82. In the context of TLS (Transport Layer Security), why is Perfect Forward Secrecy (PFS) considered an important feature for securing communications? Choose the most appropriate reason from the options below :

(A) PFS prevents replay attacks by ensuring that each session key is unique and not reused.

(B) PFS ensures that if a private key is compromised, previously encrypted communications remain secure.

(C) PFS protects against man-in-the-middle attacks by ensuring that session keys are ephemeral and not stored.

(D) PFS guarantees that all data exchanged during a session remains confidential and encrypted.

83. Consider the following Python code snippet for a simple client-server interaction using sockets :

```
# Server side
import socket
server_socket = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
server_socket.bind(('localhost', 12345))
server_socket.listen(5)
print("Server is listening on port 12345")
client_socket, client_address = server_socket.accept()
print(f"Connection established with {client_address}")
client_message = client_socket.recv(1024).decode()
print(f"Received message from client: {client_message}")
client_socket.sendall("Hello from server!".encode())
client_socket.close()
server_socket.close()
```

Which statement accurately describes the code snippet above?

(A) The server listens for incoming TCP connections on port 12345 and sends a response to the client after receiving a message.

(B) The server sends a UDP broadcast message to all clients listening on port 12345 and closes the connection.

(C) The server establishes a secure TLS connection with the client using certificates stored in local directory.

(D) The server uses HTTP protocol to handle GET requests and responses for web applications.

84. Assume you are testing the task management API implemented in Flask. You send a POST request to create a new task with the following JSON payload :

```
{
    "title": "Task 3",
    "description": "This is task 3."
}
```

If the current state of tasks in the server is as follows :

```
tasks = [
    {'id': 1, 'title': 'Task 1', 'description': 'This is task 1.', 'done': False},
    {'id': 2, 'title': 'Task 2', 'description': 'This is task 2.', 'done': False},
]
```

After successfully creating the new task, what will be the total number of tasks stored on the server?

(A) 2 (B) 3

(C) 4 (D) 5

85. In the Kerberos authentication protocol, which of the following statements accurately describes the purpose of the Ticket Granting Ticket (TGT) and the Service Ticket?

(A) The TGT is used by the client to request access to network resources, while the Service Ticket is used by the Key Distribution Center (KDC) to verify the client's identity.

(B) The TGT is used by the client to request access to network resources, while the Service Ticket is issued by the KDC to grant access to specific services on behalf of the client.

(C) The TGT is used by the KDC to authenticate network services, while the Service Ticket is used by the client to establish a secure channel with the KDC.

(D) The TGT is used by the KDC to issue certificates to clients, while the Service Ticket is used by network administrators to monitor user activity.

86. In an RSA encryption system, suppose a message $M = 64$ is encrypted using RSA with a public key (e, n) where $e = 17$ and $n = 31$. If the cipher text C is calculated as $C = M^e \bmod n$, What is the value of C?

(A) 4 (B) 5

(C) 6 (D) 11

87. Consider the following Python code snippet using the requests library to perform an HTTPS request :

```
import requests

url = 'https://api.example.com/data'

headers = {'Authorization': 'Bearer YOUR_ACCESS_TOKEN'}

response = requests.get(url, headers=headers)

print(response.status_code)
```

What security measure does HTTPS primarily provide in this context?

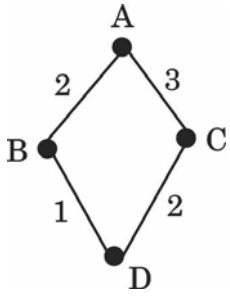
(A) Encrypts the HTTP request headers sent to the server.

(B) Encrypts the entire HTTP request and response data exchanged with the server.

(C) Verifies the client's identity using a digital certificate.

(D) Enforces access control policies on the server-side.

88. In an OSPF network, consider the following network topology with link costs represented as shown. If OSPF is used with each link cost representing the number of hops, what will be the shortest path cost from Router A to Router D?



(A) 3 (B) 4

(C) 5 (D) 6

89. In the classical waterfall life-cycle, which phase immediately precedes implementation?

(A) System testing (B) Requirements analysis

(C) Architectural design (D) Maintenance

90. Which clause is mandatory in a well-formed SRS as per IEEE 830?

(A) Project funding details
(B) Functional requirements
(C) Post-deployment marketing plan
(D) Corporate HR policy

91. A context model most commonly represents a system using :

(A) UML state-machine diagrams
(B) Level-0 data-flow diagrams
(C) Entity-relationship diagrams
(D) CRC cards

92. During a feasibility study, *economic feasibility* primarily evaluates :

(A) Algorithmic time complexity
(B) Return on investment and cost-benefit
(C) Regulatory compliance
(D) Staff morale impacts

93. Incremental development statements:

I. Early increments act as prototypes;
II. Functionality delivered in equal-sized increments;
III. Reduces risk vs waterfall.

Which are true?

(A) I only
(B) I and III only
(C) II and III only
(D) I, II and III

94. In object-oriented design, which pairing correctly matches a design principle with its goal?

(A) High cohesion $\rightarrow$ maximise dependencies
(B) Information hiding $\rightarrow$ expose private data
(C) Low coupling $\rightarrow$ minimise dependencies
(D) Inheritance $\rightarrow$ eliminate polymorphism

95. Validation and verification are distinct QA activities. Which activity-question pair is correct?

(A) Validation – "Are we building the product right?"
(B) Verification – "Are we building the right product?"
(C) Validation – acceptance testing with the customer
(D) Verification – beta release to end users

96. A hard real-time control system must ensure that :

(A) Outputs are eventually produced

(B) Average response time below a threshold

(C) Every deadline is met; a miss is catastrophic

(D) Throughput is maximised even if deadlines slip

97. Select the only combination always classed as behavioural models :

(A) Class diagrams + statecharts

(B) Statecharts + sequence diagrams

(C) Deployment diagrams + activity diagrams

(D) Object diagrams + data-flow diagrams

98. Which statement about design evolution and refactoring is FALSE?

(A) Continuous refactoring maintains low complexity

(B) Behaviour must be preserved

(C) Design patterns introduced only during initial design

(D) Regression tests support refactoring

99. For critical-system specification (e.g., nuclear reactor), which requirement property is essential?

(A) Ambiguity acceptable under time pressure

(B) Use formal notations to reduce misinterpretation

(C) UI aesthetics over safety proofs

(D) Informal prose alone suffices

100. Testing statements:

P : Mutation testing introduces small code changes;

Q : Boundary-value analysis targets edges of equivalence classes;

R : Path coverage guarantees freedom from all logical errors. Which of the above statements are true?

(A) P and Q only

(B) Q and R only

(C) P and R only

(D) P, Q and R

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