1. Consider the following statements:

1. A mouse listener can keep other mouse listeners from receiving a mouse event by invoking the consume() method on Mouse Event Object.

2. To enable events for a component, one must first invoke enableEvents() with the appropriate flags.
   Which of the above is/are correct?
   (a) 1 only
   (b) 2 only
   (c) Both 1 and 2
   (d) Neither 1 nor 2
   Answer: (d)

2. When an exception is thrown but not caught in a particular scope, the method-call stack is 'unwound', and an attempt is made to catch the exception in the next outer try block. This process is called:

(a) Rethrowing Exception
(b) Stack Unwinding
(c) Stack Unwounding
(d) Stack Tracing
Answer: (b)

3. Consider the following tables:

The result of the division LANGUAGES / CITY in relational algebra is:
(a) A table containing first three rows of LANGUAGES
(b) A table with a single column LANGUAGE and a single row "Hindi"
(c) A table with two columns CITY and LANGUAGE and a single row = "a", "Hindi"
(d) A table having the first, third and fifth rows of LANGUAGES
Answer: (b)

4. Consider the following statements regarding Second Normal Form (2NF):

1. A composite attribute is converted to individual attributes.

2. Non key attributes are functionally dependent on key attributes.

3. The non key attributes functionally dependent on not a part of key attributes.
   Which of the above is/are correct?
   (a) 1 only
   (b) 2 only
   (c) 3 only

(d) 1, 2 and 3
Answer: (b)

5. In a relation (table), if a non-key attribute is fully functionally dependent on composite key, then the relation (table) is in:

(a) DKNF (Domain Key Normal Form)
(b) BCNF (Boyce - Codd Normal Form)
(c) Fourth Normal Form
(d) Third Normal Form
Answer: (b)

6. Consider the following relational schema for a library database:

- Book (Title, Author, Catalog_no, Publisher, Year, Price)

- Collection (Title, Author, Catalog_no)

Functional Dependencies:

- Title, Author → Catalog_no

- Catalog_no → Title, Author, Publisher, Year

- Publisher, Title, Year → Price

Assume (Author, Title) is the key for both schemas. Which is correct?
(a) Both book and collection are in BCNF only
(b) Both book and collection are in 3NF only
(c) Book is in 2NF and collection is in 3NF
(d) Both book and collection are in 2NF only
Answer: (c)

7. The simple object model frequently used for database applications and easier to use than OLE DB is:

(a) ADO
(b) ASP
(c) XML
(d) ODBC
Answer: (a)

8. Which CPU scheduling algorithm suffers from starvation?

(a) Round Robin
(b) FCFS (First Come First Serve)
(c) SJF (Shortest Job First)

(d) Multilevel Queues
Answer: (c)

9. An OS uses swapping. A running process encounters a wait. What is the correct sequence of states to re-enter running stage?

(a) Blocked → Blocked-Ready → Blocked-suspended → Ready → Running
(b) Blocked-suspended → Blocked-Ready → Blocked → Ready → Running
(c) Ready → Running → Blocked → Ready → Running
(d) Blocked → Blocked-suspended → Blocked-Ready → Ready → Running
Answer: (d)

10. What is the maximum possible disk space for a cluster size of 2 Kbytes for MS-DOS disk system?

(a) 128 Mbytes
(b) 512 Mbytes
(c) 512 bytes
(d) 128 bytes
Answer: (a)

11. In C programming, the qualifiers 'signed' and 'unsigned' apply to:

1. Char

2. Float

3. Int

4. Double
   (a) 1 and 4
   (b) 2 and 3
   (c) 1 and 3
   (d) 2 and 4
   Answer: (c)

12. The complexity for: $T(n)=T(n-1)+nT(n)=T(n-1)+n$ is:

(a) O(log n)
(b) O(n^2)
(c) O(n log n)
(d) O(n)
Answer: (b)

13. Which one of the following algorithmic approaches is followed in Floyd-Warshall shortest path algorithm?

(a) Divide and Conquer
(b) Dynamic Programming
(c) Greedy
(d) Backtracking
Answer: (b)

14. ATM (Asynchronous Transfer Mode) is fundamentally a:

1. Circuit switching

2. Packet switching

3. Narrow band
   Which of the above is/are correct?
   (a) 1 only
   (b) 2 only
   (c) 1 and 2
   (d) 2 and 3
   Answer: (b)

15. Consider the following consistency semantics:

1. Writes to an open file by a user are visible immediately to other users who have this file open.

2. Only after closing and reopening the file do the changes become visible to other users.
   Which describes session semantics?
   (a) 1 only
   (b) 2 only
   (c) Both 1 and 2
   (d) Neither 1 nor 2
   Answer: (b)

16. Which system call results in creation of a child process in UNIX?

(a) exec
(b) fork
(c) wait
(d) exit
Answer: (b)

17. In context of scheduling, 'aging' is used to:

(a) Prevent deadlock
(b) Prevent thrashing
(c) Prevent process starvation
(d) Ensure mutual exclusion
Answer: (c)

18. Which one is not an advantage of distributed systems over centralized systems?

(a) Scalability
(b) Increased reliability
(c) Security
(d) Resource sharing
Answer: (c)

19. Which protocol is used for automatic assignment of IP addresses?

(a) ARP
(b) RIP
(c) DHCP
(d) ICMP
Answer: (c)

20. IPv6 address is:

(a) 32 bit
(b) 64 bit
(c) 128 bit
(d) 256 bit
Answer: (c)

21. In E-R diagrams, weak entity is represented by:

(a) Double rectangle
(b) Double oval
(c) Dashed rectangle
(d) Single rectangle
Answer: (a)

22. In relational database, redundancy can be avoided by:

(a) Normalization
(b) Denormalization
(c) Aggregation

(d) Generalization
Answer: (a)

23. Decomposition in database is:

(a) Breaking a schema into two or more schemas
(b) Clubbing two schemas
(c) Creating views
(d) Combining tables
Answer: (a)

24. Which protocol provides reliable end-to-end communication?

(a) UDP
(b) TCP
(c) IP
(d) ARP
Answer: (b)

25. A 3-bit R/2R DAC has a reference voltage of 5V. If binary input is 110 and R = 15 kΩ, what is output voltage?

(a) 0.375 V
(b) 3.75 V
(c) 4.25 V
(d) 4.28 V
Answer: (b)

26. A 8086 microprocessor is interfaced to 8253 programmable interval timer. The maximum number by which the clock frequency on one of the timers is divided by:

(a) 65535
(b) 32767
(c) 9999
(d) 999
Answer: (a)

27. Black box testing is also called:

(a) Data flow testing
(b) Loop testing
(c) Behavioral testing
(d) Graph based testing
Answer: (c)

28. Which one of the following is Software Engineering process model?

(a) Waterfall Model
(b) Incremental Model
(c) Spiral Model
(d) All of the above
Answer: (d)

29. What does RAID stand for?

(a) Randomly Addressed Intelligent Disk
(b) Redundant Array of Independent Disks
(c) Redundant Automatic Integrated Disk
(d) Random Array of Independent Disks
Answer: (b)

30. Which memory is non-volatile?

(a) RAM
(b) ROM
(c) Cache
(d) CPU register
Answer: (b)

31. Which of the following best describes software testing?

(a) Code running stage
(b) Detect defects in software
(c) Debugging the application
(d) Writing code
Answer: (b)

32. What is the main drawback of using linked lists over arrays?

(a) Wastage of memory
(b) Can't be used in dynamic memory allocations
(c) No random access to elements
(d) Difficult to implement
Answer: (c)

33. What is the output of post-increment in C when used in expression?

(a) The value before increment
(b) The value after increment
(c) The updated value twice

(d) Compiler error
Answer: (a)

34. Which sorting technique is fastest on average?

(a) Bubble sort
(b) Merge sort
(c) Selection sort
(d) Insertion sort
Answer: (b)

35. What is the function of a linker?

(a) Translates source code to machine code
(b) Combines multiple object files into an executable
(c) Manages runtime memory
(d) Performs syntax analysis
Answer: (b)

36. Which of the following is a NoSQL database?

(a) MySQL
(b) Oracle
(c) MongoDB
(d) MS Access
Answer: (c)

37. What is the default port number for HTTP protocol?

(a) 23
(b) 80
(c) 443
(d) 21
Answer: (b)

38. What is firewall used for?

(a) To block viruses
(b) To control incoming and outgoing network traffic
(c) To speed up network
(d) To connect two networks
Answer: (b)

39. The full form of DNS in networking is:

(a) Dynamic Naming System
(b) Domain Number System

(c) Domain Name System
(d) Dynamic Network System
Answer: (c)

40. Which of the following is a server-side scripting language?

(a) JavaScript
(b) PHP
(c) HTML
(d) CSS
Answer: (b)

41. What is the main function of an operating system?

(a) Manage hardware resources
(b) Provide graphical user interface
(c) Run software applications
(d) Connect to the internet
Answer: (a)

42. Which of the following is NOT a computer language?

(a) Python
(b) HTML
(c) TCP/IP
(d) Java
Answer: (c)

43. Which device connects different networks together?

(a) Router
(b) Switch
(c) Hub
(d) Modem
Answer: (a)

44. Which of the following is a volatile memory?

(a) ROM
(b) Hard Disk
(c) RAM
(d) DVD
Answer: (c)

45. What is the primary key in a database?

(a) Unique identifier for records
(b) Foreign key
(c) Composite key
(d) Candidate key
Answer: (a)

46. Which IP address class is used for large networks?

(a) Class A
(b) Class B
(c) Class C
(d) Class D
Answer: (a)

47. What is the use of checksum in networking?

(a) Error detection
(b) Packet routing
(c) Packet switching
(d) Data compression
Answer: (a)

48. Which is the fastest cache memory level?

(a) L1
(b) L2
(c) L3
(d) RAM
Answer: (a)

49. What is the function of DNS?

(a) Resolves website names to IP addresses
(b) Blocks malicious websites
(c) Supplies network addresses
(d) Encrypts data
Answer: (a)

50. Which technology is used in blockchain?

(a) Distributed ledger
(b) Centralized database
(c) Single server architecture

(d) Monolithic architecture
Answer: (a)

51. Which of the following are components of the CPU?

(a) ALU, Memory Unit, I/O Unit
(b) ALU, Control Unit, Memory Unit
(c) Memory Unit, I/O Unit, Control Unit
(d) Control Unit, ALU, I/O Device
Answer: (b)

52. The term 'virtual memory' means:

(a) A logically contiguous address space stored in main memory.
(b) Secondary memory used as part of main memory.
(c) Physical memory used as main memory.
(d) A high-speed cache memory.
Answer: (b)

53. Which data structure uses LIFO?

(a) Queue
(b) Stack
(c) Linked List
(d) Graph
Answer: (b)

54. Which of these is a noSQL database?

(a) Oracle
(b) MySQL
(c) Cassandra
(d) Microsoft SQL Server
Answer: (c)

55. Which of the following is NOT a type of computer network?

(a) LAN
(b) VPN
(c) WAN
(d) BIOS
Answer: (d)

56. The number of bits required to address a memory location in a system with 4 MB memory is:

(a) 12 bits
(b) 20 bits
(c) 22 bits
(d) 24 bits
Answer: (b)
Explanation: 4 MB = 2^22 bytes, so 22 bits are needed.

57. Ethernet is a:

(a) Protocol used for LAN
(b) Wide-area network
(c) A routing protocol
(d) Network layer protocol
Answer: (a)

58. What is the main purpose of HTTP?

(a) To provide an encryption method
(b) For transferring files
(c) To transfer hypertext data over the internet
(d) For database querying
Answer: (c)

59. In TCP/IP model, the protocol at the transport layer is:

(a) FTP
(b) TCP
(c) IP
(d) HTTP
Answer: (b)

60. Which layer is responsible for end-to-end delivery in OSI model?

(a) Network Layer
(b) Data Link Layer
(c) Transport Layer
(d) Session Layer
Answer: (c)

61. What does MAC stand for in networking?

(a) Media Access Control
(b) Message Access Center

(c) Multimedia Access Channel
(d) Message Authentication Code
Answer: (a)

62. Which of the following is used to detect hardware/software errors?

(a) Parity Bit
(b) CRC
(c) Both (a) and (b)
(d) None of these
Answer: (c)

63. What is an IP address?

(a) Identifies a network device uniquely
(b) Identifies a domain name
(c) It's a process identifier
(d) Network topography
Answer: (a)

64. Which of the following is called the brain of the computer?

(a) ALU
(b) Control Unit
(c) CPU
(d) Memory
Answer: (c)

65. Which command line utility is used to test connectivity between devices?

(a) ping
(b) ipconfig
(c) netstat
(d) tracert
Answer: (a)

66. What is the name of the process of translating a high-level language into machine code?

(a) Compilation
(b) Interpretation
(c) Execution
(d) Debugging
Answer: (a)

67. What does SSL stand for?

(a) Secure Socket Layer
(b) Secure System Layer
(c) Symbolic System Library
(d) None of these
Answer: (a)

68. In relational DBMS, the operation 'join' is:

(a) Set union of two tables
(b) Cartesian product of two tables
(c) Combining rows from two or more tables based on a related column
(d) Projection of specified columns
Answer: (c)

69. What is the primary key characteristic?

(a) Must be unique
(b) Can be NULL
(c) Composite key only
(d) None of these
Answer: (a)

70. What is checksum used for in networking?

(a) To ensure data integrity
(b) To encrypt data
(c) To route packets
(d) To compress packets
Answer: (a)

71. The complexity for: $T(n) = T(n-1)+n$, is

(a) n

(b) n^2

(c) $\log n$

(d) $n \log n$

Answer: (b)

72. Which one of the following algorithmic approaches is followed in Floyd-Warshall shortest path algorithm?
(a) Divide and conquer
(b) Dynamic programming
(c) Greedy approach
(d) Backtracking

Answer: (b)

73. The worst-case complexity to sort an array of integers in non-decreasing order, by using quicksort is

(a) $O(n^2)$ and occurs when the array is pre-sorted in non-increasing order

(b) $O(n\,logn)$ and occurs when the array is pre-sorted in non-decreasing order

(c) $O(n^2)$ and occurs for any ordering of the array

(d) $O(n^2logn)$ and occurs for any ordering of the array

Answer: (a)

74. What allows the Java programmer to destroy an object A?
(a) a. delete ( )
(b) a. finalize ( )
(c) Runtime. GetRuntime ( ). gc ( )
(d) Only the garbage collection system can destroy an object

Answer: (d)

75. In which order a Binary search tree should be traversed to obtain the output sequence in descending order?
(a) Root, left and right
(b) Right, root and left
(c) Right, left and root
(d) Left, root and right

Answer: (b)

76. The total number of comparisons made in Bubble sort algorithm is

(a) $O(lgn)$

(b) $O(n^2)$

(c) $O(n^2 lgn)$

(d) $O(lg\ n^2)$

Answer: (b)

77. The recurrence relation for the optimal execution time of the Tower of Hanoi problem having n discs is

(a) $T(n) = 2T(n-2) + 2$

(b) $T(n) = 2T(n-1) + n$

(c) $T(n) = 2T\left(\frac{n}{3}\right) + 1$

(d) $T(n) = 2T(n-1) + 1$

Answer: (d)

78. The running time of an algorithm $T(n)$ where n the input size is given by:

$$T(n) = 8T\left(\frac{n}{2}\right) + qn, \quad if\ n > 1$$

$= p$, if $n = 1$
where, p and q are constants.

What is the complexity (order) of the algorithm?

(a) n^2

(b) n^n

(c) n^3

(d) n

Answer: (c)

79. Consider the following statements regarding automata theory:
1. The pumping length must always be equal to the number of states in a machine
2. A non-regular expression can have a finite pumping length
3. In a regular language/expression, a string of pumping length can be repeated arbitrarily

4. The language $B = \{0^n \, 1^n \mid n \geq 0\}$ has a pumping length

Which of the above statements is/are correct?
(a) 1, 2 and 4
(b) 1, 3 and 4
(c) 2 only
(d) 3 only

Answer: (d)

80. Consider the following machines regarding Finite automatas:
1. DFA
2. NFA
3. E - NFA
4. Any automaton

Which of the above are correct about the applicability of Arden's Theorem?
(a) 1 and 4
(b) 1 and 2
(c) 2 and 3
(d) 3 and 4

Answer: (b)

81. In C programming, the qualifiers 'signed' and 'unsigned' apply to
1. Char
2. Float
3. Int
4. Double

(a) 1 and 4
(b) 2 and 3
(c) 1 and 3
(d) 2 and 4

Answer: (c)

82. When a compiler encounters a function parameter for a single-subscripted array of the form int a [ ], it converts the parameter to:
(a) Int a
(b) Int & a
(c) Int * a
(d) No conversion is required

Answer: (c)

83. The dominator node in DAG represents
(a) Any node of DAG which represents start of loop
(b) Last node of DAG
(c) Node with highest degree of DAG
(d) Isolated node of DAG

Answer: (a)

84. Which of the following is used for grouping of characters into tokens?
(a) Parser
(b) Code optimization
(c) Code generator
(d) Lexical analyzer

Answer: (d)

85. Consider the following contents of different registers:

Offset (displacement) = 5000 H
[AX]−1000 H , [BX]−2000H , [SI]−4000H , [DI]−3000H
[BP]−5000 H , [SP]−6000H , [CS]−0000H , [DS]−2000H
[SS]−3000 H , [IP]−7000H ,

What is the effective address of the data for the following instruction?

MOV AX, [BX] [SI]

(a) 20000H
(b) 25000H
(c) 26000H
(d) 30000H

Answer: (c)

86. In a C program, a programmer has written following line in a function.
x=100+"hello";   //x defined as integer data type

Which part of compiler will detect the error?
(a) Lexical Analyzer
(b) Syntax Analyzer
(c) Semantic Analyzer
(d) Intermediate code Generator

Answer: (c)

87. In a program, dead code occurs because of
(a) Aliasing
(b) Function in-lining and macros
(c) Loop invariant instructions and loop peeling
(d) Constant folding, constant propagation and copy propagation

Answer: (d)

88. In which method a Parse tree is created, a depending graph is drawn and then the semantic rules of the Parse tree nodes are evaluated in topological sorted order?
(a) Parse tree method
(b) Bottom up translation
(c) Top-down translation
(d) Recursive evaluator model

Answer: (a)

89. The Capability Maturity Model (CMM) level 5 defines:
(a) Initial mature work processes in software development organization
(b) Managed work processes in software development organization
(c) Optimizing work processes in software development organization
(d) Repeatable work processes in software development organization

Answer: (c)

90. Consider the following statements:

The UML sequence diagram shows
1. Lifelines of processes along vertical lines
2. Sequence of operations within a process
3. Interactions among processes

Which of the above statements are correct?
(a) 1, 2 and 3
(b) 1 and 2 only
(c) 1 and 3 only
(d) 2 and 3 only

Answer: (c)

91. Black box testing is also called

(a) Data flow testing
(b) Loop testing
(c) Behavioral testing
(d) Graph based testing

Answer: (c)

92. The Wireless Application Protocol (WAP) is:
(a) A product of W3C -World Wide Web Consortium
(b) A data link layer of the OSI model
(c) Aims to ensure Interoperability among service providers
(d) Incurs high overheads of protocol stack

Answer: (c)

93. The XML DOM object is
(a) Entity
(b) Entity Reference
(c) Comment Reference
(d) Comment Data

Answer: (b)

94. Which one of the following characteristics is satisfied by websites without the attached database?
(a) The ability to generate data via SQL
(b) The inability to use a browser to display WebPages
(c) Static information using HTML or JavaScript
(d) The need to use TCP/IP as the network protocol

Answer: (c)

95. Each computer connected to the Internet is assigned a unique compound number which is:
(a) An 8-bit number
(b) A 32-bit number but is expressed as four single byte values, each in the range of 0 to 255
(c) A 64-bit number but is expressed as eight single byte values, each in the range of 0 to 65536
(d) A 16-bit number and is expressed as a four single byte values, each one in the range of 0 to 128.

Answer: (b)

96. Which of the following is the appropriate format for graphics that are to be embedded within an Internet document?
(a) BMP
(b) TIFF
(c) GIF
(d) HTML

Answer: (c)

97. Consider the following test processes:
1. Acceptance testing
2. System testing
3. Verification
4. Unit testing
5. Integration testing

What is the correct order of conducting, these tests?
(a) 3, 4, 5, 2 and 1
(b) 4, 3, 5, 2 and 1
(c) 3, 2, 5, 4 and 1
(d) 4, 2, 5, 3 and 1

Answer: (a)

98. Consider the following statements:
1. Condition coverage is Black-Box testing
2. Boundary analysis is Black-Box testing
3. Decision coverage is White-Box testing
4. Data Equivalence partitioning is Black-Box testing

Which of the above statements are correct?
(a) 2, 3 and 4

(b) 1, 2 and 4
(c) 1, 2 and 3
(d) 1, 3 and 4

Answer: (a)

99. Consider the following statements regarding maintenance testing:
1. It need not be done for emergency bug fixes
2. It is a testing to show how easy it will be to maintain the system
3. Additional new tests may be required apart from re-test and regression test
4. It needs careful risk and impact analysis as its scope is difficult

Which of the above statements are correct?
(a) 1 and 2
(b) 3 and 4
(c) 2 and 3
(d) 1 and 4

Answer: (b)

100. Consider the following test methods:
1. Code walkthrough
2. Integration testing
3. Design reviews
4. Requirement reviews
5. User acceptance testing

Which of the above tests are Verification (Vr) and Validation (Vd)?
(a) 1(Vd), 2(Vd)), 3(Vd), 4(Vr), and 5(Vr)
(b) 1(Vr), 2(Vd)), 3(Vd), 4(Vr), and 5(Vr)
(c) 1(Vd), 2(Vd)), 3(Vr), 4(Vd), and 5(Vd)
(d) 1(Vr), 2(Vd), 3(Vr), 4(Vr), and 5(Vd)

Answer: (d)