

(1) Inductive theory involves:

- a) Deriving specific predictions from general principles
- b) Moving from specific observations to broader generalizations
- c) Testing hypotheses through controlled experiments
- d) Focusing on deductive reasoning exclusively

(2) In research, an independent variable is:

- a) The outcome variable that is being measured
- b) The variable that is controlled by the researcher
- c) A variable that is affected by changes in another variable
- d) A constant value used for comparison

(3) Which level of measurement categorizes data into distinct categories with no inherent order?

- a) Nominal
- b) Ordinal
- c) Interval
- d) Ratio

(4) Which measure of central tendency is used when dealing with a dataset containing outliers?

- a) Arithmetic mean
- b) Median
- c) Mode
- d) Geometric mean

(5) What is a Type I error in hypothesis testing?

- a) Rejecting a true null hypothesis
- b) Failing to reject a false null hypothesis
- c) Rejecting a false null hypothesis
- d) Failing to reject a true null hypothesis

(6) What is Monte Carlo method used for in simulation?

- a) Generating random numbers
- b) Solving systems of linear equations
- c) Calculating the area under a curve
- d) Estimating the value of a function by averaging over random samples

(7) Which simulation language is widely used for modeling and analyzing discrete event systems?

- a) Ada
- b) Kotlin
- c) Python
- d) SIMSCRIPT

(8) Which of the following is a canonical form of a Linear Programming Problem?

- a) Standard Form
- b) Slack Form
- c) Dual Form
- d) Big-M Form

(9) What is the Big-M method used for in Linear Programming?

- a) To maximize the objective function
- b) To minimize the objective function
- c) To handle constraints with inequality signs
- d) To solve integer programming problems

(10) If a distribution has a kurtosis value of 3, it is considered:

- a) Mesokurtic
- b) Leptokurtic
- c) Platykurtic
- d) Symmetric

(11) What does skewness measure in a probability distribution?

- a) Spread of the data
- b) Symmetry of the data
- c) Tails of the distribution
- d) Peak of the distribution

(12) When the values in a dataset are multiplied together and then the n th root is taken, which measure of central tendency is being calculated?

- a) Arithmetic mean
- b) Geometric mean
- c) Harmonic mean
- d) Weighted mean

(13) Suppose a person has 8 red, 5 green, 12 oranges, and 15 blue balls. Test the null hypothesis that the colors of the balls occur with equal frequency. What is the Chi Square value you get?

- a) 5.6
- b) 5.68
- c) 5.86
- d) 5.8

(14) A set of values of decision variables that satisfies the linear constraints and non-negativity conditions of an L.P.P. is called its:

- a) Unbounded solution
- b) Optimum solution
- c) Feasible solution
- d) None of these

(15) The minimum value of $Z = 3x + 5y$ subjected to constraints $x + 3y \geq 3$, $x + y \geq 2$, $x, y \geq 0$ is:

- a) 5
- b) 7
- c) 10
- d) 11

(16) What is the assumption made for performing the hypothesis test with T distribution?

- (a) the distribution is non-symmetric
- (b) the distribution has more than one modal class
- (c) the distribution has a constant variance
- (d) the distribution follows a normal distribution

(17) Consider the following example “How we can divide set of articles such that those articles have the same theme (we do not know the theme of the articles ahead of time)” is this:

- a) Clustering
- b) Classification
- c) Regression
- d) None of these

(18) The probability of getting two tails when two coins are tossed is

- a) $1/6$
- b) $1/2$
- c) $1/3$
- d) $1/4$

(19) What is the formula for Bayes' Theorem?

- a) $P(A|B) = P(B|A) * P(A) / P(B)$
- b) $P(A|B) = P(B|A) * P(B) / P(A)$
- c) $P(B|A) = P(A|B) * P(B) / P(A)$
- d) $P(B|A) = P(A|B) * P(A) / P(B)$

(20) In primal-dual solutions, the dual problem solution can be obtained by solving other problems classified as

- a) unrestricted problem
- b) original problem
- c) double problem
- d) restricted problem

21) F distribution is used primarily in which statistical technique?

- a) Chi-Square test
- b) T test
- c) ANOVA
- d) Z test

22) Choose the correct option for the regression line passing through the origin.

- a) Correlation is zero
- b) Regression coefficient is zero

c) Intercept is zero d) Association is zero.

23) Coefficient of correlation explains:

- a) Concentration b) Relation
- c) Dispersion d) Asymmetry

24) Accepting a null hypothesis when it is false is called

- a) Type I error b) Type II error
- c) Probable error d) Standard error

25) The regression coefficient and correlation coefficient of the two variables will be the same if theirare same.

- a) Arithmetic mean b) Standard deviation
- c) Geometric mean d) Mean deviation

26) What does PERT stand for?

- a) Program Evaluation and Review Technique.
- b) Project Execution and Resource Tracking.
- c) Production Efficiency and Resource Testing.
- d) Project Efficiency and Risk Tolerance.

27) What is the primary objective of the Monte Carlo method in simulation?

- a) To generate random numbers.
- b) To optimize system performance.
- c) To estimate the probability of outcomes.
- d) To simulate continuous systems.

28) In PERT simulation, what is the critical path?

- a) The shortest path in the project network.
- b) The path with the highest probability of completion.
- c) The path with the least amount of resources.
- d) The longest path in the project network.

29) What is the purpose of conducting sensitivity analysis in simulation experiments?

- a) To determine the optimal values of input parameters.
- b) To analyze the impact of variations in input parameters on the output.
- c) To compare different simulation models.
- d) To generate random numbers for simulation.

30) Which level of measurement allows for rank order and meaningful differences between values but does not have a true zero point?

- a) Nominal. b) Ordinal.
- c) Interval. d) Ratio.

31) Which level of measurement has categories with no inherent order or ranking?

- a) Nominal b) Ordinal.
- c) Interval d) Ratio.

32) In which type of research design does the researcher manipulate variables to observe their effects?

- a) Descriptive research design.
- b) Exploratory research design.
- c) Experimental research design.
- d) Longitudinal research design.

33) Which type of theory starts with general principles and predicts specific observations?

- a) Inductive theory.
- b) Deductive theory.
- c) Empirical theory.
- d) Experimental theory.

34) Inductive theory building involves:

- a) Testing hypotheses derived from existing theories.
- b) Developing general principles based on specific observations.
- c) Making predictions from general principles.
- d) Confirming pre-existing beliefs.

35) What does APA stand for in referencing?

- a) American Publishing Association.
- b) American Psychological Association.
- c) Academic Publishing Association.
- d) Author Publishing Agency.

36) What information is included in an APA style in-text citation?

- a) Author's last name and page number.
- b) Author's first name and publication year.
- c) Title of the source and publication year.
- d) Author's last name and publication year.

37) How is the h-index calculated?

- a) It is the total number of citations an author has received.
- b) It is the number of publications an author has.
- c) It is the highest number of citations for an author's top h publications.
- d) It is the average number of citations an author's publications have received.

38) If an author's papers have received 10, 8, 5, 3, and 2 citations respectively, what is their h-index?

- a) 10
- b) 5
- c) 3
- d) 2

39) A journal with an impact factor of 5 means that:

- a) On average, each article published in the journal has been cited 5 times.
- b) The journal has published 5 articles.
- c) The journal has received 5 citations.
- d) The journal is ranked 5th among similar journals in the field.

40) If a journal has received a total of 500 citations in the last two years and has published 100 articles during the same period, what is its impact factor?

- a) 5
- b) 2.5
- c) 50
- d) 0.2

41) The range of a sample gives an indication of the

- a) way in which the values cluster about a particular point
- b) number of observations bearing the same value
- c) maximum variation in the sample
- d) degree to which the mean value differs from its expected value.

42) Which Quartile is called Median?

- a) Q_0
- b) Q_1
- c) Q_2
- d) None

43) In statistical inference, what does excess kurtosis indicate?

- a) The distribution is normally distributed.
- b) The distribution has heavier tails than a normal distribution.
- c) The distribution is negatively skewed.
- d) The distribution is perfectly symmetrical.

44) Which of the following is an example of plagiarism?

- a) Quoting a source and providing a citation.
- b) Paraphrasing a source and providing a citation.
- c) Copying verbatim text from a source without citation.
- d) Summarizing information from multiple sources.

45) Insurance companies use Bayes' Theorem to:

- a) Determine the premiums for policyholders.
- b) Assess the risk of insuring a particular individual or property.
- c) Calculate the company's profits.
- d) Estimate the number of claims filed each year.

46) Which technique in image enhancement involves modifying individual pixel values based on their intensity levels?

- a) Point-based techniques
- b) Mask-based techniques
- c) Spatial filtering
- d) Frequency domain filtering

47) What is the purpose of spatial filtering in digital image processing?

- a) To convert images from spatial domain to frequency domain
- b) To convert grayscale images to color images
- c) To resize images for different display devices
- d) To remove noise and enhance image features based on pixel neighborhood

48) What will be the first value of the decision parameter if a line is plotted from (20, 10) to (30, 18) using Bresenham's line drawing algorithm?

- a) 10
- b) 6
- c) 8
- d) None of the above

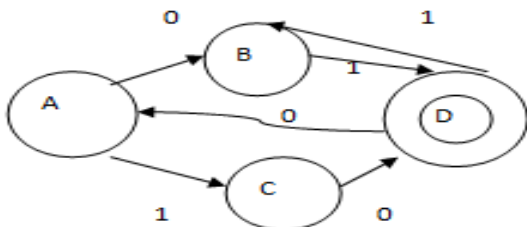
49) Which of the following uniquely identifies a network interface?

- a) IP address
- b) Subnet mask
- c) MAC address
- d) Default gateway

50) Bayonet-Neill-Concelman(BNC) connectors are used with which type of cables?

- a) UTP
- b) STP
- c) Coaxial cable
- d) Optical Cables

(51) Examine the following DFA: If input is 011100101, which edge is NOT traversed?



- a) A B
- b) B D
- c) C D
- d) D A

(52) Regular expressions are not closed under:

- a) Union
- b) Intersection
- c) Kleene star
- d) Complement

(53) Let the class of language accepted by finite state machine be L_1 and the class of languages represented by regular expressions be L_2 then?

- a) $L_1 < L_2$
- b) $L_1 \geq L_2$
- c) $L_1 \cup L_2 = .*$
- d) $L_1 = L_2$

(54) Consider the context-free grammar $G = (\{S\}, \{a, b\}, P, S)$ with the production rules: $P = \{S \rightarrow aSb \mid bSa \mid \epsilon\}$. Which of the following strings cannot be generated by this grammar?

- a) abba
- b) abab
- c) aabb
- d) bbaa

(55) What is regression testing?

- a) Testing performed to ensure that new code changes do not adversely affect existing functionality
- b) Testing performed to identify bugs in the software
- c) Testing performed to verify the system as a whole
- d) Testing performed to validate user requirements

(56) What does a cyclomatic complexity value of 1 indicate?

- a) The CFG of code has one predicate node only
- b) The code has a single path through it
- c) The code is highly complex
- d) The code has a high risk of containing bugs

(57) Which optimization technique combines adjacent loops into a single loop to reduce loop overhead?

- a) Loop fusion
- b) Loop unrolling
- c) Loop hoisting
- d) Loop sinking

(58) What are the minimum number of tables required to have a foreign key in a database?

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

(59) Consider the following relation $R(A, B, C, D, E)$ and Functional dependencies:

- $\{A, B\} \rightarrow \{C\}$
- $\{C\} \rightarrow \{D, E\}$
- $\{D\} \rightarrow \{A\}$

Which normal form is R currently in?

- a) 1NF
- b) 2NF
- c) 3NF
- d) BCNF

(60) Which parameter passing technique allows for lazy evaluation of parameters?

- a) Call by value
- b) Call by reference
- c) Call by name
- d) Call by result

(61) Which statement best describes the use of GOTO statements in structured programming?

- a) They are encouraged for complex control flow
- b) They are used to exit loops and conditionals
- c) They should be avoided in favor of structured control flow constructs
- d) They are essential for code organization

(62) Which of the following sorting algorithms has the only worst-case time complexity of $O(n^2)$?

- a) Quick sort
- c) Insertion sort

- b) Merge sort
- d) Heap sort

(63) In an AVL tree, after which operation(s) is it necessary to check and fix the balance property?

- a) Insertion
- c) Both insertion & deletion
- b) Deletion
- d) Neither insertion nor deletion

(64) The time complexity of searching for an element in an AVL tree is?

- a) $O(\log n)$
- c) $O(n \log n)$
- b) $O(n)$
- d) $O(1)$

(65) A process refers to 5 pages, A, B, C, D, E in the order: A, B, C, D, A, B, E, A, B, C, D, E. If the page replacement algorithm is FIFO, the number of page transfers with an empty internal store of 3 frames is?

- a) 8
- c) 9
- b) 10
- d) 7

(66) What is the octal value for giving read, write, and execute permissions to the owner, read and execute permissions to the group, and no permissions to others?

- a) 700
- c) 755
- b) 750
- d) 644

(67) If there are 32 segments, each of size 1Kb, then the logical address should have:

- a) 13 bits
- c) 15 bits
- b) 14 bits
- d) 16 bits

(68) Which memory allocation algorithm suffers from external fragmentation?

- a) Best Fit
- c) First Fit
- b) Worst Fit
- d) Next Fit

(69) Which command is used for displaying the contents of a file in Unix?

- a) mkdir
- c) rm
- b) cat
- d) cp

(70) Which of the following algorithms is designed to exploit both temporal and spatial locality of reference?

- a) First In First Out (FIFO)
- c) Optimal Page Replacement
- b) Least Recently Used (LRU)
- d) Random Page Replacement

(71) Which data structure is commonly used for implementing undo functionality in text editors?

- a) Stack
- c) Linked List
- b) Queue
- d) Priority Queue

(72) In parsing, what does the term "ambiguity" refer to?

- a) The presence of multiple meanings for a single symbol
- b) The presence of multiple parse trees for a single input string
- c) The presence of syntax errors in the input string
- d) The presence of undefined symbols in the grammar

(73) Which of the following grammars is ambiguous?

- a) $E \rightarrow E+E \mid \text{no}$
- c) $E \rightarrow E+E \mid (E) \mid \text{no}$
- b) $E \rightarrow E+E \mid E * E \mid \text{no}$
- d) $E \rightarrow E * E \mid \text{no}$

(74) What does the SQL keyword "DISTINCT" do?

- a) Sorts the result set in ascending order

- b) Removes duplicate rows from the result set
- c) Filters out NULL values from the result set
- d) Groups the result set based on a specified column

(75) Select the addressing mode, in which the operand is given explicitly in the instruction itself

- a) immediate mode
- b) absolute mode
- c) indirect mode
- d) index mode

(76) Which of the following option is suitable when a process is executing in its critical section, then no other processes can be executing in their critical section:

- a) Mutual exclusion
- b) Critical exclusion
- c) Synchronous exclusion
- d) Asynchronous exclusion

(77) A limitation of recursive descent parsing is?

- a) It cannot handle left-recursive grammars
- b) It requires a lexer to tokenize the input stream
- c) It cannot handle right-associative operators efficiently
- d) It cannot handle LL(1) grammars

(78) A BST is traversed in the order recursively: Right, root, left. The output sequence will be in

- a) Ascending order
- b) Descending order
- c) Bitomic sequence
- d) No specific order

(79) Which operation increases the value of a semaphore in most implementations?

- a) Wait
- b) Release
- c) Signal
- d) Lock

(80) Which sorting algorithm uses a divide-and-conquer approach and works by partitioning the array into two parts, then recursively sorting each part?

- a) Insertion sort
- b) Merge sort
- c) Selection sort
- d) Bubble sort

(81) Searching technique that takes $O(1)$ time to find a data is

- a) Linear Search
- b) Binary Search
- c) Hashing
- d) Tree Search

(82) If a node in a BST has two children, then its inorder predecessor has

- a) no left child
- b) no right child
- c) two children
- d) no child

(83) The keyword to eliminate duplicate rows from the query result in SQL is

- a) DISTINCT
- b) NO DUPLICATE
- c) UNIQUE
- d) None of the above

(84) A functional dependency of the form $x \rightarrow y$ is trivial if

- a) $y \subseteq x$
- b) $y \subset x$
- c) $x \subseteq y$
- d) $x \subset y$

(85) Modules X and Y operate on the same input and output data, then the cohesion is

- a) Sequential
- b) Communicational
- c) Procedural
- d) Logical

(86) An IPv4 datagram has arrived with an M bit value of 1 and a fragmentation offset value of 0. Which fragment is this?

- a) First fragment b) Last Fragment
c) Middle fragment d) Not fragmented

(87) A communication channel has a maximum bandwidth of 5 kHz. According to Nyquist's formula, what is the maximum achievable data rate (in bps) if 16 signaling values are used?

- a) 20,000bps b) 40,000bps
c) 80,000bps d) 10,000bps

(88) What is the class of the IP address 220.34.56.78?

- a) Class A b) Class B
c) Class C d) Class D

(89) Equivalence partitioning is a _____ testing method that divides the input domain of a program into classes of data from which test cases can be derived.

- a) White box b) Black box
c) Regression d) Smoke

(90) What is the main purpose of federation in cloud computing?

- a) To optimize resource allocation within a single cloud provider
b) To enable interoperability and resource sharing across multiple cloud providers
c) To improve security within a single cloud provider
d) To enhance data privacy within a single cloud provider

(91) Given the relation $R(A, B, C, D)$ & the set $F = \{AB \rightarrow C, B \rightarrow D, D \rightarrow B\}$ find the candidate keys of the relation.

- a) AB & CD b) ABCD
c) BD & AB d) AB & AD

(92) Arrange the following layers of OSI model as per Software to Hardware layers

1. Session
2. Application
3. Data Link
4. Transport

Choose the correct answer from the below options only:

- a) 1, 2, 3, 4 b) 4, 3, 2, 1
c) 2, 1, 4, 3 d) 1, 3, 2, 4

(93) In a fully connected mesh network with n devices, there are _____ physical channels to link all devices

- a) $n(n-1) / 2$ b) $n(n+1) / 2$
c) $2n$ d) $n/(n-1)$

(94) Match list- I with List – II:

LIST –I

- a) 802.3
b) 802.11
c) 802.15
d) 802.16

LIST- II

1. Wireless LAN
2. Bluetooth
3. Ethernet
4. Wireless WAN

Select the correct answer from the options given below:

- a) a-3 b-2 c-1 d-4 b) a-1 b-4 c-3 d-2
c) a-2 b-1 c-4 d-1 d) a-3 b-1 c-2 d-4

(95) Given the following statements with respect to transformations:

1. Two successive translation are additive
2. Two successive rotations are additive

3. Two successive scaling operations are multiplicative

Which of the following is true?

- a) 1 and 2 only
- b) 1 and 3 only
- c) 2 and 3 only
- d) 1, 2 and 3

(96) In a simple paging system with 2^{24} bytes of physical memory, 256 pages of logical address space and a page size of 2^{10} bytes, how many bits are in logical address?

- a) 4
- b) 14
- c) 18
- d) 10

(97) Suppose a system contains n processes and system uses the round robin algorithm for CPU scheduling then which data structure is best suited for ready queue of the process.

- a) Stack
- b) Queue
- c) Circular queue
- d) Tree

(98) Arrange the following types of coupling in the order best to worst:

1. Content Coupling
2. Common Coupling
3. External Coupling
4. Data Coupling
5. Stamp Coupling
6. Control Coupling

Choose the correct answer from the below options only:

- a) 4, 5, 6, 3, 2, 1
- b) 4, 6, 5, 2, 3, 1
- c) 4, 2, 6, 5, 3, 1
- d) 4, 3, 2, 6, 5, 1

(99) An operating system contains 3 user processes each requiring 2 units of resource R. The minimum number of units of R such that no deadlocks will ever arise is

- a) 4
- b) 3
- c) 5
- d) 6

(100) Which amongst the following is not a valid page replacement policy?

- a) LRU
- b) FIFO
- c) Recurrently used
- d) Optimal page replacement