Unit 2: Computational Thinking & Algorithms

61 MCQs. Correct option in bold. 1 mark each.

1. A decision problem normally has a response of
A. a number of solutions **B. yes or no**
C. a list of values D. a route map

2. "Is n even?" is an example of a
A. counting problem B. sorting problem
C. decision problem D. search problem

3. In a counting problem, the answer is
A. the number of possible solutions to a search problem
B. a single route
C. a sorted list
D. a yes/no response

4. If there are two roads from Islamabad to Lahore (G.T. Road and Motorway), the answer to the counting problem is
A. 3 B. 1 C. 0 **D. 2**

5. The addition principle is used for events that are
A. mutually exclusive B. identical
C. dependent D. simultaneous

6. A student chooses among 3 desktops and 4 laptops. Total options are
A. 1 B. 34 **C. 7** D. 12

7. Bilal has 3 apples, 3 bananas and 3 bunches of cherries. The number of ways to pick one of each kind is
A. 6 B. 81 C. 9 **D. 27**

8. You have 5 shirts and 4 pants. The number of different outfits is
A. 9 **B. 20** C. 10 D. 15

9. A permutation is
A. a selection where order does not matter
B. a type of sorting
C. a type of loop
D. an arrangement of items in a specific order

10. Number of ways to arrange 3 of 4 paintings on a wall is
A. 24 B. 4 C. 12 D. 6

11. A combination is a selection of items where
A. all items are used B. the order matters
C. the order does not matter D. items repeat

12. Number of ways to choose 3 of 4 paintings (order irrelevant) is
A. 12 **B. 4** C. 24 D. 6

13. Combinations equal the number of permutations divided by
A. the number of ways to order the chosen items
B. the total items
C. 2
D. the number of boxes

14. In how many ways can you choose 2 out of 5 different books?
A. 15 B. 5 **C. 10** D. 20

15. A committee of 3 is selected from 8 people. The number of committees is
A. 120 B. 28 C. 84 **D. 56**

16. In how many ways can you select 3 different fruits from 7 fruits?
A. 21 **B. 35** C. 56 D. 84

17. The Pigeonhole Principle states that if n + 1 objects are placed into n boxes, then
A. no box has any object
B. all boxes are empty
C. each box has one object
D. at least one box contains two or more objects

18. If you have 13 apples and 12 baskets, then by the Pigeonhole Principle
A. all baskets are empty
B. each basket has one apple
C. at least one basket has more than one apple
D. no basket has an apple

19. Inclusion-Exclusion: n(A□B) equals
A. n(A) + n(B) − n(A∩B) B. n(A) − n(B)
C. n(A) + n(B) + n(A∩B) D. n(A) × n(B)

20. In a class of 50 students, 30 did a math project, 25 a science project and 15 both. Students who did at least one are
A. 50 **B. 40** C. 45 D. 35

21. Binary strings of length 8 that begin with 1 can be filled in how many ways?
A. 64 B. 256 **C. 128** D. 32

22. Binary strings of length 8 that begin with 1 or end with 00 are
A. 160 B. 128 C. 224 D. 192

23. An algorithm is
A. a programming error
B. a data type
C. a type of hardware
D. a well-defined step-by-step procedure for solving a problem

24. The property of an algorithm that it can take externally supplied values is
A. Output **B. Input**
C. Finiteness D. Generality

25. Which property ensures an algorithm produces at least one result?
A. Output B. Definiteness
C. Finiteness D. Input

26. The property that every step is clear and precise is
A. Generality B. Effectiveness
C. Definiteness D. Finiteness

27. Finiteness means an algorithm
A. has infinite steps B. has no input
C. has no output **D. must end after a finite number of steps**

28. Effectiveness means operations are
A. complex and hidden
B. simple enough to be done by a person with paper and pencil
C. very long
D. infinite

29. Generality means an algorithm should
A. solve only one problem
B. have no input
C. never end
D. solve a group of similar problems, not just one

30. Which is NOT a property of an algorithm?
A. Definiteness **B. Ambiguity**
C. Finiteness D. Effectiveness

31. Which algorithm finds shortest paths in navigation applications?
A. Dijkstra B. Binary search
C. Bubble sort D. Linear search

32. Quicksort, mergesort and binary search are used for
A. cryptography B. image processing
C. sorting and searching D. machine learning

33. Boolean logic evaluates expressions to one of
A. any number **B. two values: true or false**
C. three values D. ten values

34. A AND B is true only when
A. both A and B are true B. A is false
C. both are false D. either is true

35. A OR B is false only when
A. either is false B. both are true
C. A is true **D. both A and B are false**

36. In a repeating pattern Square, Triangle, Circle, the 9th shape is a
A. Star B. Triangle **C. Circle** D. Square

37. Bubble Sort repeatedly
A. splits the list in halves
B. selects the smallest element each time
C. searches the list
D. compares adjacent elements and swaps them if in the wrong order

38. Selection Sort repeatedly
A. swaps adjacent elements
B. selects the smallest (or largest) element from the unsorted part
C. shifts elements right
D. divides the list into halves

39. Merge Sort
A. divides the list into halves, sorts each and merges them
B. selects the smallest element
C. swaps adjacent elements
D. uses a pivot only

40. Insertion Sort builds the final sorted array
A. all at once
B. by halves
C. one element at a time
D. by random swaps

41. Linear search
A. sorts the list
B. works only on sorted lists
C. halves the interval
D. checks each element sequentially until the target is found or the list ends

42. Binary search works on
A. only text files
B. unsorted arrays
C. sorted arrays
D. only strings

43. Binary search finds an element by
A. reversing the list
B. repeatedly dividing the search interval in half
C. checking every element
D. swapping elements

44. Breaking a complex problem into smaller sub problems is called
A. decomposition
B. pattern recognition
C. generalization
D. abstraction

45. Finding similarities among problems is called
A. abstraction
B. decomposition
C. testing
D. pattern recognition

46. Focusing on important information and ignoring irrelevant details is
A. debugging
B. pattern recognition
C. abstraction
D. decomposition

47. A map app showing roads and landmarks but hiding trees and houses is an example of
A. decomposition
B. abstraction
C. encryption
D. debugging

48. Using variables instead of constants is an example of
A. abstraction in programming
B. hardware
C. an error
D. decomposition

49. Calling a built-in function by name without knowing its internals is
A. a loop
B. a logical error
C. abstraction
D. a syntax error

50. A generalized solution can
A. work only once
B. never be reused
C. handle only one case
D. handle similar problems, increasing reusability

51. The order of steps for a generalized solution is: identify core problem, extract common patterns, develop generic solution and
A. print results
B. test with different scenarios
C. compile
D. delete the problem

52. Modular design breaks a system into
A. smaller interchangeable parts called modules
B. random files
C. one big block
D. hardware only

53. Steps of modular design: define modules, design interfaces, implement modules, integrate modules and
A. ignore modules
B. print modules
C. delete modules
D. test modules

54. A dry run means
A. compiling code
B. running on hardware
C. manually checking an algorithm's execution with specific inputs
D. deleting code

55. In the dry run for finding the largest number in [3,1,4,1,5,9,2,6], the final value of max is
A. 9 B. 6 C. 3 D. 5

56. A trace table records
A. only the final output
B. values of variables at each step of the algorithm
C. the programmer's name
D. hardware details

57. There are two main kinds of errors: syntax errors and
A. power errors
B. hardware errors
C. logical errors
D. network errors

58. Syntax errors are mistakes in
A. reasoning
B. hardware
C. power supply
D. the structure of an expression or statement

59. The email "amjadali@gmail" is an example of a
A. hardware error
B. syntax error
C. logical error
D. correct email

60. A total of $100 + $150 + $200 calculated as $1000 is an example of a
A. logical error
B. syntax error
C. hardware error
D. no error

61. Which activity is based on personal preference rather than algorithmic logic?
A. Checking if a number is prime
B. Calculating a square root
C. Deciding what to eat for dinner
D. Sorting numbers