CSC 301

B.Sc. Vth SEMESTER EXAMINATION, 2024-25

COMPUTER SCIENCE

(Analysis of Algorithms & Data Structure)

AFFIX PRESCRIBED RUBBER STAMP

Date (तिथि) : _____

Paper ID
(To be filled in the OMR Sheet)

1435

अनुक्रमांक (अंकों में) :
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अनुक्रमांक (शब्दों में) : _____

Roll No. (In Words) : _____

Time : 1:30 Hrs.
समय : 1:30 घण्टे

Max. Marks : 75
अधिकतम अंक : 75

नोट : पुस्तिका में 50 प्रश्न दिये गये हैं, सभी प्रश्न करने होंगे। प्रत्येक प्रश्न 1.5 अंक का होगा।

Important Instructions :

1. The candidate will write his/her Roll Number only at the places provided for, i.e. on the cover page and on the OMR answer sheet at the end and nowhere else.
2. Immediately on receipt of the question booklet, the candidate should check up the booklet and ensure that it contains all the pages and that no question is missing. If the candidate finds any discrepancy in the question booklet, he/she should report the invigilator within 10 minutes of the issue of this booklet and a fresh question booklet without any discrepancy be obtained.

महत्वपूर्ण निर्देश :

1. अभ्यर्थी अपने अनुक्रमांक केवल उन्हीं स्थानों पर लिखेंगे जो इसके लिए दिये गये हैं, अर्थात् प्रश्न पुस्तिका के मुख्य पृष्ठ तथा साथ दिये गये ओ०एम०आर० उत्तर पत्र पर, तथा अन्यत्र कहीं नहीं लिखेंगे।
2. प्रश्न पुस्तिका मिलते ही अभ्यर्थी को जाँच करके सुनिश्चित कर लेना चाहिए कि इस पुस्तिका में पूरे पृष्ठ हैं और कोई प्रश्न छूटा तो नहीं है। यदि कोई विसंगति है तो प्रश्न पुस्तिका मिलने के 10 मिनट के भीतर ही कक्ष परिप्रेक्षक को सूचित करना चाहिए और बिना त्रुटि की दूसरी प्रश्न पुस्तिका प्राप्त कर लेना चाहिए।

1. What is a data structure ?

   (A) A programming language

   (B) A collection of algorithms

   (C) A way to store and organize data

   (D) A type of computer hardware

2. Which data structure is used for recursion ?

   (A) Stack

   (B) Queue

   (C) List

   (D) Array

3. What is the value of the postfix expression 6324 + - * ?

   (A) 74

   (B) -18

   (C) 22

   (D) 40

4. What is a Dequeue ?

   (A) A queue with insert/delete from front

   (B) A queue with insert/delete from rear

   (C) Both (A) & (B)

   (D) None

5. The optimal data structure used to solve the Tower of Hanoi problem is _____.

(A) Tree

(B) Queue

(C) Stack

(D) List

6. What will be the output of the following program ?

```
main( )
{
  char str [ ] = "DAA PAPER" ;
  int len = strlen (str) , i ;
  for (i = 0 ; i < len ; i++) { push (str[i]) ;
  for (i = 0 ; i < len ; i++) { pop ( ) ; }
}
```

(A) REPAP AAD

(B) DAA PAPER

(C) PAPER DAA

(D) AAD PAPER

7. What is the need of a circular queue ?

(A) Easier computations

(B) Implement LIFO principle in queue

(C) Effective usage memory

(D) None

8. Which of the following is not the type of queue ?

(A) Priority Queue

(B) Circular Queue

(C) Single Ended Queue

(D) Ordinary Queue

9. Which of the following has LIFO property ?

(A) Tree

(B) Linked List

(C) Queue

(D) Stack

10. Which of the following follow FIFO property ?

(A) Queue

(B) Stack

(C) List

(D) Tree

11. The prefix form of the following ⇒ A – B / C (* D ^ E) is :

(A) - A / B * C ^ D E

(B) - A / B C * ^ D E

(C) - A B C D * ^ D E

(D) - / * ^ A C B D E

12. How many children does a Binary tree have ?

(A) 2

(B) 1 or 2

(C) 0 or 1 or 2

(D) 2

13. Which of the following is false about binary search tree ?

(A) The left child is always lesser than its parent

(B) The right child is always greater than its parent

(C) The left and right sub-trees should also be binary search tree

(D) In order sequence gives decreasing order of element

14. What are the worst case and average case complexities of a binary search tree ?

(A) O (n), O (n)

(B) O (log n), O (log n)

(C) O (log n), O (n)

(D) O (n), O (log n)

15. How many distinct binary search trees can be created out of 4 distinct keys ?

(A) 4

(B) 14

(C) 24

(D) 42

16. What is the time complexity of inserting at the end of the dynamic arrays ?

(A) O (1)

(B) O (n)

(C) O (log n)

(D) Either (A) or (B)

17. What is the time complexity to count the number of elements in the linked list ?

(A) O (1)

(B) O (n)

(C) O (log n)

(D) O (n^2)

18. What is the space complexity for deleting a linked list ?

(A) O (1)

(B) O (n)

(C) O (n^2)

(D) O (log n)

19. Which of these is not an application of a linked list ?

(A) To implement file systems

(B) For separate chaining in hash table

(C) To implement non-binary trees

(D) Random Access of Elements

20. What is an array ?

(A) Container of objects of dissimilar types

(B) Container of objects of similar type

(C) Array is not a data structure

(D) All

21. How do you initialize an array ?

(A) int arr {3} = {1, 2, 3} ;

(B) int arr [3] = (1, 2, 3) ;

(C) int arr [3] = {1, 2, 3} ;

(D) All

22. . When does the Array Index out of Bounds Exception occur ?

(A) Compile Time

(B) Run Time

(C) Not an error

(D) None

23. In general, the index of the first element in an array is _____.

(A) -1

(B) 2

(C) 1

(D) 0

24. How do you declare an array of 10 integers ?

(A) int [10] array ;

(B) int array[10] ;

(C) int array 10 ;

(D) int [ ] array 10 ;

25. Which of the following algorithm is the fastest for sorting small arrays ?

(A) Quick Sort

(B) Shell Sort

(C) Insertion Sort

(D) Heap Sort

26. Which of the following sorting algorithm does not use recursion ?

(A) Bottom up merge sort

(B) Merge sort

(C) Heap sort

(D) Quick sort

27. Quick sort uses which of the following method to implement sorting ?

(A) Partitioning

(B) Selection

(C) Exchanging

(D) Merging

28. What is the worst case time complexity of bubble sorting ?

(A) O (n log n)

(B) O (log n)

(C) O (n)

(D) O (n^2)

29. The Breadth First Traversal on a graph is _____.

(A) Array

(B) Stack

(C) Tree

(D) Queue

30. Which data structure is required for Breadth first Traversal on a graph ?

(A) Stack

(B) Array

(C) Queue

(D) Tree

31. Circular Queue is also known as -

(A) Ring Buffer

(B) Square Buffer

(C) Rectangle Buffer

(D) Curve Buffer

32. Which of the following problems should be solved using dynamic programming ?

(A) Merge Sort

(B) Binary Search

(C) Longest Common Subsequence

(D) Quick Sort

33. Dijkstra's Algorithm is the prime example for_____.

(A) Dynamic Programming

(B) Back Tracking

(C) Branch and Bound

(D) Greedy Algorithm

34. When the user tries to delete the element from the empty stack then the condition is said to be_____.

(A) Underflow

(B) Garbage Collection

(C) Over Flow

(D) None

35. If the size of stack is 10 and we try to add the 11^{th} element in the stack then the condition known as _____.

(A) Underflow

(B) Garbage Collection

(C) Overflow

(D) None

36. Which is not the application of stack data structure ?

(A) String reversal

(B) Recursim

(C) Back Tracking

(D) Asynchronous data Transfer

37. Which is used to implement the recursive algorithm ?

(A) Queue

(B) Stack

(C) B-Tree

(D) List

38. Which of the following is the infix expression ?

(A) A + B * C

(B) + A * BC

(C) ABC + *

(D) None

39. Which of the following is the prefix form of A + B * C ?

(A) A + (B C *)

(B) + AB * C

(C) ABC + *

(D) + A * B C

40. Consider the following :- # define size 11

struck STACK

{

int arr [size] ;

int top = -1 ;

}

What would be the maximum value of the top that does not cause the overflow of the stack ?

(A) 8

(B) 9

(C) 10

(D) 11

41. The worst case complexity of Quick sort is_____.

(A) O (n)

(B) O (log n)

(C) O (n^2)

(D) O (n log n)

42. The time complexity of enqueue operation in the Queue is _____.

(A) O (1)

(B) O (n)

(C) O (log n)

(D) O (n log n)

43. How many Queue are required to implement a stack ?

(A) 1

(B) 2

(C) 3

(D) 4

44. What is time complexity of following fun ( ) ?

```
int fun (int n)
  {   int count = 0 ;
   for (int i = 0 ; i < n; i + +)
      { for (int j = i ; j > 0 ; j - -)
        { Count = count + ; 1
       }}
   }  return count ;
```

(A) θ (n)

(B) θ (n^2)

(C) θ (log n)

(D) θ (n log n)

45. O (n^2) is the worst case time complexity, so among the given options it can represent -

(A) O (n)

(B) O (1)

(C) O (n log n)

(D) All

46. Which of the following case does not exist in complexity theory ?

(A) Best case

(B) Worst case

(C) Average case

(D) Null case

47. The complexity of linear Search algorithm is :

(A) O (n)

(B) O (n^2)

(C) O (log n)

(D) O (n log n)

48. The complexity of merge sort algorithm is _____.

(A) O (n)

(B) O (log n)

(C) O (n^2)

(D) O (n log n)

49. The complexity of Bubble sort algorithm is_____.

(A) O (n)

(B) O (n^2)

(C) O (log n)

(D) O (n log n)

50. Which of the following is not a tree traversal ?

(A) In order

(B) Preorder

(C) Post order

(D) In Out order

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