CA-1

Course Code: CSE334   Course Title: Combinatorial Studies – II

Date of Conduct: 01-03-2023   Max marks: 30   Duration: 50 Minutes

Instructions:

1. Fill your answers in following grid.

2. All questions are compulsory

Q.1	Q.2	Q.3	Q.4	Q.5	Q.6	Q.7	Q.8	Q.9	Q.10	Q.11	Q.12	Q.13	Q.14	Q.15
Q.16	Q.17	Q.18	Q.19	Q.20	Q.21	Q.22	Q.23	Q.24	Q.25	Q.26	Q.27	Q.28	Q.29	Q.30

Q.1 Which algorithm is used to find a minimal spanning tree?

A. Depth-first search

B. Breadth-first search

C. Prim's algorithm

D. Dijkstra's algorithm

Q. 2 Which of the following statements is true for a minimal spanning tree?

A. It can have cycles.

B. It is a subgraph of the original graph.

C. It has the maximum weight among all spanning trees.

D. It includes all nodes in the graph.

Q. 3 Which algorithm is used to find the minimal spanning tree in a weighted undirected graph?

A. Depth-first search

B. Breadth-first search

C. Kruskal's algorithm

D. Bellman-Ford algorithm

Q. 4 Which of the following is true for a graph with no edges?

A. It has no minimal spanning tree.

B. It has a unique minimal spanning tree.

C. It has multiple minimal spanning trees.

D. It is not a connected graph.

Q. 5 Which of the following is not a property of Dijkstra's algorithm?

A. It can handle negative edge weights.

B. It can handle directed graphs.

C. It uses a priority queue to select the next node to visit.

D. It may not find the optimal solution for graphs with negative cycles.

Q. 6 What is the time complexity of the recurrence relation $T(n) = 2T(n/2) + n$, with $T(1) = 1$?

A. $O(n)$

B. $O(n \log n)$

C. $O(n^2)$

D. $O(2^n)$

Q. 7 What is the solution to the recurrence relation $T(n) = T(n-1) + T(n-2)$, with $T(1) = 1$ and $T(2) = 1$?

A. T(n) = F(n), where F(n) is the nth Fibonacci number

B. T(n) = n^2

C. T(n) = 2^n

D. T(n) = n!

Q. 8 What is the time complexity of searching for a key in a balanced binary search tree?

A. O(1)

B. O(log n)

C. O(n)

D. O(n^2)

Q. 9 Which of the following is not a property of a balanced binary search tree?

A. All leaf nodes are at the same level.

B. The difference in height between the left and right subtrees of any node is at most 1.

C. It has O(log n) height.

D. It has O(n) height.

Q. 10 What is recursion?

A. A technique for iterating over a collection of items.

B. A technique for breaking a problem into smaller sub-problems of the same type.

C. A technique for sorting an array in descending order.

D. A technique for storing data in a binary tree.

Q. 11 The pre-order traversal of a BST is 5, 4, 3, 2, 10, 9, 12. What will be the post-order traversal of the tree?

A   2,3,4,5,9,10,12

B   2,3,4,10,12,9,5

C   2,3,4,9,12,10,5

D   Cannot be determined

Q. 12 Consider the following declaration

int (*f[5]) ( );

The above declaration is

A   f is a pointer to function and returns 5 integers

B   f is an array of function pointers and returns an integer pointer

C   f is an array of function pointers and each function returns an integer

D   f is a pointer to array of function pointers and returns an integer

Q. 13 What is the worst time complexity to insert an element in an array at a specific position?

A   O(1)   B   O(n)

C   O(logn)   D   none

Q. 14 Consider:

P1: int(*x) (char * y)

P2: int *x (char*y)

Which of the following is/are true for P1 and P2?

A   P1 has x as a pointer to a function which takes an argument as pointer to a

 character and returns an integer value.

B   P2 has a function x which takes an argument as pointer to a character and returns a pointer to integer value.

C   P1 has a function x which takes an argument as pointer to a character and returns a pointer to integer value

D   Both A and B

Q. 15 Which of the following are true with respect to linked list?

A   Each link of node contains a pointer to the next node.

B Searching an element in singly linked list is sequential.

C Both A and B

D Each node contains a data part and pointer to the next node where an array of pointer points to the links.

Q. 16 Match the following:

Operation	Time Complexity
P: PUSH ( )	1. O(1)
Q: POP ( )	2. O(n)
R: Is Empty Stack ( )	3. $O(\log_2 n)$
S: Is Full Stack ( )	4. $O(n\log_2 n)$
	5. $O(n^2)$

A P, Q, R: 1, S : 2

B P : 1, Q :" 2, R : 4, S : 5

C P, R, S: 1, Q:2

D All O(1)

Q. 17 Which of the following is the output of the C program?

```
#include<stdio.h>

void india( );

int main( )
{
    void (*fun)( );
    fun = india;
    (*fun)( );
    fun();
    return 0;
}
    void india( )
    {
        printf("Dhoni");
    }
```
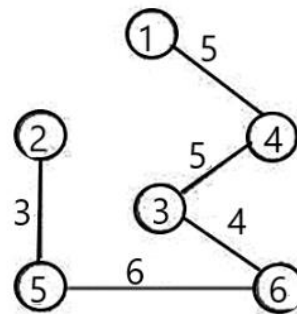
A Dhoni

B Dhoni Dhoni Dhoni

C Dhoni Dhoni

D None of the above

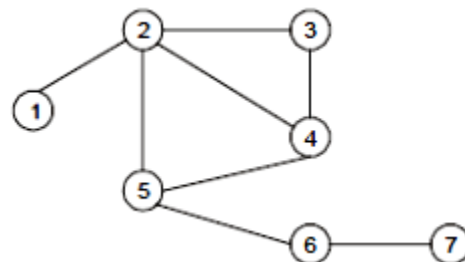Q. 18 In the spanning tree shown, what will be the minimum cost?

A 23

B 21

C 25

D 27

Q. 19 Consider the following graph:

What is the depth first search (DFS) sequence for the above graph?

A 4, 5, 2, 1, 3, 6, 7

B 2, 3, 4, 5, 6, 1, 7

C 2, 1, 5, 3, 4, 6, 7

D 4, 2, 1, 5, 6, 3, 7

Q. 20 Consider the following C program

function( )

```
{
    int i = 1; prep = 1;
    while (prep  n)
    {
        i ++
        prep = prep + i;
        printf("Target GATE 2024");
    }
}
```

What is the time complexity of the program?

A $O(\sqrt{n})$

B   O(n)

C   O(logn)

D $O(n^2)$

Q. 21 **Consider the following C program :**

int m = 1;

for

$$(i = 1; i \leq n; i + +)$$

{ m = m×3;

for

$$(j = 1; j \leq m; j + +)$$

     printf("PSC");

}

The time complexity of the program is:

A $O(n^3)$

B $O(3^n)$

C $O(3^m)$

D $O\left(n \times m^3\right)$

Q. 22 Which of the following statements are true.

A   If the graph contains a negative edge weight cycle then the dijkstra algorithm may fail.

B   If a graph contains a negative edge weight cycle then the dijkstra algorithm will always fail.

C   If a graph contains negative edge weight then the dijkstra algorithm will always fail.

D   If the graph contains negative edge weight then Bellman Ford algorithm will give the correct answer.

E   Both B and D

Q. 23 Which of the following is an postfix notation for the expression "3 + 4 * 2 / (1 - 5) ^ 2"?

A. 3 4 2 * 1 5 - 2 ^ / +

B. 3 + 4 * 2 / (1 - 5) ^ 2

C. + 3 / * 4 2 - 1 5 ^ 2

D. 3 4 2 * 1 5 - / 2 ^ +

Q. 24 Which of the following is a prefix notation for the infix expression "8 / (3 + 2) - 6 * 2"?

A. - / 8 + 3 2 * 6 2

B. - / 8 + 3 2 * 2 6

C. / 8 - + 3 2 * 6 2

D. / 8 - + 3 2 * 2 6

Q. 25 The best data structure to check whether an arithmetic expression has balanced parentheses is a

A. queue

B. stack

C. tree

D. list

Q. 26 The result evaluating the postfix expression 10 5 + 60 6 / * 8 – is

(A) 284

(B) 213

(C) 142

(D) 71

Q. 27 Consider the following sequence of operations on an empty stack.

Push(54); push(52); pop(); push(55); push(62); s=pop();

Consider the following sequence of operations on an empty queue.

enqueue(21); enqueue(24); dequeue(); enqueue(28); enqueue(32); q=dequeue();

The value of s+q is _____.

(A) 86

(B) 68

(C) 24

(D) 94

Q. 28 What will be the output of the prefix expression: +, -, *, 3, 2, /, 8, 4, 1?

A. 12

B. 5

C. 11

D. 4

Q. 29 Two matrices M1 and M2 are to be stored in arrays A and B respectively. Each array can be stored either in row-major or column-major order in contiguous memory locations. The time complexity of an algorithm to compute M1 × M2 will be

(A) best if A is in row-major, and B is in column- major order

(B) best if both are in row-major order

(C) best if both are in column-major order

(D) independent of the storage scheme

Q. 30 Which of the following is NOT a valid way to initialize an array in C?

A. int arr[] = {1, 2, 3};

B. int arr[3] = {1, 2, 3};

C. int arr[3];

arr = {1, 2, 3};

D. All of the above are valid ways to initialize an array in C.