**1. The correct matching of the following pairs is**

(a) Disk check (1) Roundrobin

(b) Batch processing (2) Scan

(c) Time sharing (3) LIFO

(d) Stack operation (4) FIFO

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

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

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

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

**1 answer A-2, B-4, C-1 and D-3**

2. What does the following function do for a given Linked List with first node as head?

void fun1(struct node\* head)

{

if(head == NULL)

return;

fun1(head->next);

printf("%d ", head->data);

}

Prints all nodes of linked lists

Prints all nodes of linked list in reverse order

Prints alternate nodes of Linked List

Prints alternate nodes in reverse order

**2 answer Prints all nodes if linked list in reverse order**

3. A program P reads in 500 integers in the range [0..100] representing the scores of 500 students. It then prints the frequency of each score above 50. What would be the best way for P to store the frequencies?

An array of 50 numbers

An array of 100 numbers

An array of 500 numbers

A dynamically allocated array of 550 numbers

**3 answer An array of 50 numbers**

4. Let A be a square matrix of size n x n. Consider the following program. What is the expected output?

The matrix A itself

Transpose of matrix A

Adding 100 to the upper diagonal elements and subtracting 100 from diagonal elements of A

None of the above

**answer The matrix of A itself**

5. The \_\_\_\_\_\_\_\_\_ time in a swap out of a running process and swap in of a new process into the memory is very high.

a. context – switch

b. waiting

c. execution

d. all of the mentioned

**5 answer a context - switch**

6. Secure shell (SSH) network protocol is used for \_\_\_\_\_\_\_\_\_\_

a) secure data communication

b) remote command-line login

c) remote command execution

d) all of the mentioned

**answer d all of the mentioned**

7.What is the time complexity of following code:

int i, j, k = 0;

for (i = n / 2; i <= n; i++) {

for (j = 2; j <= n; j = j \* 2) {

k = k + n / 2;

}

}

O(n)

O(nLogn)

O(n^2)

O(n^2Logn)

**answer d O(n^2logn)**

8. Number of characters can fit in 2GB RAM? \_\_\_\_

**8.answer A gigabyte stores 2^30 so 2\* 2^30 Makes it 2^31 which is around 480000 characters**

9. Which of the following are not shared by threads?

A. program counter

B. stack

C. Code section

D. Global variables

**9 answer both program counter and stack**

10. Which data structure is used in redo-undo feature?

Stack

Queue

Tree

Graph

**10 answer a Stack**

11. What is recurrence for worst case of QuickSort and what is the time complexity in Worst case?

Recurrence is T(n) = T(n-2) + O(n) and time complexity is O(n^2)

Recurrence is T(n) = T(n-1) + O(n) and time complexity is O(n^2)

Recurrence is T(n) = 2T(n/2) + O(n) and time complexity is O(nLogn)

Recurrence is T(n) = T(n/10) + T(9n/10) + O(n) and time complexity is O(nLogn)

**11 .answer b is the correct answer**

12.. What is time complexity of fun()?

int fun(int n)

{

int count = 0;

for (int i = n; i > 0; i /= 2)

for (int j = 0; j < i; j++)

count += 1;

return count;

}

O(n^2)

O(n\*Logn)

O(n)

O(n\*Logn\*logn)

**12. answer O(n)**

**13: An array consist of n elements.We want to create a min heap using the elements.The time complexity of building a heap will be in order of**

O(logn)

O(n)

O(n \* logn)

O(n \* n)

**13 answer O(n\*logn)**

**14. Which of the following sorting algorithms has the lowest worst-case complexity?**

(A) Merge Sort

(B) Bubble Sort

(C) Quick Sort

(D) Selection Sort

**14. Answer A merge Sort**

15. Which of the following transport layer protocols is used to support electronic mail?

(A) SMTP

(B) IP

(C) TCP

(D) UDP

**15 . Answer SMTP(simple mail transfer Protocol)**

16. A system has n resources R0,…,Rn-1,and k processes P0,….Pk-1.The implementation of the resource request logic of each process Pi is as follows:

if (i % 2 == 0) {

if (i < n) request Ri

if (i+2 < n) request Ri+2

}

else {

if (i < n) request Rn-i

if (i+2 < n) request Rn-i-2

}

In which one of the following situations is a deadlock possible?

(A) n=40, k=26

(B) n=21, k=12

(C) n=20, k=10

(D) n=41, k=19

**16.Answer Option (b) n= 21 K=12**

17. Which of the following data structure/s is best suited for converting recursive implementation to iterative implementation of an algorithm?

Queue

Stack

Tree

Graph

**17.Answer Stack**

18. The Breadth First Search algorithm has been implemented using the queue data structure. One possible order of visiting the nodes of the following graph is

MNOPQR

NQMPOR

QMNPRO

QMNPOR

**18.Answer C QMNPRO**

**Programming Questions**

1) Suppose you have a deck of cards represented as a linked list. You can perfectly shuffle that list by cutting it at the halfway point, then interleaving the two halves by alternating back and forth between the cards. For example, suppose you want to perfectly shuffle this sequence:

1 2 3 4 5 6 7 8 9 10

You'd start by splitting it into two halves, like this:

1 2 3 4 5 6 7 8 9 10

Then, you'd interleave the halves, like this:

6 1 7 2 8 3 9 4 10 5

The resulting list is said to have been perfectly shuffled. Your job is to write a function that accepts as input a linked list with an even number of elements, then rearranges the elements in that list so that they're perfectly shuffled.

**Code below for question 1**

**typedef struct Node{**

**int val;**

**node\* next;**

**} node;**

**node\* getMidPoint(node\* head){**

**node \*t1=head,\*t2=head;**

**while(t2!=NULL || t2->next!=NULL){**

**t2=t2->next->next;**

**t1=t1->next;**

**}**

**return t1;**

**}**

**node\* shuffle(node\* head){**

**node\* midpoint = getMidPoint(head);**

**node\* ans=midpoint;**

**while(midpoint!=NULL || head!=NULL){**

**midpoint->next = head;**

**node\* t=head->next;**

**midpoint=midpoint->next;**

**head->next=midpoint;**

**head=t;**

**}**

**return ans;**

**}**

**2) Given a number n, generate all distinct ways to write n as the sum of positive integers**.

For example, with n = 4, the options are 4, 3 + 1, 2 + 2, 2 + 1 + 1, and 1 + 1 + 1 + 1.

**code for question 2**

**void dfs(vector<int>& nums, int target,int& count,int n,vector<int>& path){**

**if(target<0){**

**return;**

**}**

**if(target == 0){**

**for(int s:path) cout << x <<" ";**

**cout << endl;**

**count++;**

**}**

**for(int i=0;i<n;i++){**

**path.push\_back(nums[i]);**

**dfs(nums,target-nums[i],count,n,);**

**path.pop\_back();**

**}**

**}**

**3)** Given a list of x, y values that represent points in an x, y coordinate system. Process the list of x, y coordinates to determine which two are the closest.

**code for Question 3**

**vector<pair<int,int>> firsttwopoints(vector<pair<int,int>> cord){**

**sort(cord.begin(),cord.end(),[](pair<int,int>& a,pair<int,int>& b){**

**return a.first\*a.first + a.second\*a.second > b.first\*b.first + b.second\*b.second**

**})**

**return {cord[0],cord[1]};**

**}**