CSE209-DATA STRUCTURES & ALGORITHMS

CIA – 3

Part A

Answer ALL the questions **10 X 2 = 20**

1. Write the asymptotic notations for the following computation times:
   a) $T(n) = 6\log(n^2) + 100n$
   b) $T(n) = 5n^2 + n^{3/2}$

2. Does the following recursive function work, if it is called with a positive integer for n? Justify your answer:

```
int Recurr(n, A)
   if (n == 0) return A[n]
   else if ( n mod 2 == 0) return Recurr(n-1, A)
        else return Recurr(n+1, A)
```

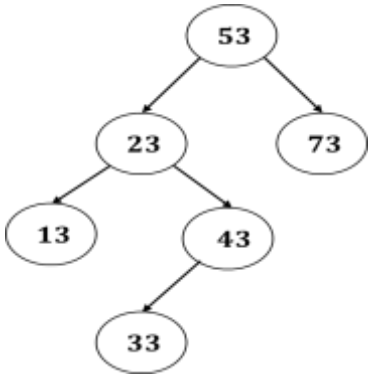
3. Imagine you have a stack of integers, S, and a queue of integers, Q. Draw a picture of S and Q after the following operations:

   i) pushStack (S, 3) ii) pushStack (S, 12) iii) enqueue (Q, 5) iv) enqueue (Q, 8)
   v) popStack (S, x) vi) pushStack (S, 2) vii) enqueue (Q, x)
   viii) dequeue (Q, y) ix) pushStack (S, x) x) pushStack (S, y)

4. What data structures can be used to store the following information
   a) To facilitate Sequence of undo or redo operations in a text editor
   b) To store folders in your laptop

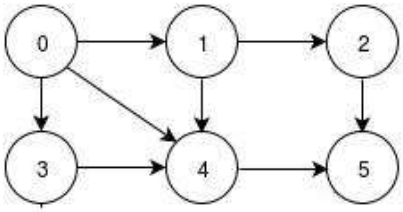
5. What will be minimum and maximum heights of a Binary tree with 27 nodes?

6. Perform required rotation(s) on the part of the AVL tree below:



7. Trace a call to PARTITION algorithm of quick sort on the following list:
   200, 500, 300, 800, 400

8. Write the adjacency matrix for the following graph:



9. What clustering is (are) avoided by key offset collision resolution and how?

10. Demonstrate Folding hash function on the key: 203112123241

Part B

Answer any TWO questions **2 X 10 = 20**

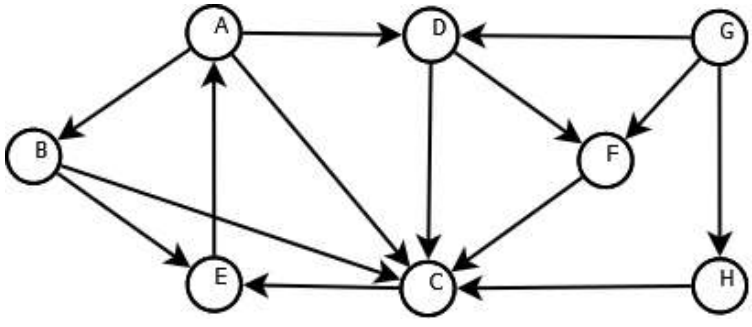
11. Assume that a singly linked list of a sequence of p integers is given. Write algorithms to find M^{th} and N^{th} nodes in the list (for a pair of given integers M & N required to be between 1 and p), swap those nodes in the list and display them. Use standard SLL ADT functions wherever possible **(10)**

12. a) Write a recursive algorithm for finding whether the given string is a palindrome or not. The function returns 1 if yes and 0 otherwise

b) Construct a Binary Search Tree for the following input data in that order. Demonstrate deleting ***set*** from the BST: **(5)**

Get, Set, Bet, Pet, Net, Tit, Sit, Pit, Bit

13. Trace Breadth First Search Algorithm on the following graph, showing status of data structure used. Assume that the root is A and the adjacency list is stored in alphabetical order of vertex names: **(10)**



Part C

14. Demonstrate Heap Sort on the following elements, showing the intermediate steps: **20, 60, 40, 50, 90, 10, 70, 30** **(10)**