RAMANUJAN COLLEGE

KALKAJI, NEW DELHI -110019

Name – Shivansh Kumar

Course – BSC (HONOURS) Computer Science

Semester - IV

College Roll no- 20191434

University Roll no- 19020570031

Submitted to : Mr. Vipin Rathi Sir

Design and Analysis Of Algorithms

Practical 2021

1. Write a program to Implement RB Tree supporting following operations:

   a. Insert a node

   b. Delete a node

   c. Search a number and report the color of node having this number.

Output:

```
Enter your choice.
1.Insertion.
2.Deletion.
3.Search a number.
4.Display its preorder and inorder transversals.
5.Exit.
1
```

```
Enter the number to be inserted in tree.
34
```

```
Enter your choice.
1.Insertion.
2.Deletion.
3.Search a number.
4.Display its preorder and inorder transversals.
5.Exit.
3
```

```
Enter number to be searched.
34

34color :blackPress any key to continue . . .
```

```
Enter your choice.
1.Insertion.
2.Deletion.
3.Search a number.
4.Display its preorder and inorder transversals.
5.Exit.
2
```

```
Enter number to be deleted.
34
Press any key to continue . . .
```

```
Enter your choice.
1.Insertion.
2.Deletion.
3.Search a number.
4.Display its preorder and inorder transversals.
5.Exit.
4
```

```
Preorder:

Element: 34      Color: Black
Inorder:

Element: 34      Color: BlackPress any key to continue . . .
```

```
Enter your choice.
1.Insertion.
2.Deletion.
3.Search a number.
4.Display its preorder and inorder transversals.
5.Exit.
5
```

```
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Process exited after 2.832 seconds with return value 0
Press any key to continue . . .
```

2. Using any greedy approach find the Minimum Spanning Tree of a graph.

Output:

```
Enter the no. of vertices : 3
Enter the no. of edges : 2
Enter the no. from which graph starts : 5
Press 0 to enter edges manually or Press 1 to enter edges with help : 1

Enter weight of the edge between 5 and 5 vertices :(0 if no edge present) : 2
Enter weight of the edge between 5 and 6 vertices :(0 if no edge present) : 1
Enter weight of the edge between 5 and 7 vertices :(0 if no edge present) : 5
Enter weight of the edge between 6 and 6 vertices :(0 if no edge present) : 3
Enter weight of the edge between 6 and 7 vertices :(0 if no edge present) : 2
Enter weight of the edge between 7 and 7 vertices :(0 if no edge present) : 0


The minimum Spanning Tree is :-

Edge    Weight
5 - 6   1
6 - 7   2


Press 1 to search again / any other key to exit : 3

--------------------------------
Process exited after 29.55 seconds with return value 0
Press any key to continue . . .
```

3. Implement Bubble, selection, insertion, merge, quick sort. And count the number of comparisons in each case.

Output:

```
A random array is created with 17 elements:-

12010 4911 2928 18162 11594 24213 20715 3509 26789 32221 32335 26136 14101 8195 12984 11923 2495


Please select the sorting method you want to use :-
1. Merge sort
2. Insertion sort
3. Quick sort
4. Bubble Sort
5. Selection sort
Press any ohter key to exit.

Enter your choice :- 1
Sorted array is :-
2495 2928 3509 4911 8195 11594 11923 12010 12984 14101 18162 20715 24213 26136 26789 32221 32335


No. of comparisons :- 46

Press 1 to search again / any other key to exit : 3

--------------------------------
Process exited after 24.01 seconds with return value 0
Press any key to continue . . .
```

```
A random array is created with 12 elements:-

802 12669 11545 17393 18769 26279 9399 3329 32416 13437 5161 19725


Please select the sorting method you want to use :-
1. Merge sort
2. Insertion sort
3. Quick sort
4. Bubble Sort
5. Selection sort
Press any ohter key to exit.

Enter your choice :- 3
Sorted array is :-
802 3329 5161 9399 11545 12669 13437 17393 18769 19725 26279 32416


No. of comparisons :- 31

Press 1 to search again / any other key to exit : 3

--------------------------------
Process exited after 7.733 seconds with return value 0
Press any key to continue . . .
```

```
23114 3175 13552 13676 24997 16418 30371 10985 23980 4563 7803 4569 28072 29361 11175 13384 7372 17719 10884 4517 16150
22135 6315 17083 5494 433 18989 23011 32050 12836 13341 4983 11913 14116 16463 27273 20119 7789 3680 26069 22648 2231 17
910 12533 8624 11402 24137 21972 32202 31572 32483 10853 17728 7353 23972 18069 17307 13354 15880 5758 20699 9401 30125
23773 6681 18219 6671 14790


Please select the sorting method you want to use :-
1. Merge sort
2. Insertion sort
3. Quick sort
4. Bubble Sort
5. Selection sort
Press any ohter key to exit.

Enter your choice :- 2
Sorted array is :-
433 2231 3175 3680 4517 4563 4569 4983 5494 5758 6315 6671 6681 7353 7372 7789 7803 8624 9401 10853 10884 10985 11175 11
402 11913 12533 12836 13341 13354 13384 13552 13676 14116 14790 15880 16150 16418 16463 17083 17307 17719 17728 17910 18
069 18219 18989 20119 20699 21972 22135 22648 23011 23114 23773 23972 23980 24137 24997 26069 27273 28072 29361 30125 30
371 31572 32050 32202 32483


No. of comparisons :- 1145

Press 1 to search again / any other key to exit : 4

--------------------------------
Process exited after 5.313 seconds with return value 0
Press any key to continue . . .
```

```
A random array is created with 57 elements:-

23407 11545 6854 20273 2383 9669 15647 2384 9396 28309 10490 11553 21590 6827 20222 10882 17199 31088 4097 12735 10215 2
0535 8221 23128 24720 22302 8198 9989 30355 32053 24730 2808 7914 14307 1210 21602 2704 24965 30041 8248 6966 27479 2350
6 15159 20536 26264 5759 5158 32719 10473 23431 9051 12424 4087 32247 27520 9973


Please select the sorting method you want to use :-
1. Merge sort
2. Insertion sort
3. Quick sort
4. Bubble Sort
5. Selection sort
Press any ohter key to exit.

Enter your choice :- 4
Sorted array is :-
1210 2383 2384 2704 2808 4087 4097 5158 5759 6827 6854 6966 7914 8198 8221 8248 9051 9396 9669 9973 9989 10215 10473 104
90 10882 11545 11553 12424 12735 14307 15159 15647 17199 20222 20273 20535 20536 21590 21602 22302 23128 23407 23431 235
06 24720 24730 24965 26264 27479 27520 28309 30041 30355 31088 32053 32247 32719


No. of comparisons :- 1596

Press 1 to search again / any other key to exit : 4

--------------------------------
Process exited after 7.885 seconds with return value 0
Press any key to continue . . .
```

```
A random array is created with 25 elements:-

21086 25734 658 17748 5903 16839 22550 12080 895 17068 13838 22939 1159 22263 27197 17433 8492 6383 22500 28345 7118 147
82 17042 18842 13219


Please select the sorting method you want to use :-
1. Merge sort
2. Insertion sort
3. Quick sort
4. Bubble Sort
5. Selection sort
Press any ohter key to exit.

Enter your choice :- 5
Sorted array is :-
658 895 1159 5903 6383 7118 8492 12080 13219 13838 14782 16839 17042 17068 17433 17748 18842 21086 22263 22500 22550 229
39 25734 27197 28345


No. of comparisons :- 300

Press 1 to search again / any other key to exit : 3

--------------------------------
Process exited after 20.99 seconds with return value 0
Press any key to continue . . .
```