OUTPUT FOR 2 CASSES->

i.   MISPLACED TILES->

```
8 3 2 4 6 5 0 1 7
14
5 1 8 3 6 4 7 2 0
14
7 2 5 0 8 3 1 6 4
16
4 3 6 8 5 7 0 1 2
16
3 5 1 0 7 8 2 6 4
12
6 0 8 7 2 5 3 4 1
22
7 4 5 2 0 6 8 3 1
18
1 2 6 4 8 7 0 5 3
10
0 3 4 6 1 7 5 2 8
10
7 0 3 1 8 5 2 4 6
14
-----------------------------
Moves Required: 20
f = 6 g = 0 h = 6
8 3 2
4 6 5
0 1 7

f = 7 g = 1 h = 6
8 3 2
0 6 5
4 1 7

f = 8 g = 2 h = 6
8 3 2
6 0 5
4 1 7

f = 9 g = 3 h = 6
8 3 2
6 1 5
4 0 7

f = 10 g = 4 h = 6
8 3 2
6 1 5
0 4 7

f = 10 g = 5 h = 5
8 3 2
0 1 5
6 4 7

f = 11 g = 6 h = 5
8 3 2
1 0 5
6 4 7

f = 12 g = 7 h = 5
8 0 2
1 3 5
6 4 7

f = 13 g = 8 h = 5
0 8 2
1 3 5
```

```
6 4 7

f = 14 g = 9 h = 5
1 8 2
0 3 5
6 4 7

f = 14 g = 10 h = 4
1 8 2
3 0 5
6 4 7

f = 15 g = 11 h = 4
1 0 2
3 8 5
6 4 7

f = 17 g = 12 h = 5
1 2 0
3 8 5
6 4 7

f = 19 g = 13 h = 6
1 2 5
3 8 0
6 4 7

f = 20 g = 14 h = 6
1 2 5
3 0 8
6 4 7

f = 20 g = 15 h = 5
1 2 5
3 4 8
6 0 7

f = 20 g = 16 h = 4
1 2 5
3 4 8
6 7 0

f = 20 g = 17 h = 3
1 2 5
3 4 0
6 7 8

f = 20 g = 18 h = 2
1 2 0
3 4 5
6 7 8

f = 20 g = 19 h = 1
1 0 2
3 4 5
6 7 8

f = 20 g = 20 h = 0
0 1 2
3 4 5
6 7 8
```

Time taken to reach Goal state: 8927 milliseconds
Nodes removed from the frontier (): 3751

```
-----------------------------
Moves Required: 18
f = 6 g = 0 h = 6
```

```
5 1 8
3 6 4
7 2 0

f = 7 g = 1 h = 6
5 1 8
3 6 0
7 2 4

f = 8 g = 2 h = 6
5 1 0
3 6 8
7 2 4

f = 10 g = 3 h = 7
5 0 1
3 6 8
7 2 4

f = 11 g = 4 h = 7
0 5 1
3 6 8
7 2 4

f = 13 g = 5 h = 8
3 5 1
0 6 8
7 2 4

f = 14 g = 6 h = 8
3 5 1
6 0 8
7 2 4

f = 15 g = 7 h = 8
3 5 1
6 2 8
7 0 4

f = 16 g = 8 h = 8
3 5 1
6 2 8
7 4 0

f = 16 g = 9 h = 7
3 5 1
6 2 0
7 4 8

f = 17 g = 10 h = 7
3 5 1
6 0 2
7 4 8

f = 18 g = 11 h = 7
3 0 1
6 5 2
7 4 8

f = 18 g = 12 h = 6
3 1 0
6 5 2
7 4 8

f = 18 g = 13 h = 5
3 1 2
6 5 0
7 4 8

f = 18 g = 14 h = 4
3 1 2
```

6 0 5
7 4 8

f = 18 g = 15 h = 3
3 1 2
6 4 5
7 0 8

f = 18 g = 16 h = 2
3 1 2
6 4 5
0 7 8

f = 18 g = 17 h = 1
3 1 2
0 4 5
6 7 8

f = 18 g = 18 h = 0
0 1 2
3 4 5
6 7 8

ii.   MANHATTAN DISTANCE HEURISTIC-
8 3 2 4 6 5 0 1 7
14
5 1 8 3 6 4 7 2 0
14
7 2 5 0 8 3 1 6 4
16
4 3 6 8 5 7 0 1 2
16
3 5 1 0 7 8 2 6 4
12
6 0 8 7 2 5 3 4 1
22
7 4 5 2 0 6 8 3 1
18
1 2 6 4 8 7 0 5 3
10
0 3 4 6 1 7 5 2 8
10
7 0 3 1 8 5 2 4 6
14

Moves Required: 20
f = 12 g = 0 h = 12
8 3 2
4 6 5
0 1 7

f = 14 g = 1 h = 13
8 3 2
0 6 5
4 1 7

f = 14 g = 2 h = 12
8 3 2
6 0 5
4 1 7

f = 14 g = 3 h = 11
8 3 2
6 1 5
4 0 7

f = 14 g = 4 h = 10
8 3 2
6 1 5
0 4 7

f = 14 g = 5 h = 9
8 3 2
0 1 5
6 4 7

f = 14 g = 6 h = 8
0 3 2
8 1 5
6 4 7

f = 14 g = 7 h = 7
3 0 2
8 1 5
6 4 7

f = 14 g = 8 h = 6
3 1 2
8 0 5
6 4 7

f = 14 g = 9 h = 5
3 1 2
0 8 5
6 4 7

f = 14 g = 10 h = 4
0 1 2
3 8 5
6 4 7

f = 16 g = 11 h = 5
1 0 2
3 8 5
6 4 7

f = 18 g = 12 h = 6
1 2 0
3 8 5
6 4 7

f = 20 g = 13 h = 7
1 2 5
3 8 0
6 4 7

f = 20 g = 14 h = 6
1 2 5
3 0 8
6 4 7

f = 20 g = 15 h = 5
1 2 5
3 4 8
6 0 7

f = 20 g = 16 h = 4
1 2 5
3 4 8
6 7 0

f = 20 g = 17 h = 3
1 2 5
3 4 0
6 7 8

f = 20 g = 18 h = 2
1 2 0
3 4 5
6 7 8

f = 20 g = 19 h = 1
1 0 2
3 4 5
6 7 8

f = 20 g = 20 h = 0
0 1 2
3 4 5
6 7 8

Time taken to reach Goal state: 290 milliseconds
Nodes removed from the frontier (): 517

Moves Required: 18
f = 12 g = 0 h = 12
5 1 8
3 6 4
7 2 0

f = 14 g = 1 h = 13
5 1 8
3 6 0
7 2 4

f = 14 g = 2 h = 12
5 1 0
3 6 8
7 2 4

f = 16 g = 3 h = 13
5 0 1
3 6 8
7 2 4

f = 16 g = 4 h = 12
0 5 1
3 6 8
7 2 4

f = 18 g = 5 h = 13
3 5 1
0 6 8
7 2 4

f = 18 g = 6 h = 12
3 5 1
6 0 8
7 2 4

f = 18 g = 7 h = 11
3 5 1
6 2 8
7 0 4

f = 18 g = 8 h = 10
3 5 1
6 2 8
7 4 0

f = 18 g = 9 h = 9
3 5 1
6 2 0
7 4 8

f = 18 g = 10 h = 8
3 5 1
6 0 2

7 4 8

f = 18 g = 11 h = 7
3 0 1
6 5 2
7 4 8

f = 18 g = 12 h = 6
3 1 0
6 5 2
7 4 8

f = 18 g = 13 h = 5
3 1 2
6 5 0
7 4 8

f = 18 g = 14 h = 4
3 1 2
6 0 5
7 4 8

f = 18 g = 15 h = 3
3 1 2
6 4 5
7 0 8

f = 18 g = 16 h = 2
3 1 2
6 4 5
0 7 8

f = 18 g = 17 h = 1
3 1 2
0 4 5
6 7 8

f = 18 g = 18 h = 0
0 1 2
3 4 5
6 7 8

Time taken to reach
Goal state: 120
milliseconds
Nodes removed from
the frontier (): 161

iii.   Novel_heuristic-
8 3 2 4 6 5 0 1 7
14
5 1 8 3 6 4 7 2 0
14
7 2 5 0 8 3 1 6 4
16
4 3 6 8 5 7 0 1 2
16
3 5 1 0 7 8 2 6 4
12
6 0 8 7 2 5 3 4 1
22
7 4 5 2 0 6 8 3 1
18
1 2 6 4 8 7 0 5 3
10
0 3 4 6 1 7 5 2 8
10
7 0 3 1 8 5 2 4 6
14

-

Moves Required: 20
f = 9 g = 0 h = 9
8 3 2
4 6 5
0 1 7

f = 11 g = 1 h = 10
8 3 2
4 6 5
1 0 7

f = 11 g = 2 h = 9
8 3 2
4 0 5
1 6 7

f = 11 g = 3 h = 8
8 3 2
0 4 5
1 6 7

f = 12 g = 4 h = 8
8 3 2
1 4 5
0 6 7

f = 12 g = 5 h = 7
8 3 2
1 4 5
6 0 7

f = 14 g = 6 h = 8
8 3 2
1 0 5
6 4 7

f = 14 g = 7 h = 7
8 0 2
1 3 5
6 4 7

f = 15 g = 8 h = 7
0 8 2
1 3 5
6 4 7

f = 15 g = 9 h = 6
1 8 2
0 3 5
6 4 7

f = 15 g = 10 h = 5
1 8 2
3 0 5
6 4 7

f = 16 g = 11 h = 5
1 0 2
3 8 5
6 4 7

f = 18 g = 12 h = 6
1 2 0
3 8 5
6 4 7

f = 20 g = 13 h = 7
1 2 5
3 8 0
6 4 7

f = 20 g = 14 h = 6
1 2 5
3 0 8
6 4 7

f = 20 g = 15 h = 5
1 2 5
3 4 8
6 0 7

f = 20 g = 16 h = 4
1 2 5
3 4 8
6 7 0

f = 20 g = 17 h = 3
1 2 5
3 4 0
6 7 8

f = 20 g = 18 h = 2
1 2 0
3 4 5
6 7 8

f = 20 g = 19 h = 1
1 0 2
3 4 5
6 7 8

f = 20 g = 20 h = 0
0 1 2
3 4 5
6 7 8

Time taken to reach
Goal state: 816
milliseconds
Nodes removed from
the frontier (): 1014

-
Moves Required: 18
f = 9 g = 0 h = 9
5 1 8
3 6 4
7 2 0

f = 11 g = 1 h = 10
5 1 8
3 6 0
7 2 4

f = 12 g = 2 h = 10
5 1 0
3 6 8
7 2 4

f = 14 g = 3 h = 11
5 0 1
3 6 8
7 2 4

f = 15 g = 4 h = 11
0 5 1
3 6 8
7 2 4

f = 17 g = 5 h = 12
3 5 1
0 6 8

7 2 4

f = 17 g = 6 h = 11
3 5 1
6 0 8
7 2 4

f = 18 g = 7 h = 11
3 5 1
6 2 8
7 0 4

f = 18 g = 8 h = 10
3 5 1
6 2 8
7 4 0

f = 18 g = 9 h = 9
3 5 1
6 2 0
7 4 8

f = 18 g = 10 h = 8
3 5 1
6 0 2
7 4 8

f = 18 g = 11 h = 7
3 0 1
6 5 2
7 4 8

f = 18 g = 12 h = 6
3 1 0
6 5 2
7 4 8

f = 18 g = 13 h = 5
3 1 2
6 5 0
7 4 8

f = 18 g = 14 h = 4
3 1 2
6 0 5
7 4 8

f = 18 g = 15 h = 3
3 1 2
6 4 5
7 0 8

f = 18 g = 16 h = 2
3 1 2
6 4 5
0 7 8

f = 18 g = 17 h = 1
3 1 2
0 4 5
6 7 8

f = 18 g = 18 h = 0
0 1 2
3 4 5
6 7 8

Time taken to reach
Goal state: 238
milliseconds

Nodes removed from
the frontier (): 377