# PES UNIVERSITY RR CAMPUS

# GRAPH THEORY AND ITS APPLICATIONS
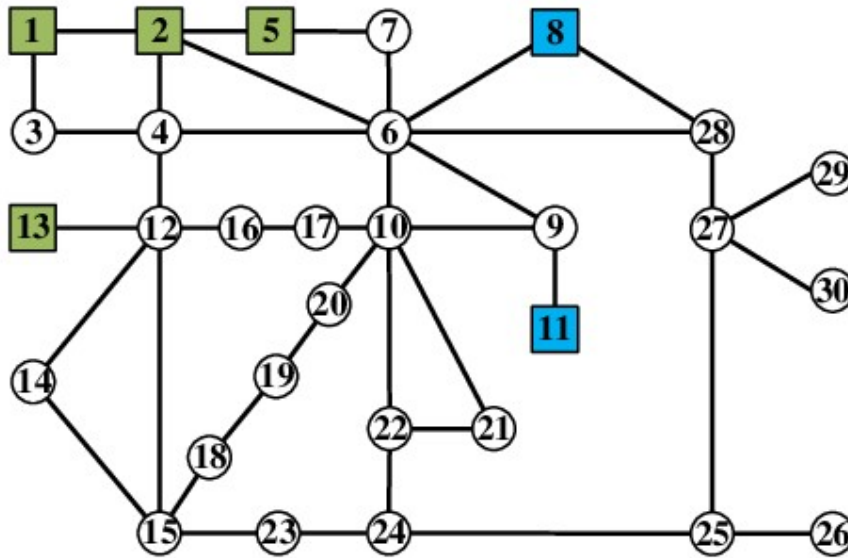
# UE20CS323

# CASE STUDY : 1

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TOPIC  :  GRAPH COLOURING USING GREEDY TECHNIQUE AND WELSH POWELL COMPARISON

**(The 2 program files are attached in the zip file.)**

## GRAPH USED IS (WITH 30 nodes) :-



## IN GREEDY TECHNIQUE :-



```
Command Prompt                    ×    +   ∨

C:\Users\sutha\Documents\PESU\GTA\UNIT 2>a
Enter the number of vertices and edges :-
30 40
Enter edge in this format : " u v " where u and v are vertices and u is connected to v:-
0 1
0 2
2 3
1 4
4 6
1 5
1 3
3 5
6 5
5 7
5 27
7 27
27 26
26 28
26 29
26 24
24 25
5 8
8 9
9 5
9 16
16 15
15 11
11 3
11 12
11 13
11 14
13 14
14 17
17 18
```

```
14 17
17 18
18 19
19 9
14 22
22 23
9 21
21 20
9 20
21 23
23 24
8 10
The pattern of colouring is:-
Vertex 0 ---> Color 0
Vertex 1 ---> Color 1
Vertex 2 ---> Color 1
Vertex 3 ---> Color 0
Vertex 4 ---> Color 0
Vertex 5 ---> Color 2
Vertex 6 ---> Color 1
Vertex 7 ---> Color 0
Vertex 8 ---> Color 0
Vertex 9 ---> Color 1
Vertex 10 ---> Color 1
Vertex 11 ---> Color 1
Vertex 12 ---> Color 0
Vertex 13 ---> Color 0
Vertex 14 ---> Color 2
Vertex 15 ---> Color 0
Vertex 16 ---> Color 2
Vertex 17 ---> Color 0
Vertex 18 ---> Color 1
Vertex 19 ---> Color 0
Vertex 20 ---> Color 0
Vertex 21 ---> Color 2
```

```
The pattern of colouring is:-
Vertex 0 ---> Color 0
Vertex 1 ---> Color 1
Vertex 2 ---> Color 1
Vertex 3 ---> Color 0
Vertex 4 ---> Color 0
Vertex 5 ---> Color 2
Vertex 6 ---> Color 1
Vertex 7 ---> Color 0
Vertex 8 ---> Color 0
Vertex 9 ---> Color 1
Vertex 10 ---> Color 1
Vertex 11 ---> Color 1
Vertex 12 ---> Color 0
Vertex 13 ---> Color 0
Vertex 14 ---> Color 2
Vertex 15 ---> Color 0
Vertex 16 ---> Color 2
Vertex 17 ---> Color 0
Vertex 18 ---> Color 1
Vertex 19 ---> Color 0
Vertex 20 ---> Color 0
Vertex 21 ---> Color 2
Vertex 22 ---> Color 0
Vertex 23 ---> Color 1
Vertex 24 ---> Color 0
Vertex 25 ---> Color 1
Vertex 26 ---> Color 1
Vertex 27 ---> Color 3
Vertex 28 ---> Color 0
Vertex 29 ---> Color 0
Chromatic Number of the graph is 4
Time : 11400.000000 ns

C:\Users\sutha\Documents\PESU\GTA\UNIT 2>
```

## OBSERVATIONS IN GREEDY TECHNIQUE :-

The time taken was **11.4 microseconds** in Greedy.

The Chromatic number of the graph was **4** in Greedy.

## IN WELSH POWELL TECHNIQUE :-

```
C:\Users\sutha\Documents\PESU\GTA\UNIT 2>gcc welsh_powell.c

C:\Users\sutha\Documents\PESU\GTA\UNIT 2>a
Enter the number of vertices and edges :-
30 40
Enter edge in this format : " u v " where u and v are vertices and u is connected to v:-
0 1
0 2
2 3
1 4
4 6
1 5
1 3
3 5
6 5
5 7
5 27
7 27
27 26
26 28
26 29
26 24
24 25
5 8
8 9
9 5
9 16
16 15
15 11
11 3
11 12
11 13
11 14
```

```
11 13
11 14
13 14
14 17
17 18
18 19
19 9
14 22
22 23
9 21
21 20
9 20
21 23
23 24
8 10
The pattern of colouring is:-
Vertex 0 ---> Color 1
Vertex 1 ---> Color 2
Vertex 2 ---> Color 2
Vertex 3 ---> Color 3
Vertex 4 ---> Color 1
Vertex 5 ---> Color 1
Vertex 6 ---> Color 2
Vertex 7 ---> Color 2
Vertex 8 ---> Color 3
Vertex 9 ---> Color 2
Vertex 10 ---> Color 1
Vertex 11 ---> Color 1
Vertex 12 ---> Color 2
Vertex 13 ---> Color 2
Vertex 14 ---> Color 2
Vertex 15 ---> Color 2
Vertex 16 ---> Color 1
Vertex 17 ---> Color 1
Vertex 18 ---> Color 2
```

```
The pattern of colouring is:-
Vertex 0 ---> Color 1
Vertex 1 ---> Color 2
Vertex 2 ---> Color 2
Vertex 3 ---> Color 3
Vertex 4 ---> Color 1
Vertex 5 ---> Color 1
Vertex 6 ---> Color 2
Vertex 7 ---> Color 2
Vertex 8 ---> Color 3
Vertex 9 ---> Color 2
Vertex 10 ---> Color 1
Vertex 11 ---> Color 1
Vertex 12 ---> Color 2
Vertex 13 ---> Color 2
Vertex 14 ---> Color 2
Vertex 15 ---> Color 2
Vertex 16 ---> Color 1
Vertex 17 ---> Color 1
Vertex 18 ---> Color 2
Vertex 19 ---> Color 1
Vertex 20 ---> Color 1
Vertex 21 ---> Color 2
Vertex 22 ---> Color 1
Vertex 23 ---> Color 2
Vertex 24 ---> Color 1
Vertex 25 ---> Color 2
Vertex 26 ---> Color 2
Vertex 27 ---> Color 3
Vertex 28 ---> Color 2
Vertex 29 ---> Color 2
Chromatic Number of the graph is 3
Time : 4500.000000 ns

C:\Users\sutha\Documents\PESU\GTA\UNIT 2>
```

## OBSERVATIONS IN WELSH POWELL TECHNIQUE:-

The time taken was **4.5 microseconds** in Welsh Powell.

The Chromatic number of the graph was **3** in Welsh Powell.

**CONCLUSION :-**

Therefore , Welsh Powell is little optimal in comparison to Greedy by taking less time and less chromatic number.

# THANK YOU