

THE RAINBOW CONNECTION NUMBER OF THE EXTENDED VERSION OF THE SANDAT GRAPH

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Graph colouring is a fundamental problem in Graph Theory, with applications varying over diverse domains related to real-world applications such as channel assignment in cellular networks, scheduling and task assignment, and register allocation in computer optimisation. Graph colouring is a special case of graph labelling with assigning colours to edges or vertices of a graph. Assigning colours to each edge in a graph so that no two adjacent edges have the same colour with a given optimal number of colours is the edge colouring of a graph. In an edge-coloured graph, if there is a path with no two edges having the same colour, then that path is called a rainbow path. If every pair of vertices in a graph is connected by at least one rainbow path, then that graph is called a rainbow-connected graph. The minimum number of colours used in a rainbow-connected graph is the rainbow connection number $rc(G)$ of that graph. The Sandat graph on $3n + 1$ vertices, denoted by $St(n)$, is a graph with the vertex set $V(St(n)) = \{r, s_{ij}, t_i | 1 \leq i \leq n \text{ and } 1 \leq j \leq 2\}$ and the edge set $E(St(n)) = \{rt_i, rs_{ij}, s_{ij}t_i | 1 \leq i \leq n \text{ and } 1 \leq j \leq 2\}$. In this study, an extended version of the Sandat graph $SSt_m(n)$ having n number of petals was obtained using the symmetrical subdivisions of having $2(2 + m)$; $m \in \{1, 2, 3, \dots\}$ vertices for each petal and with the vertex set $V(SSt_m(n))$ and the edge set $E(SSt_m(n))$ denoted by $V(SSt_m(n)) = \{r, s_{ij}^h, t_i; 1 \leq i \leq n, 1 \leq j \leq 2, 1 \leq h \leq m + 1\}$ and $E(SSt_m(n)) = \{rt_i, rs_{ij}^h, t_i s_{ij}^1, s_{ij}^k s_{ij}^{k+1}; 1 \leq i \leq n, 1 \leq j \leq 2, 1 \leq h \leq m + 1, 1 \leq k \leq m\}$. The rainbow connection number of the extended version of the Sandat graph $SSt_m(n)$ having n number of petals is three when $n \geq 2$ was proved. Future study plans to introduce the non-symmetric extended version of the Sandat graph and the rainbow colouring of that graph.

Keywords: Edge colouring, Rainbow colouring, Rainbow connection number, Sandat graph