1. If $V = \emptyset$ Then
   \begin{align*}
   w &= 0 \\
   \text{stop}
   \end{align*}
   Endif
2. If there is a vertex in $V$ with $\text{deg}(v)$ maximal
3. $V = V - v$
4. If $\text{odd}(p)$ Then
   \begin{align*}
   w &= \text{smallest even integer greater than or equal to } \text{deg}(v) \\
   \text{Else}
   w &= \text{deg}(v) \\
   \text{Endif}
   \end{align*}
5. If $w = \text{deg}(v)$ then
   \begin{align*}
   \text{Label}(v,u_i) &= 1 \text{ for all } i \\
   \text{Else}
   \text{Label}(v,u_i) &= 1, \text{ for } i = 1, \text{deg}(v) - 1 \\
   \text{Label}(v,u_i) &= w - (\text{deg}(v) - 1), \text{ for } i = \text{deg}(v) \\
   \text{Endif}
   \end{align*}
6. Success = Magic(w)
7. While Not Success and $w \leq q$
   \begin{align*}
   \text{While Not Success and Next deg}(v) \text{ Permutation of } w \text{ Exists}
   \text{Reinitialize } G \\
   \text{Label}(v,u_i) &= \text{new permutation of } w \\
   \text{Success} &= \text{Magic}(w).
   \end{align*}
   Endwhile
8. If $\text{odd}(p)$ Then
   \begin{align*}
   w &= w + 2 \\
   \text{Else}
   w &= w + 1
   \end{align*}
   Endif
Endwhile

Figure 3 Algorithm Magiclabel

whose edges have not been completely labeled, and is removed from further consideration (step 3). An attempt is then made to label the edges of this vertex (step 4). Failure to label the edges of the vertex with $w$ indicates that a magic label assignment is impossible given the labeling already performed (step 5). In this case the algorithm backtracks to the labeling of the edges of the previous vertex. If a new permutation of labels is possible with $w$ for the edges of the previous vertex, it is tried and the search moves forward again; otherwise the algorithm backtracks further until a new labeling can be tried. It is noted that this step ensures that unnecessary computation is not performed for a search path that leads to a dead end, thus making the search process more efficient. If, however, the labeling of the edges for the current vertex is successful, the search continues with the labeling of the rest of the edges (see also step 5). If a successful labeling is not possible for the rest of the edges, a new permutation of $w$ is tried for the labeling of the edges of the current vertex (step 6).