Introduce 0–1 variables for every node, call them $y_i$ for all $i$.

Change the node constraints

$$\sum_j x_{ij} = \sum_j x_{ji} = 1 \forall i$$

to

$$\sum_j x_{ij} = \sum_j x_{ji} = y_i \forall i$$

and add the constraints

$$\sum_i y_i = k, \ y_1 = 1.$$