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Modular Edge-Graceful Graphs.

In an edge-graceful labeling of a graph G of order n and size m, distinct edges of G are assigned distinct labels from the set $\{1, 2, \ldots, m\}$ so that for every two distinct vertices of G the sums of the labels of their incident edges are distinct in $\mathbb{Z}_n$. A graph that admits an edge-graceful labeling is called an edge-graceful graph. When $m > n$, this edge labeling is not actually a bijective labeling. This suggests removing altogether the requirement that edge labelings be bijective. We study such modular edge-graceful labelings and resulting modular edge-graceful graphs, primarily focusing on which graphs are modular edge-graceful. (Received September 21, 2010)