PLANARITY OF ECCENTRIC DIGRAPH OF GRAPHS

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Abstract

The eccentricity $e(u)$ of a vertex u is the maximum distance of u to any other vertex of G. A vertex v is an eccentric vertex of vertex u if the distance from u to v is equal to $e(u)$. The eccentric digraph $ED(G)$ of a graph(digraph) G is the digraph that has the same vertex set as G and an arc from u to v exists in $ED(G)$ if and only if v is an eccentric vertex of u in G. In this paper, we consider planarity of eccentric digraph of a graph.

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1. INTRODUCTION

Unless mentioned otherwise for terminology and notation the reader may refer Buckley and Harary [7] and Chartrand and Lesniak [8], new ones will be introduced as and when found necessary.

A *directed graph* or *digraph* G consists of a finite nonempty set $V(G)$ called *vertex set* with vertices and *edge set* $E(G)$ of ordered pairs of vertices called *arcs,* that is $E(G)$ represents a binary relation on $V(G)$. If (u, v) is an arc, it is said that u is adjacent to v and that v is adjacent from u. The set of vertices which are adjacent from (to) a given vertex v is denoted by $N^+(u)[N^-(u)]$ and its cardinality is the *out-degree* of v[*in-degree* of v]. A *walk* of *length* k from a vertex u to a vertex v in G is a sequence of vertices $u = u_0, u_1, u_2, \ldots, u_{k-1}, u_k = v$ such that each pair (u_{i-1}, u_i) is an arc of G. A digraph G is *strongly connected* if there is a u to v walk for any pair of vertices u and v of G. The *distance* $d(u,v)$ from u to v is the length of a shortest u to v walk. The *eccentricity* $e(v)$ of v is the distance to a farthest vertex from v. If $d(u,v) = e(u)(v \neq u)$, we say that v is an eccentric vertex of u. A graph is said to be an *unique eccentric vertex* graph if every vertex has a unique

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