Meeting: 1003, Atlanta, Georgia, SS 24A, AMS Special Session on Design Theory and Graph Theory, I

1003-05-120 **Robert B. Gardner*** (gardnerr@etsu.edu), East Tennessee State University, Box 70663, Department of Mathematics, Johnson City, TN 37614, and **Benedict B. Bobga**, **Gary D. Coker** and **Chau Nguyen**. *Some Graph, Digraph, and Mixed Graph Results Concerning Decompositions, Packings, and Coverings.* Preliminary report.

Let g be a subgraph of G. A *decomposition* of G into copies of g is a set of isomorphic copies of g, $\{g_1, g_2, \ldots, g_N\}$, such that $\cup_{i=1}^{N} g_i = G$ and $g_i \cap g_j = \emptyset$ for $i \neq j$, with decompositions of digraphs and mixed graphs similarly defined. We will explore decompositions of the complete graph K_v (and complete digraph D_v and complete mixed graph M_v) and the *complete graph with a hole* $K_v \setminus K_w$ (and $D_v \setminus D_w$ and $M_v \setminus M_w$), into various small graphs. A *maximal packing* of a graph G with copies of g is a set of isomorphic copies of g, $\{g_1, g_2, \ldots, g_n\}$, where $g_i \cap g_j = \emptyset$ if $i \neq j$, $\cup_{i=1}^{n} g_i \subset G$, and $|E(G) \setminus \cup_{i=1}^{n} E(g_i)|$ is minimal. A *minimal covering* of a graph G with copies of a graph g is a set of isomorphic copies of g, $\{g_1, g_2, \ldots, g_n\}$, where $E(g_i) \subset E(G)$ for all i, $G \subset \cup_{i=1}^{n} g_i$, and $|\cup_{i=1}^{n} E(g_i) \setminus E(G)|$ is minimal. Packings and coverings of directed and mixed graphs are similarly defined. We consider packing and covering problems related to the decompositions problems mentioned above. (Received August 09, 2004)