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3-factors of 3-factorization of $K_{3,3,3,\cdots,3}$ with n-partite sets for all even integers $n \geq 2$

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Graph Theory is an important area in mathematics with many applications, one of the important areas in graph theory is factorization of graphs. It is one of the most flourishing research area in Graph Theory. A factor of a graph G is a spanning sub-graph of G which is not totally disconnected and factorization of a graph G is a set of spanning sub-graphs of G that are pairwise edge-disjoint and whose union is G. Most of the research work on factorization of graphs is on complete bipartite graphs. Our research work is for complete multipartite graph of the form $K_{3,3,3,\cdots,3}$. In our previous work, 2-factors of 2-factorization of the complete multipartite graphs $K_{2,2,2,\cdots,2}$ and $K_{2^r,2^r,2^r,\cdots,2^r}$ have been constructed by using degree factors. In this work, by considering degree factorization, a theorem has been proved using Mathematical Induction to obtain 3-factors of 3-factorization, for different values of $n \in \mathbb{Z}^+$, of the complete multipartite graphs $K_{3,3,3,\cdots,3}$ with n partite sets. It has been shown that a complete multipartite graph with $2n$ partite sets of the form $K_{3,3,3,\cdots,3}$ has $\frac{^{2n}C_2}{n} = 2n-1$, 3-factors for a 3-factorization for $2n$ partite sets. Furthermore, it is found that the tournament scheduling technique can be used to obtain the number of 3-factors of 3-factorization.

Keywords: complete multipartite graph, factorization and tournament scheduling technique

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