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Tessa Cotron* (tessa.cotron@emory.edu), 605 Asbury Circle, Box 122042, Atlanta, GA 30322, **Robert Dicks** (rdicks@emory.edu), 605 Asbury Circle, Atlanta, GA 30322, and **Sarah Fleming** (smf1@williams.edu), Paresky Center, Williams College, Williamstown, MA 01267. *Asymptotics and Congruences For Partition Functions which Arise from Finitary Permutation Groups.*

In a recent paper, Bacher and de la Harpe study the conjugacy growth series of finitary permutation groups. In the course of studying the coefficients of a series related to the finitary alternating group, they introduce generalized partition functions $p(n)_e$. The group theory in their work motivates the study of the asymptotics for these functions. Moreover, Bacher and de la Harpe conjecture over 200 congruences for these functions which are analogous to the Ramanujan congruences for the unrestricted partition function $p(n)$. We obtain asymptotic formulas for all of the $p(n)_e$, and prove their conjectured congruences. Their work also motivates an investigation into congruence relationships between the finitary symmetric group and the finitary alternating group. Using the Ramanujan congruences for the partition function $p(n)$ and Atkin's generalization to the k -colored partition function $p_k(n)$, we prove the existence of congruence relations between these two series modulo arbitrary powers of 5 and 7, which we systematically describe. Furthermore, we prove that such relationships exist modulo powers of all primes $\ell \geq 5$. (Received September 09, 2016)