South East Asian J. of Mathematics and Mathematical Sciences
Vol. 19, No. 2 (2023), pp. 01-26

DOI: 10.56827/SEAJMMS.2023.1902.1 **ISSN (Online): 2582-0850**

ISSN (Print): 0972-7752

CONGRUENCES FOR BIPARTITIONS WITH ODD DESIGNATED SUMMANDS

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(**Received:** *May 08, 2023* **Accepted:** *Aug. 26, 2023* **Published:** *Aug. 30, 2023)*

Abstract: Andrews, Lewis and Lovejoy investigated a new class of partitions with designated summands by taking ordinary partitions and tagging exactly one of each part size. Let $B_2(n)$ count the number of bipartitions of n with designated summands in which all parts are odd. In this work, we establish many infinite families of congruences modulo powers of 2 and 3 for $B_2(n)$. For example, for each $n \geq 0$ and $\alpha \geq 0$,

$$B_2\left(48 \cdot 5^{2\alpha+2}n + a_1 \cdot 5^{2\alpha+1}\right) \equiv 0 \pmod 9,$$

where $a_1 \in \{88, 136, 184, 232\}$.

Keywords and Phrases: Designated summands, Congruences, Theta functions, Dissections.

2020 Mathematics Subject Classification: 11P83, 05A15, 05A17.