

# Package ‘PBtDesigns’

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**Type** Package

**Title** Partially Balanced t-Designs (PBtDesigns)

**Version** 1.0.0

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**Description** The t-designs represent a generalized class of balanced incomplete block designs in which the number of blocks in which any t-tuple of treatments ( $t \geq 2$ ) occur together is a constant. When the focus of an experiment lies in grading and selecting treatment subgroups, t-designs would be preferred over the conventional ones, as they have the additional advantage of t-tuple balance. t-designs can be advantageously used in identifying the best crop-livestock combination for a particular location in Integrated Farming Systems that will help in generating maximum profit. But as the number of components increases, the number of possible t-component combinations will also increase. Most often, combinations derived from specific components are only practically feasible, for example, in a specific locality, farmers may not be interested in keeping a pig or goat and hence combinations involving these may not be of any use in that locality. In such situations partially balanced t-designs with few selected combinations appearing in a constant number of blocks (while others not at all appearing) may be useful (Sayantani Karmakar, Cini Varghese, Seema Jaggi & Mohd Harun (2021)<[doi:10.1080/03610918.2021.2008436](https://doi.org/10.1080/03610918.2021.2008436)>). Further, every location may not have the resources to form equally sized homogeneous blocks. Partially balanced t-designs with unequal block sizes (Damaraju Raghavarao & Bei Zhou (1998)<[doi:10.1080/03610929808832657](https://doi.org/10.1080/03610929808832657)>. Sayantani Karmakar, Cini Varghese, Seema Jaggi & Mohd Harun (2022). ``Partially Balanced t-designs with unequal block sizes'') prove to be more suitable for such situations. This package generates three series of partially balanced t-designs namely Series 1, Series 2 and Series 3. Series 1 and Series 2 are designs having equal block sizes and with treatment structures  $4(t + 1)$  and a prime number, respectively. Series 3 consists of designs with unequal block sizes and with treatment structure  $n(n-1)/2$ . This package is based on the function named PBtD() for generating partially balanced t-designs along with their parameters, information matrices, average variance factors and canonical efficiency factors.

**Imports** MASS

**License** GPL ( $\geq 2$ )

**Encoding** UTF-8

**Repository** CRAN

**RoxygenNote** 7.2.0

**NeedsCompilation** no

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## Contents

PBtD . . . . .	2
<b>Index</b>	<b>4</b>

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PBtD	<i>Partially Balanced t-Designs (PBtDesigns)</i>
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### Description

This package contains functions named PBtD() for generating partially balanced t-designs along with their parameters, information matrices, average variance factors and canonical efficiency factors.

### Usage

```
PBtD(v, Series)
```

### Arguments

v	Number of treatments
Series	Series of Partially Balanced t-Designs

### Value

Three series are given for generating of partially balanced t-designs namely Series 1, Series 2 and Series 3.

Series 1 are designs having equal block sizes and with treatment structure  $4(t + 1)$ .

Series 2 are designs having equal block sizes and with treatment as a prime number.

Series 3 consists of designs with unequal block sizes and with treatment structure  $n(n-1)/2$ .

This function generates partially balanced t-designs along with their parameters, information matrices, average variance factors and canonical efficiency factors.

## References

- 1) Karmakar, S., Varghese, C., Jaggi, S. & Harun, M. (2021)<DOI:10.1080/03610918.2021.2008436>. " Partially Balanced t-designs " .
- 2) Raghavarao, D. & Zhou, B. (1998)<<https://doi.org/10.1080/03610929808832657>> " Universal optimality of UE 3-designs for a competing effects model " .
- 3) Karmakar, S., Varghese, C., Jaggi, S. & Harun, M. (2022)." Partially Balanced t-designs with unequal block sizes " .

## Examples

```
library(PBtDesigns)
PBtD(7,2)
```

# Index

PBtD, [2](#)