

# Reliability Block Diagrams (RBDs)

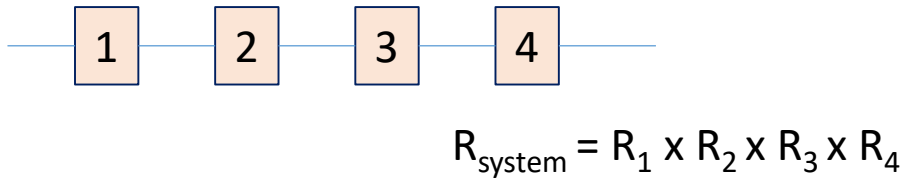
## Series



$$R_{\text{system}} = R_1 \times R_2$$

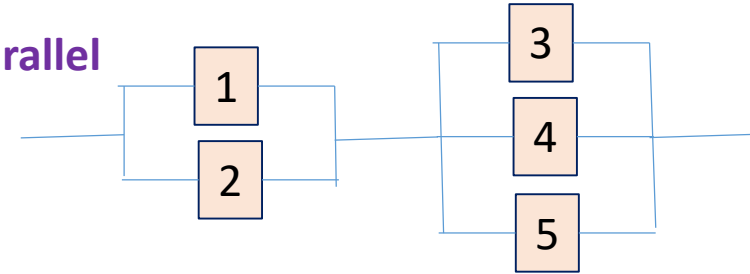


$$R_{\text{system}} = R_1 \times R_2 \times R_3$$



$$R_{\text{system}} = R_1 \times R_2 \times R_3 \times R_4$$

## Series-Parallel



1) Determine the parallel reliabilities first:

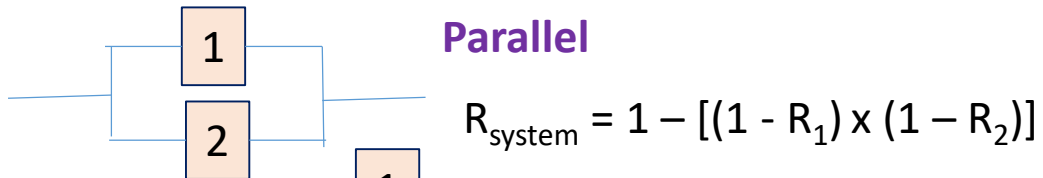
a)  $R_{1,2} = 1 - [(1 - R_1) \times (1 - R_2)]$

b)  $R_{3,4,5} = 1 - [(1 - R_3) \times (1 - R_4) \times (1 - R_5)]$

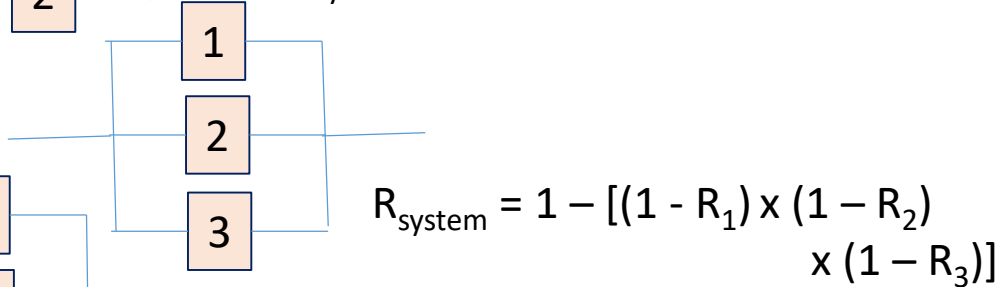
2) Then, determine the series reliability:

$$R_{\text{system}} = R_{1,2} \times R_{3,4,5}$$

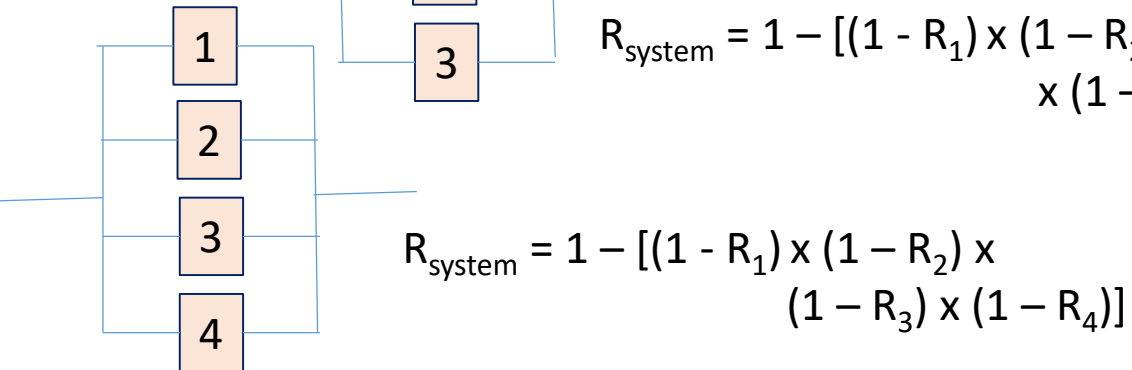
## Parallel



$$R_{\text{system}} = 1 - [(1 - R_1) \times (1 - R_2)]$$

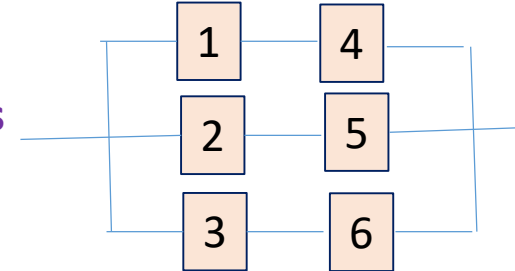


$$R_{\text{system}} = 1 - [(1 - R_1) \times (1 - R_2) \times (1 - R_3)]$$



$$R_{\text{system}} = 1 - [(1 - R_1) \times (1 - R_2) \times (1 - R_3) \times (1 - R_4)]$$

## Parallel-Series



1) Determine the series reliabilities first:

a)  $R_{1,4} = R_1 \times R_4$

b)  $R_{2,5} = R_2 \times R_5$

c)  $R_{3,6} = R_3 \times R_6$

2) Then, determine the parallel reliability:

$$R_{\text{system}} = 1 - [(1 - R_{1,4}) \times (1 - R_{2,5}) \times (1 - R_{3,6})]$$