

# Exploring the Reliability of the System in Various Configurations with Different Components

Nikhil Vikas Jaipurkar<sup>1\*</sup> and Dr. Ram Naresh B. S. Sisodiya<sup>2</sup>

<sup>1</sup>Department of Mathematics, Institutions of Higher Learning, Research and Specialised Studies,  
Sardar Patel Mahavidyalaya, Chandrapur, M. S., India

<sup>2</sup>Department of Mathematics, Sardar Patel Mahavidyalaya, Chandrapur, M. S., India

\*Corresponding authors: [nikhiljaipurkar9@yahoo.com](mailto:nikhiljaipurkar9@yahoo.com), [drbs79@gmail.com](mailto:drbs79@gmail.com)

## ABSTRACT

Our study is a comprehensive exploration of complex system reliability across various configurations, encompassing diverse sets of components. We sought to gauge the dependability of these systems, an essential facet in industries, infrastructure, and technology, where real-world conditions and configurations vary. Our approach involved meticulous analysis, breaking down the systems into their constituent components. We calculated individual reliabilities for components operating in both series and parallel configurations. This dual focus allows us to understand the critical interplay between component reliability and system design. In series, each component is vital; in parallel, redundancy offers a safety net. The paramount goal was to establish a benchmark for evaluating system reliability in diverse real-world scenarios, enabling engineers and designers to make informed decisions about system configuration and maintenance. We presented our findings graphically, providing a clear, comparative view of system reliability across different setups. In summary, our research contributes to the foundational understanding of complex system reliability, furnishing valuable insights for industries, infrastructure, and technology. By creating a visual roadmap for system performance under varying conditions, we equip decision-makers with the tools to build more dependable, resilient, and robust systems in an ever-evolving technological landscape.

**Keywords:** Reliability, Failure Rate, Reliability Block Diagram

