

## **Systems Reliability: Concept and Analyses**

In the present scenario of fast technological advancements, we are encountering systems which are not only multi-functional but also incorporate many features, involving both hardware and software. In view of this, such systems are also becoming necessarily increasingly complex devices. Further, in the context of customer confidence, it is necessary that such complex products perform as expected, for a sufficiently long length of time and should be free of faults that may impair their performance.

An inherent feature of such complex systems is that they contain a large number of components, sub-systems, parts etc. which interface and interact with each other in a complex manner in order to perform the designated tasks. Cell phones are classic examples of such systems that incorporate many components and sub-systems that need to perform seamlessly for the cell phone to be an effective and useful device. There are many other high technology engineering systems e.g. chemical refineries, manufacturing plants, nuclear reactors, unmanned ground-based and aerial systems, launch vehicles, aircraft, spacecraft etc., which fall under the category of complex systems that need to perform at the highest level, and this requirement brings into focus, the concepts of system reliability.

Reliability is an important concept that directly impacts the operational feasibility of a product or a system, and hence, determines its usefulness during its service life. In the simplest term, the reliability is defined as the probability that a system or a product will accomplish the designated function in a satisfactory manner over a reasonable period of time and represents an important quantitative measure of the acceptability of a product.

The present short course is intended as an introductory material with regard to the concept and idea of reliability of systems, its definition and quantification through simple models that provide a good understanding of the issues involved and also manner in which these can be handled. The participants can expect to acquire basic knowledge about reliability analysis and underlying mathematical basis for its computation. The course is of twelve hours duration and is delivered over six weeks.