**Course content - Product Development- 23 March to 28 March 2020**

**Topic 1: Methods of Innovative Design**

Innovative design is an organized, systematized and logical approach for solving a design problem. There are two design methods for innovative design.

• Design by creative design route

• Engineering Design

Design by creative routs [Creative Design]

This is a design method that demands maximum ‘creativity' from the part of the designer. Hence this method is also called creative design. Here the designer finds solutions to problems by allowing his creativity aspects grow in a particular manner.

**Topic 2 : Creativity**

Majority of designs belong to variant design, where the designer simply modifies an existing system. But the success of engineering design depends on the modes of thinking and acting distinctively different from others. A creative designer is distinguished by his ability to synthesize new combinations of ideas and concepts into meaningful and useful forms. Design is commonly thought of as a creative process involving the use of imagination and lateral thinking to create new and different products.

Qualities of a creative designer

The creative designer is generally a person of average intelligence, a visualiser, a hard worker and a constructive non-conformist with average knowledge about the problem at hand.

Generally, a creative designer has the following qualities.

• Visualization ability.

Creative designers have good ability to visualize, to generate and manipulate visual images in their heads.

• Knowledge

All designers start their job with what they know. During designing, they make minor modifications of what they already know –or, creative designers create new ideas out of bits of old designs they had seen in the past. Hence, they must have knowledge of past designs.

• Ability to manipulate knowledge

The ability to use the same knowledge in a different way is also an important quality of a designer.

• Risk taking

A person who does not take the risk of making mistakes cannot become a good designer. For example, Edison tried hundreds of different light bulb designs before he found the carbon filament.

• Non-conformist

There are two types of non-conformists:-constructive and obstructive. Constructive non-conformists are those who take a firm stand, because they think they are right. Obstructive non-conformists are those who take a stand just to have an opposing view. The constructive non-conformists might generate a good idea. But the obstructive non-conformists will only slow down the design process. Creative designers are constructive non-conformists, and they want to do things in their own way.

• Technique

Creative designers have more than one approach to problem solving. They are prepared to try alternative techniques, till they reach a satisfactory solution.

• Motivation

They always motivate others in the design team. In such a favourable environment creativity is further enhanced.

• Willingness to practice

Creativity comes with practice. Creative designers are ready to practice for a long enough period.

Roadblocks to Creativity

• Fear of making a mistake

• Unwillingness to think and act in a way other than the accepted norm.

• Desire to conform to standard solutions.

• Unwillingness to try new approaches

• Fear of criticism

• Lack of knowledge

• Overconfidence due to past experience

• Unwillingness to reject old solutions

• Fear of authority

• Difficulty in visualization

• Inability to distinguish between cause and effect

• Inability to collect complete information

• Unwillingness to be different

**Topic 3: Divergence, Transformation & Convergence**

The entire design process can be said to have composed of three distinct phases Viz. Divergence, Transformation and Convergence phases.

The problem definition, need analysis and conceptualization etc. aims at generating as many ideas as possible to solve a given design problem. Thus, these activities belong to the Divergence phase.

That activity wherein the concept is converted into physical object is termed as transformation phase. The convergence is a narrowing process, where the best optimal solution is tried for, by eliminating unwanted ideas.

**Topic 4: Design Criteria**

Design and decision criteria are the explicit goals that a project must achieve in order to be successful. In recommendation and feasibility reports, especially, the design and decision criteria determine the document's final recommendation for action. Managers use these criteria as their basic tool in evaluating a project's potential for success and how well it fits into the goals of the organization. Experts need explicit design and decision criteria in order to evaluate recommended designs of devices and test procedures.

Design criteria can be divided into primary and secondary criteria. Primary criteria are those that constitute a successful project; the project will be unsuccessful if it does not meet these goals. Secondary criteria are those features that are highly desirable but not absolutely essential. Separating primary and secondary criteria establishes a clear hierarchy in design choices. Often, implementing one criterion makes the implementation of another infeasible or costly, or a secondary criterion may be sacrificed in favor of a primary criterion.

Make your design criteria short but as specific as possible. List your primary criteria first; then list the secondary criteria. Often design criteria are best displayed in list with short titles preceding the explanation. These titles may then be used later in the document to refer to the specific criteria being discussed.

**Topic 5: Aesthetics**

Aesthetics is concerned with how things look. This can be influenced by an objects' appearance and its style. The appearance of an object is the feature that people notice first. In some ways appearance can be very personal and is influenced by things like the materials from which the object is made and the type of finish applied to its surface It is important that products have visual appeal. In a world where many new products function in a similar way, it is often the appearance which sells the product. Aesthetics is a pan of design which is difficult to analyse and describe in words. However there are aspects of appearance which can be considered separately.