



# GREEN BELT

Trained & Certified Green Belts gather & analyze data to assist black belts in achieving project goals and objectives. Green belts in an organization spend a proportion of their time towards projects focused on achieving continuous improvements.

An organization pursuing/ willing to pursue Six Sigma, significant proportion of employees are expected to undergo this form of training so that the language of Six Sigma is well spoken and understood by all.

## Who Should attend?

Junior & Middle Management representatives e.g. Managers Asst. Managers, Executives, Team Leaders, Project Leaders/ etc. with at least 15 years of education & 1 year of work experience.

## Duration

The program is spread across 8 full day sessions. Each session is accomplished with an objective to link concepts covered to participant's own work area and the project/s they are working on.

## Examination & Certification Criteria

Exam duration: 2hrs 45 min.  
Total Questions: 100  
QP Pattern: Objective type, Multiple choice & Open book examination.

Certification Criteria: Participant should have successfully cleared the final certification exam and should have participated in in at least one improvement project.

## Benefits

- Understand a structured approach to addressing and solving problems.
- Understand & speak the language of data.
- Be able to gather, organize and interpret performance related measures.
- Be able to present project stages to audience like Black belts, Process Owners & others concerned.
- Understand and execute a team member's role in problem solving.

Syllabus, described for this program is covered at following levels of understanding ,

*Memorize:* Remember terms, definitions, facts, ideas, patterns etc.

*Comprehension:* Comprehend descriptions, reports, tables, diagrams etc.

*Practice:* When to use which tools, ideas, methods, formulae, principles, constituents etc.

*Analyze:* Decipher the information and draw relationships between its constituents, Identify factors influencing constituents etc.

*Appraise:* Evaluate ideas and conclude about the values or the proposed solutions or ideas.

*Construct:* Combine all parts to reveal a pattern or a structure to draw a conclusion.

### I. SIX SIGMA & LEAN - OVERVIEW & PHILOSOPHY (20 QUESTIONS)

Evolution & Definition of Six Sigma. (Comprehension)

Understand why Six Sigma is needed and its application in the organization. (Comprehension)

Contributions by Quality Gurus like Juran, Deming, Shewart, Philip, Crosby Ishikawa, Taguchi etc. (Comprehension)

Understand Process inputs, outputs and feedback with respect to an organization.( Comprehension)

Explain project selection process, understand when to apply DMAIC methodology. (Comprehension)

Linking projects with organization goals and objectives. (Comprehension)

Lean Principles, Understand concepts like Value chain, Flow, Pull, etc. commonly used tools for waste elimination like Kaizen, Kanban, 5S, error proofing, VSM etc. (Comprehension)

Design for Six Sigma - overview: Understand when to use DFSS, Quality function deployment, understand concepts like DFMEA and FMEA, Distinguish between DMADV and IDOV methodology to DMAIC. (Comprehension)

### II. SIX SIGMA APPROACH - DEFINE (10 QUESTIONS)

#### Process Management Basics

Identify and Define Process Components. Understand the challenges that hinder process improvement efforts. (Analyze)

Recognize Process owners, Internal and External Customers, and other stakeholders in a project. (Practice)

Identify internal and External Customers in an Project and its impact on the them.(Practice)

Methods of collecting customer feedback e.g. Surveys, Focus Groups, interviews and observation) (Practice)

Identify CTQ (Critical to Quality) parameters within a project.(Practice)

#### Project Management Basics

Project Charter. (Practice)

Understand the Project activity tools like Gantt charts, Critical path, and method, etc. Understand how to prepare presentation for review. (Practice)

Understand and Explain Project Risk analysis. (Comprehension)

Investigate various Project Management tools

Affinity Diagram, Interrelationships digraphs, Prioritization matrix,

Activity network diagram(Comprehension)

### **Evaluating Project Results**

Cost of poor Quality. (Analyze)

Understand metrics like Defects per Unit (DPU), Defects per Opportunities, (DPO), Defects per Million opportunities and respective sigma levels.

(Practice)

Yield concepts like First Pass Yield and Rolled throughput Yield. (Practice)

### **Team Dynamics Basics**

Stages of Team Evolution, Forming, Storming, Norming, Performing, Adjourning and Recognition. (Comprehension)

Explore Negative Team Dynamics like Overbearing, Dominant, or Reluctant participants, group think, feuding, floundering, digressions and tangents etc. (Comprehension)

Describe the roles and responsibilities of team members like Green Belts, Black Belts, Master black belt, Coach, Facilitator, Process owner, Sponsor etc. (Comprehension)

Explore Team Tools like Brainstorming, Nominal Groups Techniques, Multi-Voting (Practice)

## **III. SIX SIGMA APPROACH - MEASURE (20 QUESTIONS)**

### **Process Documentation**

Develop and review Process Maps, Written Procedures, work instructions Flowcharts etc. (Analyze)

Identify process input variables and process output variables (SIPOC), (Analyze)

### **Statistics Basics**

Descriptive and Inferential studies, population and sample statistic. (Practice)

Explore Central Limit Theorem and describe its significance in inferential statistics for Confidence interval, Control charts, etc. (Practice)

Understand Basic Probability concepts. (Comprehension)

Understand & distinguish between Continuous and Discrete data. (Practice)

Understand and distinguish measurement scales like nominal, ordinal, interval and ratio.(Analyze)

### **Data Collection and Summarization**

Define current state using Lean concepts like Value Stream Mapping. (Comprehension). 7QC Tools. (Practice)

Understand Sampling methods like Stratified, Subgroup, Random sampling methods. (Comprehension)

Understand and Explore measures of central tendency, construct and interpret frequency and cumulative frequency distributions. (Analyze)

Understand and interpret data using Stem-and-leaf plot, Box-and-whisker plot, run charts, scatter diagram. (Practice)

Understand Normal, Binomial & Poisson distributions. (Comprehension)

### **Measurement System Analysis**

Use various analytical methods (e.g. Repeatability and Reproducibility (R&R), Correlation, bias, Linearity, precision to tolerance, percent agreement, etc.) to analyze and interpret measurement systems capability for variables. (Practice)

### **Process Capability Analysis**

Define, Select and Calculate Cp and CpK to access process performance. (Appraise)

Define and calculate Pp, Ppk and Cpm to assess process performance. (Appraise)

Describe assumptions made for when short term or long term data is available. Interpret relations between short term and long term capability. (Appraise).

Distinguish between natural process limits and specification limits, and calculate process performance metrics such as percent defective. (Appraise)

### **IV. SIX SIGMA APPROACH - ANALYZE (20 QUESTIONS)**

Calculate and interpret the correlation coefficient and its confidence interval, and describe the difference between correlation and causation. (Analyze)

Calculate and interpret Regression analysis (Linear model only), apply and interpret hypothesis tests for regression statistics. Use the regression model for estimation and prediction, analyze the uncertainty in the estimate, and perform a residuals analysis to validate the model. (Appraise)

Hypothesis testing - Define and interpret the significance level, power, type I and type II errors of statistical tests. (Appraise)

Equality of means and proportions. (Practice)

Define & distinguish between confidence and prediction intervals. Define & interpret the efficiency and bias estimators, tolerance and confidence intervals, Hypothesis testing for means, variance, and proportions. (Appraise)

Chi-square- Define and interpret chi-square and use to determine statistical significance. (Analyze)

Root cause analysis using tools like 5 why's, pareto chart, fault tree analysis cause and effect diagrams, etc.)for resolving critical problems.(Appraise)

Identify 7 types of waste (Overproduction, Inventory, Defects, Over-processing, Waiting, Motion, and Transportation). (Appraise)

Single factor analysis of variance - Define terms related to one-way ANOVA and interpret their results and data points.(Practice)

### **V. SIX SIGMA APPROACH - IMPROVE (15 QUESTIONS)**

#### **Design of Experiment (DOE)**

Kaizen events, pilot run preparation and implementation. (Practice)

Understand terms like dependent and independent variables, factors, and levels, response, treatment and error etc. (Comprehension)

Define and apply DOE principles, including power and sample size , balance, repetition, replication, order, efficiency, randomization, blocking interaction, confounding, resolution, etc. (Practice)

Design and conduct one factor at a time Experiment (OFAT). (Practice)

Design and conduct 2 level, Full factorial Experiment. (Practice)

## VI. SIX SIGMA APPROACH - CONTROL (15 QUESTIONS)

Understand & Explain the objective of SPC, including monitoring and controlling process performance, tracking trends, runs, etc, and reducing variation in a process. (Comprehension). Rational Subgrouping. (Appraise)  
Select and apply control chart like individual and moving range chart (ImR), p, np, c, u, short - run SPC and Moving average. (Practice)  
Interpret control charts and distinguish between common and special cause of variation. (Analyze). Develop control plan to sustain the solution, including transfer of responsibility from project team to the process owner, develop and implement SOPs, work instructions, etc., (Practice)

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