Universally Accepted Lean Six Sigma Body of Knowledge for Black Belts

The IASSC Certified Black Belt Exam was developed and constructed based on the topics within the Body of Knowledge listed here. Questions may test up to the complexity level of "Analyze" as defined by Levels of Cognition based on Bloom's Taxonomy – Revised (2001).

1.0 Define Phase

1.1 The Basics of Six Sigma
1.1.1 Meanings of Six Sigma
1.1.2 General History of Six Sigma & Continuous Improvement
1.1.3 Deliverables of a Lean Six Sigma Project
1.1.4 The Problem Solving Strategy Y = f(x)
1.1.5 Voice of the Customer, Business and Employee
1.1.6 Six Sigma Roles & Responsibilities

1.2 The Fundamentals of Six Sigma
1.2.1 Defining a Process
1.2.2 Critical to Quality Characteristics (CTQ's)
1.2.3 Cost of Poor Quality (COPQ)
1.2.4 Pareto Analysis (80:20 rule)
1.2.5 Basic Six Sigma Metrics
a. including DPU, DPMO, FTY, RTY Cycle Time, deriving these metrics and these metrics

1.3 Selecting Lean Six Sigma Projects
1.3.1 Building a Business Case & Project Charter
1.3.2 Developing Project Metrics
1.3.3 Financial Evaluation & Benefits Capture

1.4 The Lean Enterprise
1.4.1 Understanding Lean
1.4.2 The History of Lean
1.4.3 Lean & Six Sigma
1.4.4 The Seven Elements of Waste
a. Overproduction, Correction, Inventory, Motion, Overprocessing, Conveyance, Waiting.
1.4.5 5S
a. Straighten, Shine, Standardize, Self-Discipline, Sort

2.0 Measure Phase

2.1 Process Definition
2.1.1 Cause & Effect / Fishbone Diagrams
2.1.2 Process Mapping, SIPOC, Value Stream Map
2.1.3 X-Y Diagram
2.1.4 Failure Modes & Effects Analysis (FMEA)

2.2 Six Sigma Statistics
2.2.1 Basic Statistics
2.2.2 Descriptive Statistics
2.2.3 Normal Distributions & Normality
2.2.4 Graphical Analysis

2.3 Measurement System Analysis
2.3.1 Precision & Accuracy
2.3.2 Bias, Linearity & Stability
2.3.3 Gage Repeatability & Reproducibility
2.3.4 Variable & Attribute MSA

2.4 Process Capability
2.4.1 Capability Analysis
2.4.2 Concept of Stability
2.4.3 Attribute & Discrete Capability
2.4.4 Monitoring Techniques

3.0 Analyze Phase

3.1 Patterns of Variation
3.1.1 Multi-Vari Analysis
3.1.2 Classes of Distributions

3.2 Inferential Statistics
3.2.1 Understanding Inference
3.2.2 Sampling Techniques & Uses
3.2.3 Central Limit Theorem

3.3 Hypothesis Testing
3.3.1 General Concepts & Goals of Hypothesis Testing
3.3.2 Significance; Practical vs. Statistical
3.3.3 Risk; Alpha & Beta
3.3.4 Types of Hypothesis Test

3.4 Hypothesis Testing with Normal Data
3.4.1 1 & 2 sample t-tests
3.4.2 1 sample variance
3.4.3 One Way ANOVA
a. Including Tests of Equal Variance, Normality Testing and Sample Size calculation, performing tests and interpreting results.

3.5 Hypothesis Testing with Non-Normal Data
3.5.1 Mann-Whitney
3.5.2 Kruskal-Wallis
3.5.3 Mood's Median
3.5.4 Friedman
3.5.5 1 Sample Sign
3.5.6 1 Sample Wilcoxon
3.5.7 One and Two Sample Proportion
3.5.8 Chi-Squared (Contingency Tables)
a. Including Tests of Equal Variance, Normality Testing and Sample Size calculation, performing tests and interpreting results.

4.0 Improve Phase

4.1 Simple Linear Regression
4.1.1 Correlation
4.1.2 Regression Equations
4.1.3 Residuals Analysis

4.2 Multiple Regression Analysis
4.2.1 Non- Linear Regression
4.2.2 Multiple Linear Regression
4.2.3 Confidence & Prediction Intervals
4.2.4 Residuals Analysis
4.2.5 Data Transformation, Box Cox

4.3 Designed Experiments
4.3.1 Experiment Objectives
4.3.2 Experimental Methods
4.3.3 Experiment Design Considerations

4.4 Full Factorial Experiments
4.4.1 2k Full Factorial Designs
4.4.2 Linear & Quadratic Mathematical Models
4.4.3 Balanced & Orthogonal Designs
4.4.4 Fit, Diagnose Model and Center Points

4.5 Fractional Factorial Experiments
4.5.1 Designs
4.5.2 Confounding Effects
4.5.3 Experimental Resolution

5.0 Control Phase

5.1 Lean Controls
5.1.1 Control Methods for 5S
5.1.2 Kanban
5.1.3 Poka-Yoke (Mistake Proofing)

5.2 Statistical Process Control (SPC)
5.2.1 Data Collection for SPC
5.2.2 I-MR Chart
5.2.3 Xbar-R Chart
5.2.4 U Chart
5.2.5 P Chart
5.2.6 NP Chart
5.2.7 X-S chart
5.2.8 CumSum Chart
5.2.9 EWMA Chart
5.2.10 Control Methods
5.2.11 Control Chart Anatomy
5.2.12 Subgroups, Impact of Variation, Frequency of Sampling
5.2.13 Center Line & Control Limit Calculations

5.3 Six Sigma Control Plans
5.3.1 Cost Benefit Analysis
5.3.2 Elements of the Control Plan
5.3.3 Elements of the Response Plan

Levels of Cognition based on Bloom's Taxonomy – Revised (2001)
These levels are from "Levels of Cognition" (from Bloom's Taxonomy – Revised, 2001). They are listed in order from the least complex to the most complex.

Remember: Recall or recognize terms, definitions, facts, ideas, materials, patterns, sequences, methods, principles, etc.

Understand: Read and understand descriptions, communications, reports, tables, diagrams, directions, regulations, etc.

Apply: Know when and how to use ideas, procedures, methods, formulas, principles, theories, etc.

Analyze: Break down information into its constituent parts and recognize their relationship to one another and how they are organized; identify sublevel factors or salient data from a complex scenario.

Evaluate: Make judgments about the value of proposed ideas, solutions, etc., by comparing the proposal to specific criteria or standards.

Create: Put parts or elements together in such a way as to reveal a pattern or structure not clearly there before; identify which data or information from a complex set is appropriate to examine further or from which supported conclusions can be drawn.