

CBMG Lean Six Sigma Black Belt BoK (List below excludes GB BoK which is mandatory for BB)

- 1. Black Belt leadership**
 1. Expectations from a Black Belt role in market
 2. Leadership Qualities
 3. Organizational Roadblocks & Change Management Techniques
 4. Mentoring Skills

- 2. Basic Six Sigma Metrics**
 1. CTQ Tree, Big Y, CTX
 2. DPU, DPMO, FTY, RTY, Cycle Time, Takt time
 3. Sigma scores computation using different tools
 4. Target setting techniques & Role of Benchmarking

- 3. Business Process Management System**
 1. BPMS and its elements
 2. Benefits of practicing BPMS (Process centricity and silos)
 3. BPMS Application scenarios
 4. BSC Vs Six Sigma

- 4. MSA**
 1. Performing Variable GRR using ANOVA/X-bar R method
 2. Precision, P/T, P/TV, Cont %, No. of Distinct Categories
 3. Crossed & Nested Designs
 4. Procedure to conduct Continuous MSA
 5. Performing Discrete GRR using agreement methods for binary and ordinal data
 6. Agreement & Disagreement Scores for part, operator, standard
 7. Kappa Scores Computation for ordinal data and criteria for acceptance of gage

- 5. Statistical Techniques**
 1. Probability Curve, Cumulative Probability, Inverse Cumulative Probability (Example and procedure), Shape, Scale and Location parameters
 2. Types of Distributions (Normal, Weibull, Exponential, Binomial, Poisson) & their interpretation and application
 3. Identifying distributions from data
 4. Central Limit Theorem - Origin, Standard Error, Relevance to Sampling
 5. Example & Application of Central Limit Theorem

- 6. Sampling Distributions**
 1. Degrees of Freedom
 2. t-distribution - Origin, relevance, pre-requisites, t-statistic computation
 3. Chi-square distribution - Origin, relevance, pre-requisites, Chi-square statistic computation, Approximation to discrete data
 4. F-distribution - Origin, relevance, pre-requisites, F-Statistic and areas of applications
 5. Point & Interval estimates - Confidence and Predictive estimates for Sampling Distributions
 6. Application of Confidence Estimates in decision making

- 7. Sampling of Estimates**
 1. Continuous and Discrete Sample Size Computation for sampling of estimates
 2. Impact of Margin of Error, standard deviation, confidence levels, proportion defective and population on sample size
 3. Sample Size correction for finite population
 4. Scenarios to optimize Sample Size such as destructive tests, time constraints

- 8. Advanced Graphical Methods**
 1. Dot Plot
 2. Box Plot

3. Interval Plot
 4. Stem-and-Leaf Plot
 5. Time Series & Run Chart
 6. Scatter Plot
 7. Marginal Plot
 8. Line Plots
 9. Contour Plot
 10. 3D scatter Plot
 11. 3D Surface Plot
 12. Matrix Plot
 13. Multi Vary Chart
- 9. Inferential Statistics**
1. Advanced Introduction to Hypothesis Tests
 2. Significance and implications of 1 tail and 2 tail
 3. Types of Risks - Alpha and Beta Risks
 4. Significance & computation of test statistic, critical statistic, p-value
- 10. Sample Size for Hypothesis Tests**
1. Sample Size computation for hypothesis tests
 2. Power Curve
 3. Scenarios to optimize Sample Size, Alpha, Beta, Delta such as destructive tests
- 11. Hypothesis Tests**
1. 1Z, 1t, 2t, Paired t Test - Pre-requisites, Components & interpretations
 2. One and Two Sample Proportion
 3. Chi-square Distribution
 4. Ch-square Test for Significance & Good of Fit - Components & interpretations
- 12. ANOVA & GLM**
1. ANOVA - Pre-requisites, Components & interpretations
 2. Between and Within Variation, SS, MS, F statistic
 3. 2-way ANOVA - Pre-requisites, Interpretation of results
 4. Balanced, unbalanced and Mixed factors models
 5. GLM - Introduction, Pre-requisites, Components & Interpretations
- 13. Correlation & Regression**
1. Linear Correlation - Theory and computation of r value
 2. Nonlinear Correlation - Spearson's Rho application and relevance
 3. Partial Correlation - Computing the impact of two independent variables
 4. Regression - Multi-linear Components & interpretations
 5. Confidence and Prediction Bands, Residual Analysis, Building Prediction Models
 6. Regression - Logistic(Logit) & Prediction - Components & interpretations with example
- 14. Dealing with Non-normal data**
1. Identifying Non-normal data
 2. Box Cox & Johnson Transformation
- 15. Process Capability**
1. Process Capability for Normal data
 2. Within Process Capability, Subgrouping of data
 3. Decision Tree for Type of Process Capability Study
 4. Process Capability of Non-normal data - Weibull, Binomial, Poisson Process Capability and interpretation of results
- 16. Non-Parametric Tests**
1. Mann-Whitney
 2. Kruskal-Wallis

3. Mood's Median
4. Sample Sign
5. Sample Wilcoxon

17. Experimental Design

1. DOE terms, (independent and dependent variables, factors, and levels, response, treatment, error, etc.)
2. Design principles (power and sample size, balance, repetition, replication, order, efficiency, randomization, blocking, interaction, confounding, resolution, etc.)
3. Planning Experiments (Plan, organize and evaluate experiments by determining the objective, selecting factors, responses and measurement methods, choosing the appropriate design,
4. One-factor experiments (Design and conduct completely randomized, randomized block and Latin square designs and evaluate their results)
5. Two-level fractional factorial experiments (Design, analyze and interpret these types of experiments and describe how confounding affects their use)
6. Full factorial experiments (Design, conduct and analyze full factorial experiments)

18. Advanced Control Charts

1. X-S chart
2. CumSum Chart
3. EWMA Chart