Lean Six Sigma Black Belt (LSSBB) –

LSSBB Full Length Simulation Test 4

A picture containing table

Description automatically generated

Q1.Hypothesis testing is usually done to:

SELECT THE CORRECT ANSWER

1. statistically validate if a sample mean does belong to the population.
2. statistically validate if the means of two groups are the same or if they are significantly different.
3. statistically validate if variances of two groups are the same or if they are different.
4. All of the above

**Correct Option:D**

**Answer (d) Hypothesis testing is usually done to statistically validate if a sample mean does belong to the population, find if means of two groups are the same or if they are significantly different and validate if variances of two groups are the same or if they are different.**

Q2.What is the opposite of NULL hypothesis?

SELECT THE CORRECT ANSWER

1. Alternate Hypothesis
2. Not NULL Hypothesis
3. Finite Hypothesis
4. Fixed Hypothesis

**Correct Option:A**

**Answer (a) When the NULL hypothesis is rejected, Alternate Hypothesis is accepted. Alternate Hypothesis is considered the opposite of NULL hypothesis.**

Q3.Type 1 Error is known as:

SELECT THE CORRECT ANSWER

1. False Negative
2. False Positive
3. True Negative
4. True Positive

**Correct Option:B**

**Answer (b) Type I Error is said to be committed when you reject the Null Hypothesis although it was actually true. For example, the movie was good, but you came out and said the movie was bad.**

Q4.If men having high blood sugar problems are diagnosed with Diabetes, with the mean blood sugar level to be 150 and a standard deviation of 10, and if any individual with blood sugar greater than 125 can be diagnosed with Diabetes, what is the probability of committing a Type II Error?

SELECT THE CORRECT ANSWER

1. 0.007
2. 0.00655
3. 0.0062
4. 0.0055

**Correct Option:C**

**Answer: (c) Z = (150-125)/10 = 25/10 = 2.5 Area under 2.5 corresponds to 0.0062. Thus, the probability of a Type II Error, which is ?, is 0.62%.**

Q5.What does ANOVA stand for?

SELECT THE CORRECT ANSWER

1. Analysis of Variance
2. Analysis of Variables
3. Accuracy of Variance
4. Analysis and Validation

**Correct Option:A**

**Answer: (a) ANOVA stands for Analysis of Variance.**

Q6.When should Mann Whitney Test be used?

SELECT THE CORRECT ANSWER

1. If the data meets non-parametric testing conditions and if the data is divided into two independent samples
2. If the data meets parametric testing conditions and if the data is divided into two independent samples
3. If the data meets non-parametric testing conditions and if the data is present in equal sets in two independent samples.
4. If the data meets parametric testing conditions and if the data is present in equal sets in two independent samples.

**Correct Option:A**

**Answer: (a) Use the Mann Whitney Test if the data meets non-parametric testing conditions and if the data is divided into two independent samples.**

Q7.A Black Belt practitioner constructs a control chart to display a process mean and its outer limits. In the above chart, what does LCL stand for?

SELECT THE CORRECT ANSWER

1. Lower Cycle Length
2. Lower Control Limit
3. Lower Cycle Limit
4. Lower Control Length

**Correct Option:B**

**Answer (b) LCL is Lower Control Limit. It is calculated as three standard deviations below the mean of a process.**

Q8.Which of the area represent a range of special, unexpected variation?

SELECT THE CORRECT ANSWER

A) Outside control limits

B) Within control limits

C) Not enough information available'

D) Neither

**Correct Option:A**

**a) Outside control limits**

Q9.Process capability (Cp) describes a process often in a stable manufacturing environment that leads to the production of a product that conforms to client and design specifications. An ideal process will have a Cp value of:

SELECT THE CORRECT ANSWER

1. >1
2. <1
3. equal to 1
4. within 1 standard deviation of mean

**Correct Option:A**

**Answer (a) An ideal process will have a value > 1 in a stable environment.**

Q10.Which control chart must have at least 20 subgroups of observed values to judge whether a process is in control or not?

SELECT THE CORRECT ANSWER

1. R-Chart
2. C-Chart
3. P-Chart
4. Y-Chart

**Correct Option:A**

**Answer: (a) An R-Chart must have at least 20 subgroups of observed values to judge whether a process is in control or not.**

Q11.Given an average of 1.84 defects per 5 units, what is the upper limit of the control chart to be set?

SELECT THE CORRECT ANSWER

1. 2.944
2. 3.66
3. 3.287
4. 5

**Correct Option:B**

**Answer: (b) This is a case of u-chart (count defects and sub-group size may not be constant) u-bar = 1.84 n = 5 UCL = u-bar + 3 \* SQRT (u-bar/n) UCL = 1.84 + 3 \* SQRT (1.84/5) UCL = 1.84 + 3 \* 0.60663 UCL = 3.66**

Q12.A Black Belt practitioner is hired to identify a number of Critical to Price(CTP) factors in an effort to streamline and reduce costs associated with manufacturing product A. The following are CTP factors EXCEPT:

SELECT THE CORRECT ANSWER

1. component costs
2. assembly costs
3. shipping costs
4. loan refinancing costs

**Correct Option:D**

**Answer (d) CTP factors are factors that influence the costs of a process. In this example, component cost, assembly cost, and shipping cost are all CTP costs. The loan refinancing cost is not part of CTP and hence "D" is the answer.**

Q13.A Six Sigma practitioner is likely to use advanced quantitative analysis to optimize business or industrial processes. Through process mapping, the practitioner can match the processes inherent to the project to multiple variables required by requirement or customer needs. This tool is also referred to as:

SELECT THE CORRECT ANSWER

1. Capability-requirement analysis
2. FMEA analysis
3. Capability-complexity analysis
4. CandE analysis

**Correct Option:C**

**Answer: (c) Capability-Complexity Analysis is used.**

Q14.Researchers at a car manufacturing unit are conducting a double-blind, controlled study to compare brake systems. What does double blind mean?

SELECT THE CORRECT ANSWER

1. Only blind attendants are used.
2. Special types of blinds are used.
3. Samples are kept confidential from customers.
4. Samples are kept confidential from testers.

**Correct Option:D**

**Answer: (d) Double blind experimental design means that the samples are kept confidential from testers.**

Q15.The following are examples of One Way Analysis of Variance EXCEPT:

SELECT THE CORRECT ANSWER

1. F-test
2. Tukey Kramer
3. Levene test for homogeneity of variance
4. Tukey multiple comparison

**Correct Option:D**

**Answer: (d) Tukey Multiple Comparison is not a one-way analysis of variance.**

Q16.In the coefficient of variation formula, what does (S) stand for?

SELECT THE CORRECT ANSWER

1. Sigma
2. Standard deviation
3. Sum of squares
4. Sum of rectangles

**Correct Option:B**

**Answer (b) In standard deviation calculations, "s" stands for standard deviation.**

Q17.A normally distributed data should approximate the theoretical normal distribution. What is the interquartile range of a normal distribution?

SELECT THE CORRECT ANSWER

1. 1.33 standard deviation
2. 1.67 standard deviation
3. 1.96 standard deviation
4. 2.67 standard deviation

**Correct Option:A**

**Answer (a) The interquartile range of a normal distribution is 1.33 standard deviations.**

Q18.According to a national grocery store chain manager, only 6% of customers who have surveys mailed to their homes return them filled out completely. What is this type of sampling error called?

SELECT THE CORRECT ANSWER

1. Non-response error
2. Confidence interval
3. Lazy consumer error
4. Mailing error

**Correct Option:A**

**Answer: (a) Since 94% of the customers have not responded to the surveys, it is termed as non-response error.**

Q19.A company wishes to compare the expected mileage of eight different types of car tyres. Which one of the following statistical tests is best suited for analysis?

SELECT THE CORRECT ANSWER

1. Multiple regression
2. ANOVA
3. Paired-difference tests
4. Z-test

**Correct Option:B**

**Answer (b) ANOVA is a statistical test that evaluates the difference among means of three or more samples. In this example , each of the eight tyres could be tested and the average expected mileage is recorded. ANOVA analysis determines whether at least 2 of the tyres have significantly different mileages.**

Q20.Machines A and B have been showing disparate efficiency and defects per unit rate despite similar variation in quality at purchase time. If the mean squares between the 2 machines is 250 and the mean square from each machine 100, what is the value of FSTAT (F-Statistics)?

SELECT THE CORRECT ANSWER

1. 0.4
2. 5
3. 2.5
4. 4

**Correct Option:C**

**Answer: (c) FSTAT (F-Statistics) = 250/100 = 2.5**

Q21.Adam is a Black Belt practitioner who has been requested to investigate and improve the working relationship between the assembly line manager and unit project manager. He discovers that the unit project manager is reluctant to share information with the assembly line manager. This is an example of a(n):

SELECT THE CORRECT ANSWER

1. Organizational block
2. Organizational split
3. Inadequate specialization
4. Confusion of frontline roles

**Correct Option:A**

**Answer: (a) Typically there are organizational boundaries which might result in people not sharing information. These are typically categorized as organizational block.**

Q22.Richard builds a predictive model based on data collected from the highway gas mileage of a number of tyre brands. The difference between actual data points and predicted ones is referred to as:

SELECT THE CORRECT ANSWER

1. residuals
2. convergence error
3. non-response bias
4. estimators

**Correct Option:A**

**Answer: (a) The difference between actual and predicted points is called residuals.**

Q23.In the manufacturing floor of Quest industries, large white posters are used to signal the need for the line manager to begin quality assurance. What is the concept referred to as?

SELECT THE CORRECT ANSWER

1. 5S
2. Kanban
3. Poka-yoke
4. Kaizen

**Correct Option:B**

**Answer: (b) Kanban is a Japanese term that literally means 'sign-board.' Kanban is a scheduling system for lean and Just-In-Time (JIT) production.**

Q24.SMED is a lean manufacturing concept that is used to reduce waste in the manufacturing process. What does E stand for?

SELECT THE CORRECT ANSWER

1. Exchange
2. Error
3. Estimate
4. Expected

**Correct Option:A**

**Answer: (a) SMED stands for Single Minute Exchange of Die. It means that the Die should be exchanged in not more than 9 minutes.**

Q25.Escon is a company that encourages employee autonomy in decision making and has few hierarchical structures. In this environment, delegation of tasks is encouraged and controls over employee initiatives is low. What type of organizational structure is this?

SELECT THE CORRECT ANSWER

1. Wide
2. Tall
3. Flat
4. Narrow

**Correct Option:C**

**Answer: (c ) This is a good example of a flat organization structure.**

Q26.Which of the following is NOT a component of the decision making process in business or manufacturing?

SELECT THE CORRECT ANSWER

1. Listing alternative courses of action
2. Evaluating the performance of the last project
3. Listing uncertain events
4. Adopting decision criteria

**Correct Option:B**

**Answer: (b) Evaluation of the last project is done for Root Cause Analysis. This is not done for subsequent decision making.**

Q27.Encot produces computer chips for large medical and technological corporations. To determine the number of defective chips from each batch of inspected products, what type of chart should managers use?

SELECT THE CORRECT ANSWER

1. P chart
2. R Chart
3. C chart
4. X chart

**Correct Option:A**

**Answer: (a) The p chart is used when the data can only be whole numbers, as in counting, it is known as discrete (also known as attribute data). The sample is evaluated for only the number of defects, flaws, occurrences, etc.**

Q28.Deams management team is conducting measurements to quantify the manufacture of brakes for a European car company. The Cp value is calculated as > 1.33. Which of the following statements is not correct about Cp?

SELECT THE CORRECT ANSWER

1. It indicates the process is capable in the long-term.
2. It indicates the process is incapable in the short-term.
3. it indicates that the width specifications of the process are unknown.
4. it indicates that the width specifications of the process are known.

**Correct Option:A**

**Answer: (a) The Cpk value of more than 1 signifies that the process is capable in the long run.**

Q29.The following are components of Operational Excellence in manufacturing EXCEPT:

SELECT THE CORRECT ANSWER

1. Using the needs of the customers
2. Introducing multiple layers of middle management
3. Optimizing current activities
4. Providing employees with continuous training

**Correct Option:B**

**Answer: (b) The only odd answer from these options is "introducing multiple layers of middle management."**

Q30.An organization finds that an extra measure of security added to online transactions did not reduce the incidence of identity theft. What is this concept of management referred as?

SELECT THE CORRECT ANSWER

1. No-value added
2. No-security added
3. Limited effectiveness model
4. Identity theft model

**Correct Option:A**

**Answer: (a) This is a case of non-value added activity.**

Q31.How does production smoothing reduce waste?

SELECT THE CORRECT ANSWER

1. By producing intermediate goods at a constant rate
2. By producing non commercial goods at a constant rate
3. By eliminating undersold goods from the production line
4. By reducing undersold goods from the production line

**Correct Option:A**

**Answer: (a) In the production smoothening process, the product levels are leveled and can be optimized further.**

Q32.Which of the following models is ideal for informal communication?

SELECT THE CORRECT ANSWER

1. Water-cooler discussion
2. Presentation
3. E-mail
4. Group meeting

**Correct Option:A**

**Answer: (a) For business level meetings and formal discussions, we use group meeting, emails and presentations. While informal discussions can happen anywhere, like over coffee, canteen area, near water-cooler, etc.**

Q33.Which of the following is an innovative methodology for problem solving?

SELECT THE CORRECT ANSWER

1. BPR
2. TPM
3. TRIZ
4. BMP

**Correct Option:C**

**Answer: (c) The TRIZ methodology is an innovative way of problem solving.**

Q34.A perfect regression model with all points fitting the regression line has Sum Square of Errors:

SELECT THE CORRECT ANSWER

1. >0
2. <0
3. equal to 0
4. equal to 1

**Correct Option:C**

**Answer: (c) For a regression model to fit, the plot should have sum of square of the errors to be zero.**

Q35.Sum Square of Error is equal to:

SELECT THE CORRECT ANSWER

1. Sum Squares due to Pure Error + Sum Squares due to Lack of Fit
2. Sum Squares due to Pure Error - Sum Squares due to Lack of Fit
3. Sum Squares due to Lack of Fit-Sum Squares due to Pure Error
4. None of the above

**Correct Option:A**

**Answer: (a) The Sum of Squares for Error (SSE) is often calculated when you find the least squares line equation for a set of data. It is used as a basis for other statistics that assess how well the equation fits the data**

Q36.Which of the following is true about Design of Experiments?

SELECT THE CORRECT ANSWER

1. Misses out on interactions
2. Tests one factor at a time
3. Will be able to show the lack of fit for model
4. Depends on the skill of the Black Belt

**Correct Option:C**

**Answer: (c) Design of experiments (DOE) is a systematic method to determine the relationship between factors affecting a process and the output of that process. In other words, it is used to find cause-and-effect relationships. This information is needed to manage process inputs in order to optimize the output.**

Q37.For a full factorial 23 design with 1 replicate, how many runs could you expect?

SELECT THE CORRECT ANSWER

1. 8
2. 16
3. 46
4. 32

**Correct Option:C**

**Answer: (c) 23 designs + 1 replicate gives you 23+23. Since this is full factorial, we would include all of these, that is 46.**

Q38.For a 2 level, 5 factor experiment, if the number of runs on 2 replicates is 16, which of the following experiments is the Black Belt looking at?

SELECT THE CORRECT ANSWER

1. Full factorial
2. Half fractional factorial
3. Quarter fractional factorial
4. None of the above

**Correct Option:B**

**Answer: (b) An experiment where half of the combinations are omitted is the answer here.**

Q39.Which of the following techniques allows you to eliminate errors due to nuisance factors?

SELECT THE CORRECT ANSWER

1. Blocking
2. Coding
3. Transformation
4. Replication

**Correct Option:A**

**Answer: (a) In experimental design, blocking is a technique used to deal with nuisance factors that may affect the results of the experiment. The experiment is organized into blocks, where the nuisance factor is maintained at a constant level in each block.**

Q40.In a four factor factorial experiment (fractional), the Design results show I = ABCD. What does ABCD here stand for?

SELECT THE CORRECT ANSWER

1. Coded interactions
2. Aliased interactions
3. Combination of main effects
4. Design Generator

**Correct Option:D**

**Answer: (d) There are a bunch of components in any design. In this case, it shows some of the combinations I = ABCD and hence, ABCD is Design Generator.**

Q41.What does TPM stand for?

SELECT THE CORRECT ANSWER

1. Total Product Maintenance
2. Total Productive Maintenance
3. Total People Maintenance
4. Total Purchase Maintenance

**Correct Option:B**

**Answer: (b) TPM stands for Total Productive Maintenance.**

Q42.Which of the following is NOT a pillar of TPM?

SELECT THE CORRECT ANSWER

1. Focused improvement
2. Autonomous maintenance
3. Quality maintenance
4. Reduce costs

**Correct Option:D**

**Answer: (d) 8 Pillars of TPM : Focused improvement (Kobetsu Kaizen) Autonomous maintenance (Jishu Hozen) Planned maintenance Training and education Early phase management Quality maintenance (Hinshitsu Hozen) Office TPM SHE**

Q43.What does OEE stand for?

SELECT THE CORRECT ANSWER

1. Overall Equipment Effectiveness
2. Overall Estimation Effectiveness
3. Overall Equipment Estimation
4. Overall Effective Estimation

**Correct Option:A**

**Answer: (a) OEE stands for Overall Equipment Effectiveness.**

Q44.What does TEEP stand for?

SELECT THE CORRECT ANSWER

1. Total Effective Equipment Performance
2. Total Effective Estimation Performance
3. Total Effective Equipment Purchase
4. Total Effort in Equipment Purchase

**Correct Option:A**

**Answer: (a) TEEP stands for Total Effective Equipment Performance.**

Q45.Which of the following tools is commonly used in the Define phase of a project?

SELECT THE CORRECT ANSWER

1. Affinity diagram
2. Control chart
3. Failure Mode and Effects Analysis
4. Data collection checklist

**Correct Option:A**

**Answer: (a) The Affinity diagram is designed to invoke creative thinking and organize qualitative information into related topics. It is the easiest and least complex modern quality tool to begin the problem solving journey.**

Q46.Which of the following techniques would help increase process stability when the cause of variation is a cluttered work station?

SELECT THE CORRECT ANSWER

1. 5S
2. SMED
3. Preventive Maintenance
4. Visual Factory

**Correct Option:A**

**Answer: (a) 5S is the technique used to reduce variation that is caused because of cluttered work station. The 5S program stands for the Japanese words, seiri, seiton, seiso, seiketsu, and shitsuke. Roughly translated, the American equivalent becomes: Sort. Separate and eliminate unnecessary tools, parts, and methods to de-clutter work areas.**

Q47.An important aspect of data collection is that the data collector should:

SELECT THE CORRECT ANSWER

1. determine the dispersion of the data.
2. know how the data is to be used.
3. use a control chart to analyze the data.
4. use a stratified sampling plan.

**Correct Option:B**

**Answer: (b) It is very important to know the meaning of data and its usage before starting the data collection phase.**

Q48.A Six Sigma team has been chartered to improve the way in which a company takes orders for its products. Which of the following tools should the team use to determine all the potential pitfalls and actual defects that occur?

SELECT THE CORRECT ANSWER

1. Process Failure Mode and Effects Analysis
2. Process Map
3. Design for Six Sigma
4. Supplier Input Process Output Control

**Correct Option:A**

**Answer: (a) A Process Failure Mode Effects Analysis (PFMEA) is a structured analytical tool used by an organization, business unit, or cross-functional team to identify and evaluate the potential failures of a process. PFMEA helps to establish the impact of the failure, and identify and prioritize the action items with the goal of alleviating risk. It is a living document that should be initiated prior to the process of production and maintained through the life cycle of the product.**

Q49.A store uses signs at specific points in its storage area to indicate when products need to be ordered. This practice is an example of:

SELECT THE CORRECT ANSWER

1. Kanban
2. Poka-yoke
3. Checkpoints
4. Hoshin

**Correct Option:A**

**Answer: (a) Kanban is a Japanese term that literally means 'sign-board.' Kanban is a scheduling system for lean and Just-In-Time (JIT) production**

Q50.After the major headings of a tree diagram have been broken into greater detail, what is the next step that should be taken?

SELECT THE CORRECT ANSWER

1. Assemble the right team
2. Review the diagram for logical flow and completeness
3. Revise the problem statement
4. Choose the tree diagram goal statement

**Correct Option:B**

**Answer: (b) Review is a mandatory process to ensure that nothing has been missed and also to eliminate redundancies if any.**

Q51.Poka-yoke is best defined as:

SELECT THE CORRECT ANSWER

1. improving machine efficiency
2. reducing field failures to virtually zero
3. capturing the voice of the customer
4. preventing controllable defects

**Correct Option:D**

**Answer: (d) A poka-yoke device is one that prevents incorrect parts from being made or assembled, or that easily identifies a flaw or error.**

Q52.Which of the following activities is value-added?

SELECT THE CORRECT ANSWER

1. Setup
2. Process
3. Storage
4. Inspection

**Correct Option:B**

**Answer: (b) Process defines the values/culture within any organization.**

Q53.Which of the following tools would be most appropriate for collecting data to study the symptoms of a problem?

SELECT THE CORRECT ANSWER

1. Check sheet
2. Flow diagram
3. Force-field analysis
4. Activity network diagram

**Correct Option:A**

**Answer: (a) This ensures that all the required data has been identified and validated.**

Q54.A Black Belt would use non-parametric statistical methods when:

SELECT THE CORRECT ANSWER

1. knowledge of the underlying distribution of the population is limited
2. the measurement scale is either nominal or ordinal
3. the statistical estimation is required to have higher assurance
4. management requires substantial statistical analysis prior to implementation

**Correct Option:B**

**Answer: (b) A Black Belt would use non-parametric statistical methods when the measurement scale is either nominal or ordinal**

Q55.Benchmarking is difficult to perform on processes that:

SELECT THE CORRECT ANSWER

1. can be identified and researched easily
2. are practiced in many different industries
3. have a major impact on the success of the business
4. have not been documented

**Correct Option:D**

**Answer: (d) For an undocumented process, Benchmarking would not yield any good results.**

Q56.One characteristic of attributes data is that it is always:

SELECT THE CORRECT ANSWER

1. continuous
2. discrete
3. expensive to collect
4. read from a scale of measurement

**Correct Option:B**

**Answer: (b) Attribute data is always discrete.**

Q57.Which of the following best describes internal failure costs?

SELECT THE CORRECT ANSWER

1. The economic costs associated with a catastrophic failure of an internal subsystem
2. The unavoidable quality system costs associated with the production of any product or service
3. The opposite of external failure costs
4. The costs resulting from a nonconformance detected before a product or service is provided

**Correct Option:D**

**Answer: (d) The non-conformance costs are related to processes which don't match customer expectations and hence related to internal failure costs.**

Q58.According to Juran, when a major quality improvement project is launched, which of the following would describe the desired change in performance level?

SELECT THE CORRECT ANSWER

1. Six Sigma
2. Continuous
3. Breakthrough
4. Sporadic

**Correct Option:C**

**Answer: (c) Continuous and Breakthrough are the most appropriate ones. While Six Sigma deals with breakthrough, any minor quality improvement project will deal with continuous improvement. So, breakthrough improvement is most appropriate.**

Q59.Which of the following methods is used to develop an exhaustive list of ideas about a subject?

SELECT THE CORRECT ANSWER

1. Benchmarking
2. Brainstorming
3. Goal-setting
4. Problem-solving

**Correct Option:B**

**Answer: (b) Brainstorming helps getting people's views together from their background and understanding. It also ensures that different ideas get discussed.**

Q60.In comparison to a full-factorial design of experiment (DOE), a traditional, one-at-a-time approach will:

SELECT THE CORRECT ANSWER

1. miss interactions
2. gain efficiencies
3. save time
4. cost less

**Correct Option:A**

**Answer: (a) A full factorial design helps you get all the individual effects along with interaction effects.**

Q61.Benchmarking is difficult to perform on processes that:

SELECT THE CORRECT ANSWER

1. can be identified and researched easily.
2. are practiced in many different industries.
3. have a major impact on the success of the business.
4. have not been documented.

**Correct Option:D**

**Answer: (d) If information/documents are not available about the processes, it becomes very difficult to benchmark.**

Q62.Calendar Time and Temperature are examples of which measurement scale?

SELECT THE CORRECT ANSWER

1. Variance
2. Ordinal
3. Inverse
4. Interval

**Correct Option:D**

**Answer: (d) Interval scale defines the difference between any two successive points. The difference may or may not be equal for the data to be treated on Interval scales. Example --- Calendar time and temperature. Correlations, f tests, t tests, Regression can be used with Interval scales.**

Q63.The primary focus of the Analyze phase in the DMAIC process is to:

SELECT THE CORRECT ANSWER

1. find out the person who caused the issue.
2. analyze and eliminated measurement issues.
3. decrease non value-add activities and waste from a process.
4. understand the root cause of issues that are causing gaps between the current performance of the system and the expected performance.

**Correct Option:D**

**Answer: (d) While some of the analyses might find the root cause to a particular process or a person, the overall goal is to find out the reason for the gap between expected and actual performance.**

Q64.If 95% of data from a Normally Distributed data set is within +/- 2 Standard Deviation of the Mean, then calculate the probability of having the sample mean within +/- 2 Standard Deviation of the overall population mean.

SELECT THE CORRECT ANSWER

1. 0.95
2. 0.05
3. 0.9938
4. 1

**Correct Option:A**

**Answer: (a) It is 95%. As the data is normally distributed and 95% of the data is within +/- 2 sigma level, there is an probability of 95% that the sample mean will fall within this range**

Q65.What is major difference between the DMAIC and DMADV approach?

SELECT THE CORRECT ANSWER

1. The DMAIC approach is used to improve and perfect the process that is already in place. DMADV focuses on creating a new product and services and perfecting them.
2. You first do DMAIC and then go for DMADV.
3. If the root cause is known, you adopt DMADV, else you adopt DMAIC.
4. DMADV is for process improvement and DMAIC for process control.

**Correct Option:A**

**Answer: (a) DMAIC is a problem solving approach for process improvements. DMADV is used when you do not have any process in place and want to set up a new process.**

Q66.A company's process is performing at 4.5 sigma. What would be its failure rate (defects per million opportunity)?

SELECT THE CORRECT ANSWER

1. 233 defects per million
2. 1350 defects per million
3. 6210 defects per million
4. Unable to determine with these details

**Correct Option:B**

**Answer: (b) As per DPMO table, 1350 would be the number of defects per million opportunities at 4.5 sigma level of the process.**

Q67.Arrange the team development stages in order.

SELECT THE CORRECT ANSWER

1. Decide, Measure, Analyze, Design, Validate
2. Select Team, Assign Roles, Allocate Work, Get Results
3. Define, Measure, Analyze, and Control
4. Forming, Storming, Norming, and Performing

**Correct Option:D**

**Answer: (d) The team development stages are Forming, Storming, Norming, and Performing. The other stages are not related to team development.**

Q68.27% of the time in the last month, the response time to customer complaints was two days longer than the published service level agreement. This problem statement is termed as:

SELECT THE CORRECT ANSWER

1. Manageable
2. Achievable Goal
3. Specific
4. Out of Control

**Correct Option:C**

**Answer: (c) This is a very specific problem statement with the details of the problem with data--hence, it is "specific."**

Q69.The tool that provides details on the relationship between the suppliers, their inputs, internal processes, outputs generated, and customers of the output is:

SELECT THE CORRECT ANSWER

1. Process Map
2. SIPOC
3. Flow Chart
4. VoC

**Correct Option:B**

**Answer: (b) SIPOC: Supplier Input Process Output and Control is the right answer that provides an overarching view of all the things together. VoC is capturing Voice of Customer. The process Map and Flowchart provide details on how inputs are flowing through the system, the details of sub processes and how output is produced.**

Q70.Force Field Analysis is done for..

SELECT THE CORRECT ANSWER

1. Analysis of what Forces results into what output
2. Cause and Effect Matrix to analyze Input Vs. Output Force Fields
3. To Analyze and understand the driving positive forces for changes along with restraining forces and obstacles for Changes
4. Forcing the team to conduct analysis

**Correct Option:C**

**Answer: (c) Force Field Analysis is done to understand what are the driving forces along with restraining forces.**

Q71.What type of data would be related to length, volume, and time?

SELECT THE CORRECT ANSWER

1. Attribute Data
2. Continuous Data
3. Correlation
4. GRR Measurement Analysis

**Correct Option:B**

**Answer: (b) Data like Length, Volume, Temperature, and Time are part of Continuous Data. Data like Defects and Defectives are part of attribute data**

Q72.Determine the upper control limit (+3 standard deviation) for proportion defective when the average daily output is 1,335 units and the average fraction defective for last 3 months is 0.03%.

SELECT THE CORRECT ANSWER

1. 0.09
2. 0.044
3. 0.55
4. 0.03

**Correct Option:B**

**Answer: (b) For this question, we need p-control chart to compute the UCL The upper control limit is calculated by using: UCL = p-bar + (3 \* sqrt (p-bar \* (1-p-bar)/n)) UCL = 0.03 + (3 \* sqrt (0.03 \* (1-0.03)/1335)) UCL = 0.03 + (3 \* sqrt ( 0.0291/ 1335)) UCL = 0.03 + (3 \* 0.00467) UCL = 0.03 + 0.014**

Q73.Which table should be used to determine a confidence interval on the mean when the standard deviation is not known?

SELECT THE CORRECT ANSWER

1. F-Table
2. T-Table
3. Z-Table
4. Chi-Square

**Correct Option:B**

**Answer: (b) Chi-Square and F-tests are used for determining difference in variances between data sets. The Z-table is used for calculating Mean only whenever the standard deviation is known for the population. The t-test distribution is used when the population variance is unknown and the sample size is small (less than 30). That is why T-test is the right answer.**

Q74.Out of the following nonparametric tests, which test does NOT make a ranking evaluation by comparison with a critical value of chi-square?

SELECT THE CORRECT ANSWER

1. Kendall coefficient of concordance
2. Mood's median test
3. Kruskal-Wallis test
4. Spearman Rank correlation coefficient

**Correct Option:D**

**Answer: (d) The 3 tests in options a, b and c require use of chi-square. "Spearman Rank Correlation Coefficient" is the right answer.**

Q75.Product yield was 86% before an improvement was made. To determine if a 3% change (in either direction) has been made at the 95% confidence level, what sample size should be taken?

SELECT THE CORRECT ANSWER

1. 514
2. 3671
3. 110
4. 86

**Correct Option:A**

**Answer: (a) For this, we would need to use the Binomial formula n = Z2 \*p-bar\*(1-p-bar)/(tolerance)2 n = (1.96)2 \* (0.86) \* (0.14)/(0.03)2 n = 514**

Q76.The equation for analysis of variance may be expressed as follows:

SELECT THE CORRECT ANSWER

1. The total standard deviation is equal to the sum of the standard deviation for the treatment effect plus the standard deviation of the random error.
2. Sum of Square of Errors between the mean and individual values
3. The total sum of squares of deviations from the grand mean is equal to the sum of squares of deviations among treatment means and the grand mean plus the sum of squares of deviation within treatments.
4. Average variation of data from mean

**Correct Option:C**

**Answer: (c) The equation is Total SS = SST + SSE Total SS = total sum of squares SST = sum of squares among treatments SSE = sum of squares within treatments (error) Answer C correctly captures this.**

Q77.A study was conducted on the relationship between the speed of different cars and their gasoline mileage. The correlation coefficient was found to be 0.35. Later, it was discovered that there was a defect in the speedometers and they had all been set 5 miles per hour too fast. The correlation coefficient was computed using the corrected scores. Its new value will be:

SELECT THE CORRECT ANSWER

1. 0.35
2. 0.3
3. 0.4
4. 0.5

**Correct Option:A**

**Answer: (a) The correlation coefficient reflects the two variables and tracks the slope of the line. With the change in the values of speed, the y-intercept would change and hence the equation of y would change. But there will not be any impact to the other factors. That's why the correlation coefficient remains the same.**

Q78.Given that the population standard deviation is 3.7, what sample size is required to be 95% confident that the estimated mean has an error less than 0.05?

SELECT THE CORRECT ANSWER

1. 783
2. 42074
3. 21037
4. 412

**Correct Option:C**

**Answer: (c) If the sample average is used to estimate the population mean, the confidence that the error will not exceed E is (1-alpha). The same size is computed by the expression: n = Z2sigma2 / E2 n = (1.96)2 \* (3.7)2/(0.05)2 n = 21037**

Q79.Design of Experiments (DoE) can be best described as:

SELECT THE CORRECT ANSWER

1. better than one factor at a time testing.
2. model based testing.
3. poka yoke.
4. a careful planned application of the scientific method.

**Correct Option:D**

**Answer: (d) While all the answers have some merits , option D is a lot more accurate and broad.**

Q80.In Taguchi Design Methods, what form of product design did Taguchi state as the most neglected area?

SELECT THE CORRECT ANSWER

1. Tolerance Design
2. Parameter Design
3. Product Design
4. System Design

**Correct Option:B**

**Answer: (b) Taguchi referred to system, parameter, and tolerance design as design considerations for products and processes. Of these, Taguchi considered parameter design to be the most neglected aspect of product design.**

Q81.In the Taguchi Design Methodology, what are considered as noise factors?

SELECT THE CORRECT ANSWER

1. Factors that impact tolerance design
2. Factors that influence variation in the output
3. Factors that strongly influence the mean response
4. Factors that maximize parameter design

**Correct Option:B**

**Answer: (b) Taguchi's design methodology refers to two major categories of factors: Signal Factors and Noise Factors. Signal factors are those that strongly influence the output response and Noise factors are those factors that influence variation in the output response.**

Q82.Assume an operating speed rate of 84%. If 60 units are produced at 3 minutes/unit in 4 hours, what is the performance efficiency of the work unit?

SELECT THE CORRECT ANSWER

1. 0.85
2. 0.63
3. 0.75
4. 0.60

**Correct Option:B**

**Answer: (b) For this problem, there are 2 calculations to be done: 1. Net Operating Rate = (Processed Amount X Actual Cycle Time) / Operating Time = 60 X 3 / 240 = 0.75 or 75% 2. Performance Efficiency = Operating Speed Rate X Net Operating Rate Performance efficiency = 0.84 X 0.75 = 0.63**

Q83.The Theory of Constraints concentrates mainly on:

SELECT THE CORRECT ANSWER

1. achieving on-time goals.
2. removing process bottlenecks.
3. removing waste.
4. correlation analysis of constraints.

**Correct Option:B**

**Answer: (b) The Theory of Constraints focuses on eliminating bottlenecks in a process of increasing the throughput. Achieving on-time goals and removing waste may not increase throughput.**

Q84.Measurement Precision is best defined as:

SELECT THE CORRECT ANSWER

1. the ability to target a process to a specified normal value.
2. repeated measurements done by different operators and then taking an average of the readings.
3. the agreement or closeness of measurements on the same item.
4. difference between the average of repeated measurements on the same item.

**Correct Option:C**

**Answer: (c ) Measurement Precision is achieved when all the measurements fall together at one point close to each other.**

Q85.For the distribution Weibull, what happens as the scale parameter decreases?

SELECT THE CORRECT ANSWER

1. The location parameter approaches zero.
2. The probability density function is compressed to the left.
3. The probability density function stretches to the right.
4. There is no change.

**Correct Option:B**

**Answer: (b) The Weibull distribution is the most complex of all the distributions. It is generally used in reliability analysis. It was developed by scientist W. Weibull from Sweden. He developed it for solving problems involving the fatigue levels of materials. As the scale decreases, the probability density function is compressed to the left.**

Q86.The probability of John passing his Chemistry course is 0.75. The probability of John passing his Physics class is 0.8. If the probability of John passing both courses is 0.60, what is the probability that John will pass either his Chemistry or Physics course?

SELECT THE CORRECT ANSWER

1. 0.75
2. 0.8
3. 0.6
4. 0.95

**Correct Option:D**

**Answer: (d) This problem is a classic case of the additive law of probability, which is applied to the union of events. The probability that John passes either Chemistry or Physics is the union of the 2 events. The probability of 2 events A and B occurring is given by the addition rule, which is: P(A U B) = P(A) + P (B) - P(A ∩ B) The correct answer is 0.75 + 0.80 - 0.60 = 0.95**

Q87.If the variance of a distribution of readings is 25, the standard deviation of the distribution is:

SELECT THE CORRECT ANSWER

1. 5
2. 25
3. 625
4. 6

**Correct Option:A**

**Answer: (a)Standard Deviation is calculated by taking the square root of the variance. Square root of 25 is 5. So, Standard Deviation is 5**

Q88.While conducting process capability study on a pilot run of 50 units, it was found that the Cpk upper value is 1.7, while the Cpk lower value is 0.80 . The requirements given by the customer expects the minimum value of Cpk to be 1.25. What action should be taken?

SELECT THE CORRECT ANSWER

1. Reduce variability
2. Contact customer and change specification
3. Change the process
4. Center the process

**Correct Option:D**

**Answer: (d) From the data, it is obvious that the Cpk upper and lower values are away from each other; this typically occurs when the process is not centered and the mean is skewed toward upper or lower limit. In this case it is skewed towards lower limit. The first and immediate solution is to center the process to ensure mean is centered.**

Q89.While conducting a t-test, alpha is set at 0.5. Therefore we can conclude that:

SELECT THE CORRECT ANSWER

1. 95% of the time, our decision will be correct.
2. 5% of the time, we will claim that there is a real difference when there really is not a difference.
3. the data will be 95% accurate.
4. 5% of the time, we will say that there is no real difference, but in reality, there is a difference.

**Correct Option:B**

**Answer: (b) An alpha risk or Type-I risk is risk of rejecting a true hypothesis. A t-test evaluates the equality of two sample means: If alpha = 0.05, the null hypothesis will be rejected (says there is a difference) when the null hypothesis should not be rejected (no evidence of a difference) 5% of the time.**

Q90.The probability of a bus arriving on time and leaving on time is 0.8. The same bus has a probability of 0.84 for arriving on time and 0.86 for leaving on time. If the bus arrived on time, what is the probability that it will leave on time?

SELECT THE CORRECT ANSWER

1. 0.9524
2. 0.8
3. 0.84
4. 0.688

**Correct Option:A**

**Answer: (a) The solution to this problem involves conditional probability. The probability of Event B occurring, given Event A has occurred is P(B/A) = P (A∩B)/P(A) Let event B be the probability of the bus leaving on time. Let event A be the probability of the bus arriving on time.The interaction of Events A and B is the probability of the bus arriving and leaving on time.Thus, the probability of event B given Event A is 0.8/0.84 = 0.9524**

Q91.It has been observed that the number of defects in the finish of a surface has an overage of 0.45. What is the probability of a randomly selected item having more than 1 defect in the surface finish?

SELECT THE CORRECT ANSWER

1. 0.45
2. 0.2869
3. 0.05
4. 0.0755

**Correct Option:D**

**Answer: (d) The Poisson distribution is used to model rates. The probability of exactly r events occurring can be computed using the poisson distribution. We need to find out probability of exactly 0 and 1 defects and then subtract from 1. Entering the data in Poisson distribution equation gives the probability of exactly zero defects as 0.6376 and for exactly 1 defect as 0.2869. To calculate more than 1 defect, 1-(0.6376+0.2869) = 0.0755**

Q92.Where is the F-distribution used?

SELECT THE CORRECT ANSWER

1. To model discrete data when the population size is small compared to the sample size
2. To make decisions and construct confidence intervals by summing the square of normal random variables
3. To test for equality of variances from two normal populations
4. To compensate for error in the estimated standard deviation for a small sample size

**Correct Option:C**

**Answer: (c) Answer A aligns with the geometric and hypergeometric distributions. Answer D is partial explanation of the T-Distribution. Answer B is one description of the chi-square distribution.**

Q93.Which of the following is a valid null hypothesis?

SELECT THE CORRECT ANSWER

1. Y = 95
2. Y < 95
3. Y > 95
4. Y <> 95

**Correct Option:A**

**Answer: (a) A statistical hypothesis test determines if there is enough evidence to reject the null hypothesis at a given significance level. The null hypothesis must contain an equal sign.**

Q94.In the principles of 5S, which of the following is included?

SELECT THE CORRECT ANSWER

1. 5 Sigma
2. Self-Discipline
3. Sorting
4. Systems management

**Correct Option:C**

**Answer: (c) The 5S includes Sort.**

Q95.A p chart can be used to plot what data on a control chart?

SELECT THE CORRECT ANSWER

1. Any type of defects data
2. Variable data on defects
3. The number of defects in a sample
4. Either the fraction or percent defective in order of time

**Correct Option:D**

**Answer: (d) The p chart does not plot the number of defects in a sample (a c or u chart is required). An p chart is an attribute chart and is not used for variables.**

Q96.Overproduction, Waiting, Scrap, and Excess Motion are all forms of:

SELECT THE CORRECT ANSWER

1. muda
2. Special Cause
3. 5S
4. Toyota production system

**Correct Option:A**

**Answer: (a) While Toyota Production System uses Lean, these are categorized as waste or muda. So muda is more appropriate answer.**

Q97.Which control chart is appropriate to be used to monitor the number of non-conformities per unit?

SELECT THE CORRECT ANSWER

1. X-Bar chart
2. np chart
3. u chart
4. c chart

**Correct Option:C**

**Answer: (c) The u chart is used to monitor the number of non-conformities per unit. This is also considered the average number of defects/unit.**

Q98.Sometimes on a Control Chart, you may get two consecutive samples outside the target area but inside the specification. What is the expectation that two consecutive samples would both fall between the target area and the specification limit on the high side?

SELECT THE CORRECT ANSWER

1. 1/7
2. 1/49
3. 1/98
4. 1/196

**Correct Option:D**

**Answer: (d) The chance of two parts that can fall outside the control lines is 1/7 times 1/7 = 1/49. Since there are 4 ways it can occur, 1/196 is right answer**

Q99.Which of the following statements is NOT true with regard to X-Bar control charts?

SELECT THE CORRECT ANSWER

1. The width of the limits is usually set at plus or minus 3 standard deviations of the process.
2. If the process is in control, 2700 points per million will fall outside the control limits.
3. If the process is in control, half the points will fall below the center line.
4. The width of the limits is inversely proportional to the square root of the sample size.

**Correct Option:A**

**Answer: (a) The control limits are usually set at plus or minus 3 standard deviations of the sampling distribution used, not the process. If the sample size is 1, these are the same. In general the standard deviation of the sampling distribution is equal to the standard deviation of the individuals divided by the square root of the sample size.**

Q100.The best chart for analyzing volatile data, like stock market averages or commodity prices, would be:

SELECT THE CORRECT ANSWER

1. Scatter Plot
2. Moving Average
3. Histogram
4. Control Chart

**Correct Option:B**

**Answer: (b) The question describes an application for the moving average chart. With the moving average chart, the data is smoothened so that true trends can be analyzed.**