PRACTICE

Lean Six Sigma

Black Belt Exam

Q1: Why is it important to understand the Voice of a Customer when attempting to improve a business process ?

A Customers do not know what they want so we need to educate them
B To be sure that we understand problems with the process from our customer's point of view
C To ensure we can check that the process is stable
D To check that the process is stable and capable

Q2: What is the BEST type of data to collect when trying to understand the Current State (As-Is state) of a Process ?

A Variable (continuous data)
B Attribute data
C Categorical data
D It does not matter – there are methods to analyse all types of data

Q3: What colour cards are used in a 5S audit for marking an item or area that is out of compliance?

A Kanban
B Kaizen
C Blue
D Red

Q4: If a given process is stable and has a Cp= 1.0 and Cpk = 1.0; which of the following improvement approaches is most appropriate?

A Variation reduction
B Move the mean to the centre between the specification limits
C Centering and variation reduction
D Process stability (identify and eliminate special causes)

Q5: A process map is used to accomplish which of the following?

A Display a dynamic picture of process performance behaviour
B Focus attention on process problems in priority order
C Diagram possible problem causes in a process
D Track products, operator actions, or administrative procedures

Q6: Which type of Data Distribution is most common ifor modelling the variation of product weights in manufacturing processes ?

A Poission Distribution
B Exponential Distribution
C Normal Distribution
D Binomial Distribution

Q7: FMEA is a Six Sigma tool which helps us to understand _____.

A How the failure effects the customer
B What could cause the failure to happen
C How might the process fail to function
D How is the failure currently controlled

Q8: What is the approximate probability that a sample Mean is within +/- 3 Standard Deviations of the population Mean for a Normal Distribution?

A 95 %
B 97.9 %
C 68 %
D 99.7 %

Q9: Which step of 5S is concerned with moving or disposing of unnecessary items ?

A Shining
B Standardizing
C Sustaining
D Sorting

Q10: Which one of the following is the most effective means of reducing defects?

A Training
B Keep a Len Six Sigma project going on the process at all times
C Design defect prevention and mistake proofing into the product and production process
D Have each process consist of no more than five steps

Q11: Kaoru Ishikawa worked with quality professionals such as W.E. Deming to advance quality management. Which of the following is a key principle promoted by Ishikawa and other quality professionals?

A Focus on Long Term quality improvement rather than short term profit targets
B Kaizen improvement strategy is enough to make any company successful
C Management should be rewarded well even if performance is poor
D Cost cutting is the most important element of any process improvement strategy

Q12: Which statement describes an undesirable situation when implementing SPC?

A The Lower Control Limit for the R chart is equal to zero
B Attempt to use SPC for tracking transaction times at a warehouse
C A process is in Statistical Control before implementation of SPC
D The Control Limits are wider than the customer specification limits

Q13: Design for Six Sigma (DFSS) is a design technique that provides_____ :

A All of the benefits shown below (B, C and D)
B Easier production (manufacturing)
C Better mistake proofing
D Understanding the needs of the customer

Q14: Which relationships are depicted in a SIPOC diagram?

A Internal customers to external customers
B Diversion to conversion
C Suppliers through to customers
D Raw materials to finished products

Q15: If a process has subgroups and continuous data which control chart is most preferable?

A Individual-Moving Range Chart
B Xbar-R Chart
C EWMA Chart
D P Charts

Q16: Which chart is used to visualise the trend of long term variation of a process variable?

A Moving Average Chart
B Multi-Vari Chart
C P-Chart
D Pareto Chart

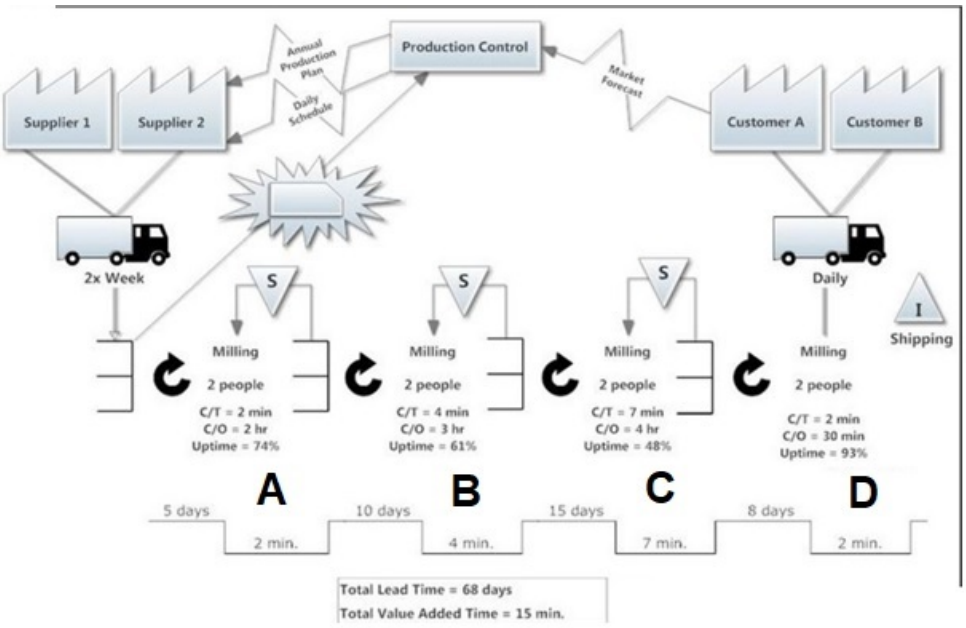
Q17: Project scope can be limited by the following factors EXCEPT:

A Geography
B Demographics
C Organizational structures
D Ten year financial projections

Q18: Which statement is most correct about the Value Stream Map in Figure 1 (below)?

A The process is using a pull system with supermarket buffer inventories
B Daily deliveries are made by Suppliers 1 and 2
C The production control is decided locally at each process step
D Yield for this process is 93%

Figure 1:



Q19: Which statement is most correct about the Value Stream Map in Figure 1 (above)?

A Signal Kanbans are used to re-stock 3 of the Milling Supermarkets
B One delivery per week is made by Suppliers 1 and 2
C The production control is decided locally at each process step
D Value-Added time is greater than 50%

Q20: Which statement is most correct about the Value Stream Map in Figure 1 (above)?

A The focus for improvement should be Operation C because it has the longest Cycle Time (C/T)
B The focus for improvement should be Operation C because it has the longest change Over Time (C/O) and the longest Cycle Time (C/T) and lowest uptime
C The production control receives messages from customers and suppliers by road transport
D Non-Value-Added time is less than 95%

Q21: According to the Central Limit Theorem, regardless of the population from which data is drawn, the sampling distribution of the mean when sufficiently large is:

A Normally distributed
B Abnormally distributed
C Skewed towards the outliers
D Skewed towards the standard deviation

Q22: At what point can the Control Plan be closed ?.

A Never
B As soon as the project is finished
C Within 30 days of the LSS project review team meeting

D After the project has been presented at the recognition event

Q23: A Black Belt practitioner constructs a control chart to display a process mean and its outer limits. In the chart above, what does LCL stand for?

A Lower cycle length
B Lower control limit
C Lower cycle limit
D Lower control length

Q24: An ideal process will have a Pp value for capability_____:

A Greater than one
B Less than one
C Equal to one
D Within one standard deviation of mean

Q25: When analysing a data set, we frequently graph one metric as a function of another. If the Correlation Coefficient is -0.95, how are the two-metrics correlated?

A Positively
B Not
C Negatively
D None

Q26: Which of the control charts helps us to understand the amount of variation within subgroups of continuous data?

A R-chart
B C-chart
C P-chart
D Y-chart

Q27: Which of the following is not a type of hypothesis test?

A F-test
B ANOVA
C p-test
D t-test

Q28: What does the symbol 's' stand for in regression analysis?

A Process Sigma Level
B Standard deviation of the sample
C Sum of squares
D Sum of rectangles

Q29: A Black Belt will sometimes do an experiment referred to as an OFAT, which stands for

A Only a Few Are Tested

B Opposite Factors Affect Technique
C One Factor at a Time
D Ordinary Fractional Approach Technique

Q30: What advantage does SMED provide in a Lean process ?

A Reduction of motion
B Poka Yoke devices
C Separation of 'Internal and External' activities
D All of the above

Q31: Which of the following steps is NOT a component of the decision-making process in business or manufacturing?

A Listing alternative courses of action
B Evaluating the performance of the last project
C Listing uncertain events (risks)
D Adopting decision criteria

Q32: Which method of communication is best used in project teams for better understanding ?

A Text messages (SMS or Whatsapp)
B Powerpoint Presentations
C E-mail
D Face to Face Stand-up meetings.

Q33: Which one of the following is an inventive methodology for problem-solving?

A BPR
B TPM
C TRIZ
D BMP

Q34: What is the purpose of the management tool called 'Hoshin Kanri' ?

A Uses as a Design methodology similar to DFSS
B Used as a structured approach for long term Strategic Planning and Deployment
C Used a Project Management framework
D Used for reducing WIP in a process

Q35: For a normal distribution, 4.2 standard deviations on each side of the mean would include approximately what percentage of the total population?

A 99.99%
B 95.00%
C 99.25%
D 99.75%

Q36: Data from a process output resides within the control limits. What is the best interpretation of this?

C The process is stable

Q37: What conclusions can be made from the data shown in Figure 1 (below)?

A February had the highest median snowfall
B Snowfall in December and January are significantly different
C When planning a skiing vacation in Newport VT it will be best to avoid the month of May
D These graphs show us nothing which is useful

Figure 1:

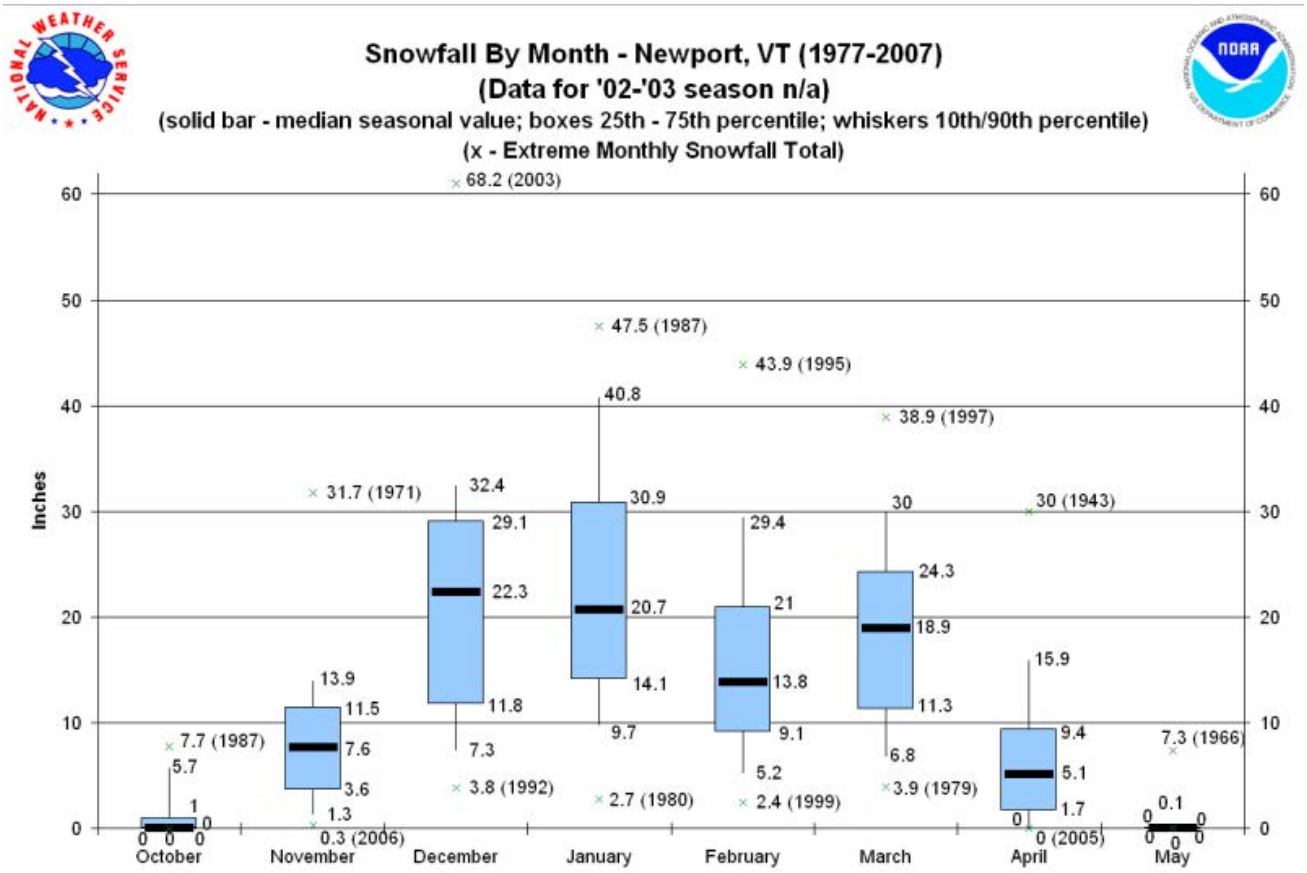
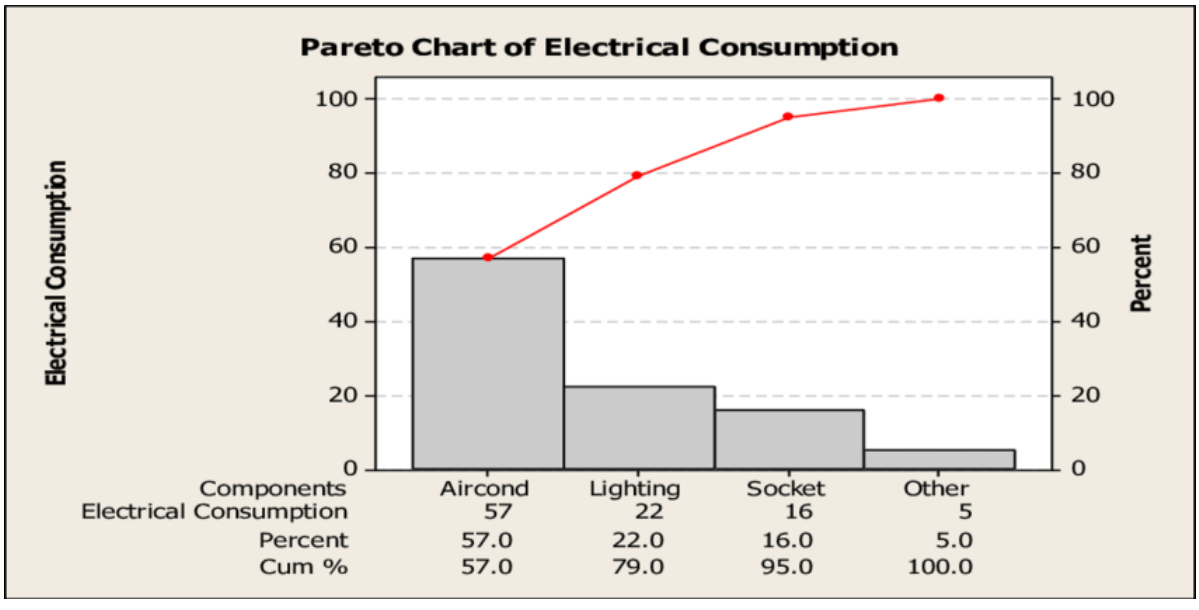


Figure 2:



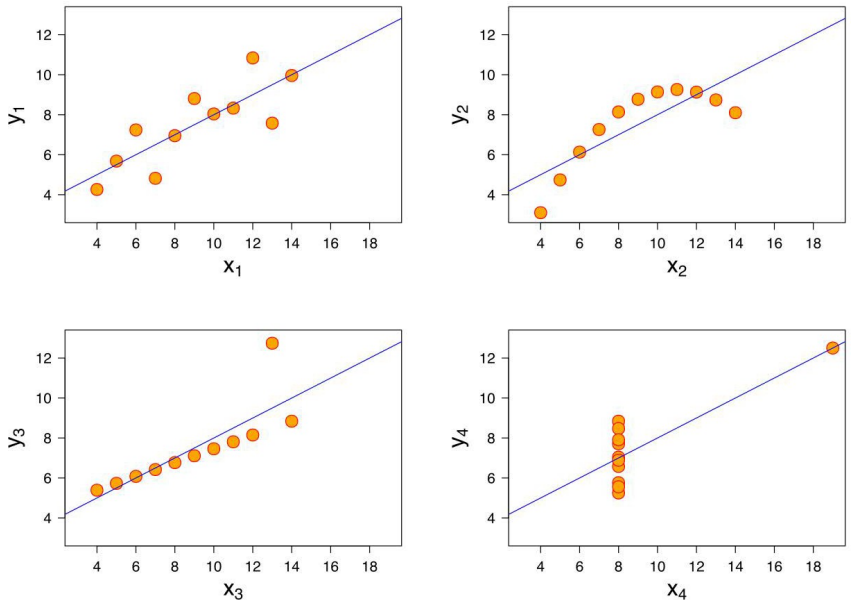
Q38: What conclusions can be made from the graphs shown in Figure 2 (above)?

A Electrical Sockets account for approximately 95% of electrical consumption.
B Air-conditioning (Aircond) accounts for approximately 80% of electrical consumption.
C Lighting accounts for approximately 20% of electrical consumption.
D Lighting accounts for approximately 79% of electrical consumption.

Q39: What conclusions can be made from the 4 fitted-line plots shown in Figure 3 (below)?

A The graph of y_1 vs x_1 shows the highest linear Correlation Coefficient of all 4 graphs B The graph of y_4 vs x_4 shows that the value of y_4 is 12 when $x_4 = 8$
C The graph of y_1 vs x_1 shows a 'best-fit' regression line which most closely models the actual data
D All the relationships shown would be better modelled using non-linear regregression.

Figure 3.



Q40: Which of the following is non-parametric Hypothesis test for comparing 2 samples of data?

A Mann Whitney test
B Kruskal–Wallis
C Chi-Square test
D None

Q41: A Six Sigma graphical tool for comparing the behaviour of one input variable against the behaviour of one output variable is called a _____

A SIPOC Chart
B Scatter Plot
C Box Plot Chart
D Run Chart

Q42: Which metric helps a Black Belt to know how much product is being made without rework or scrap ?

A DMAIC
B FTY
C RTY
D FMEA

Q43: In a Linear Regression analysis, the ANOVA table shows that, F = 26.1, df = 3, p < .05 What can we say ?

A Model is significant with less than 5% Alpha risk
B Model is not significant and no better at predicting than simply using the mean scores
C Model is significant with 5% confidence and has 3 predictors
D Model is significant at 95% confidence with one predictor

Q44: What name would describe a data distribution that is not balanced, has one mode and a long tail on one side ?

A Skewed
B Bimodal
C Gaussian
D Weibull

Q45: Chi square is a test of

A Variation in a process
B Degrees of Freedom
C Dependence or independence between categorical variables
D Symmetry in a DOE

Q46: Minimum and maximum values, female and male groups, Low and High are all examples of what in a DOE ?

A Blocks
B Interactions
C Factors
D Levels

Q47: To draw inferences about a sample population being studied by modelling patterns of data in a way that accounts for randomness and uncertainty in the observations is known as

A Influential Analysis
B Inferential Statistics
C Physical Modelling
D Sequential Inference

Q48: Which of the following is an experimental design method used for optimization and improving the robustness of a design?

A Tolerance designs
B Regression Analysis
C Response Surface method
D Systems design

Q49: You are producing a snack food that requires an adhesive label. The adhesive strength must be between 2.25 kg and 4.5 kg. You pull a sample of 100 labels and find a standard deviation of .44 kg. What is the potential process capability, Cp?

A 0.193
B 0.312
C 1.420
D 0.852

Q50: What role on a Lean Six Sigma team is most likely to define the business objectives of the project?

A Black Belt
B Green Belt
C Sponsor or Process Owner
D Customer

Q51: When two Inputs have a significant impact on the Output together yet have little impact on their own, this is called a/an

A Interaction effect
B Mixture
C Coincidence
D Main effect

Q52: When the measurement method used creates a difference between the measured value and the true value, the difference is known as

A residual
B precision
C accuracy
D bias

Q53: Cross-functional teams typically

A Have narrow skill sets and expertise
B Are comprised of subject matter experts and representatives from multiple departments or areas
C Elect their own leaders
D Are comprised of natural work teams

Q54: There is both Practical and _____Significance to consider during a Hypothesis Test.

A Non-practical
B Impractical
C Usable
D Statistical

Q55: Which chart would you use to measure plot values such as weight, speed or volume?

A X bar R chart
B X bar S chart
C I chart
D Any of the above could be used depending on subgroup size

Q56: When should you use the I-chart?

A Subgroup size >= 10
B Between-group variation
C Subgroup size = 1
D Subgroup size < 10

Q57: Which of the following shapes is used to present a termination point in a flowchart?

A Rectangle
B Diamond
C Arrow
D Oval

Q58: The technique of minimizing the sum of squared differences between observed and predicted values derived from regression model is called:

A Method of least squares
B Linear interpolation
C Structural equation modelling
D Method of determination

Q59: Which of the following is the best definition of Quality in a process?

A Profitability: the amount of positive return on the investment of process
B How well the output meets the customer's needs and expectations
C Efficiency: the ability to be effective at the least cost
D Adaptability: How well you can be effective and efficient in the face of change

Q60: The Central Limit Theorem helps us understand the_____we are taking and is the basis for using sampling to estimate population parameters

A Analysis
B Reason
C Risk
D Route

Q61: Which type of data is binary data an example of ?

A Continuous Data
B Attribute Data
C Qualitative Data
D Variable Data

Q62: If the specification limits are wider than the control limits, then

A The process is capable
B The process capability index is greater than 1.0
C The specification limits replace the control limits on the chart
D None of the above

Q63: Hypothesis Tests help us to decide whether to reject the _____based on the result of the P-values

A Alternative hypothesis
B Measurement error
C Alpha Risk
D Null Hypothesis

Q64: Which one of these is part of the Deming 'PDCA' cycle ?

A Process inputs
B Process controls
C Plan
D Process feedback

Q65: The House of Quality is a key component of which technique?

A Quality Functional Deployment
B Root Cause Analysis
C Testing
D CTQ

Q66: Dividing the standard deviation of a population by the square-root of a sample size gives us what ?

A Standard Error of the Mean
B Mean Deviation
C Mean Spread
D Mean Error

Q67: Which of the following is not a key component of measurement system?

A Historical data
B Appraiser / Operator
C Environment
D Procedure

Q68: MSA can be used in supply chain management to assess supplier performance by quantifying _____

A Supplier's quality
B Data entry accuracy
C Ease to work with
D All

Q69: Which of the following is used to test the significance for the analysis of a Contingency Table?

A t Test
B F Test
C Chi Square Test
D Acid Test

Q70: Calculate the number of trials, for an experiment with six factors and 2-levels per factor if it is designed as a half-fractional factorial design.

A 64
B 6
C 18
D 32

Q71: Which of the following is not true for frequency distribution of data?

A Horizontal line across the tops of all bars suggest a uniform distribution
B Isolated values at extreme ends suggest outliers
C Grouping of most values near the centre suggests a bimodal distribution
D More values at one end suggest negative or positive skewness

Q72: What is The Median?

A Arithmetic average of the data set
B Most frequently found value
C Middle value in a series of numbers arranged in order of size
D The largest value in data set

Q73: Contingency Tables are used to perform which of these functions?

A Illustrate one-tail proportions
B Analyse the "what if" scenario
C Contrast the Outliers under the tail
D Compare more than two sample proportions with each other

PRACTICE

Lean Six Sigma

Black Belt Exam

ANSWERS

Q1: Which of the following options is the main reason that we should

ANSWER : B

Q2: What type of data is the best data to collect and analyse during DMAIC activities?

ANSWER : D

Q3: Which card tagging system is used as a part of a 5S program to i

ANSWER : D

Q4: If a given process is stable and has a Cp= 1.0 and Cpk = 1.0; which of the following improvement approaches is most appropriate?

A Variation reduction
B Move the mean to the centre between the specification limits
C Centering and variation reduction
D Process stability (identify and eliminate special causes)

ANSWER : A

Q5: A process map is used to accomplish which of the following?

A Display a dynamic picture of process performance behaviour
B Focus attention on process problems in priority order
C Diagram possible problem causes in a process
D Track products, operator actions, or administrative procedures

ANSWER : D

Q6: Which of the following statements best describes the residual errors

ANSWER : C

Q7: Which of the following is the correct definition of a failure mode

ANSWER : B

Q8: What is the probability that a sample Mean is within +/- 1.96 Standard Deviations

ANSWER : D

Q9: What is the Lean Principle action in the 5S approach, that deals with

ANSWER : D

Q10: Which one of the following is the most effective means of reducing defects?

ANSWER : C

Q11: Kaoru Ishikawa worked with quality professionals such as W.E. Deming to

ANSWER : A

Q12: Which statement describes an undesirable situation when implementing SPC?

ANSWER : D

Q13: Design for Six Sigma (DFSS) is a design technique that offers all of the

ANSWER : A

Q14: Which relationships are depicted in a SIPOC diagram?

ANSWER : C

Q15: If a process has subgroups and continuous data which control chart is

ANSWER : B

Q16: Which chart is used to visualise the trend of long term variation

ANSWER : A

Q17: Project scope can be limited by the following factors EXCEPT:

ANSWER : D

Q18: Which statement is most correct about the Value Stream Map in

ANSWER : A

Figure 1:

Q19: Which statement is most correct about the Value Stream Map in

ANSWER : A

Q20: Which statement is most correct about the Value Stream Map in

ANSWER : B

Q21: According to the Central Limit Theorem, regardless of the population from

D Skewed towards the standard deviation

ANSWER : A

Q22: A Belt concludes a Lean Six Sigma project with the creation of a Control Plan.

ANSWER : A

Q23: A Black Belt practitioner constructs a control chart to display a

ANSWER : B

Q24: 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

i

ANSWER : A

Q25: When analysing a data set, we frequently graph one metric as a

ANSWER : C

Q26: Which of the control charts helps us to understand the amount of variation

ANSWER : A

Q27: Which of the following is not a type of hypothesis test?

ANSWER : C

Q28: What does the symbol 's' stand for in regression analysis?

A

ANSWER : B

Q29: A Black Belt will sometimes do an experiment referred to as an OFAT,

e

ANSWER : C

Q30: How does SMED achieve waste reduction in a Lean process ?

ANSWER : D

Q31: Which of the following steps is NOT a component of the decision-making

ANSWER : B

Q32: Which one of the following modes is ideal for informal communication?

ANSWER : A

Q33: Which one of the following is an inventive methodology for problem-solving?

ANSWER : C

Q34: The experimental response data varied from what a Black Belt had

ANSWER : B

Q35: For a normal distribution, four standard deviations on each side of

ANSWER : A

Q36: Data from a process output resides within the control limits. What is the best interpretation of this?

ANSWER : C

Q37: What conclusions can be made from the graphs shown in Figure 2 (below)?

ANSWER : A

Figure 2:

Q38: What conclusions can be made from the graphs shown in Figure 2 (above)?

A The Residual Errors in this Regression analysis are too skewed and so the
l. **ANSWER : D**

Q39: What conclusions can be made from the 4 fitted-line plots shown in

ANSWER : C

Q40: Which of the following is non-parametric Hypothesis test for

ANSWER : A

Q41: A Six Sigma tool that can graph more than one input on the same chart to look for the biggest source of variation

ANSWER : B

Q42: Which metric helps a Black Belt to know how much product is being made "Right first time"?

ANSWER : C

Q43: In a Linear Regression analysis, the ANOVA table shows that, F =

ANSWER : A

Q44: What name would describe a data distribution that is not balanced, has

ANSWER : A

Q45: Chi square is a test of

ANSWER : C

Q46: Minimum and maximum values, female and male groups, age designated ranges are all the above examples of what in a DOE ?

D Levels

ANSWER : D

Q47: To draw inferences about a sample population being studied by modelling

ANSWER : B

Q48: Which of the following is an experimental design method used for optimization

ANSWER : C

Q49: You are producing a snack food that requires an adhesive label. The

ANSWER : D

Q50: What role on a Lean Six Sigma team is most likely to define the business objectives of the project?

ANSWER : C

Q51: When two Inputs have a significant impact on the Output together yet have little impact on their own, this is called a/an

ANSWER : A

Q52: When the measurement method used creates a difference between the

ANSWER : D

Q53: Cross-functional teams typically

ANSWER : B

Q54: There is both Practical and _____

ANSWER : D

Q55: Which chart would you use to measure plot values such as weight, speed or volume?

A

ANSWER : D

Q56: When should you use the I-chart?

ANSWER : C

Q57: Which of the following shapes is used to present a termination point

ANSWER : D

Q58: The technique of minimizing the sum of squared differences between

ANSWER : A

Q59: Which of the following is the best definition of Quality in a process?

ANSWER : B

Q60: The Central Limit Theorem helps us understand the_____we are taking

ANSWER : C

Q61: Which type of data is binary an example of ?

ANSWER : B

Q62: If the specification limits are wider than the control limits, then

ANSWER : D

Q63: Hypothesis Tests help us to decide whether to reject the

ANSWER : D

Q64: Which one of these is part of the Deming 'PDCA' cycle ?

ANSWER :

Q65: The House of Quality is a key component of which technique?

ANSWER : A

Q66: Dividing the standard deviation of a population by the square-root of a

ANSWER : A

Q67: Which of the following is not a key component of measurement system?

ANSWER : A

Q68: MSA can be used in supply chain management to assess supplier

ANSWER : B

Q69: Which of the following is used to test the significance for the analysis of a Contingency Table?

ANSWER : C

Q70: Calculate the number of trials, for an experiment with six factors and 2-levels per factor if it is designed as a half-fractional factorial design.

ANSWER : D

Q71: Which of the following is not true for frequency distribution of data?

ANSWER : C

Q72: What is The Median?

ANSWER : C

Q73: Contingency Tables are used to perform which of these functions?

ANSWER : D