Unit 2 Statistical Consideration in Design

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| Sr. No |  |
| 1. | **1)   What causes infant mortality in mechanical equipments?**  **a.** Design errors **b.** Manufacturing defects **c.** Installation defects **d.** All of the above |
| Ans | **d.** All of the above |
| 2. | **A plain carbon steel has mean yield strength of 300 N/mm2 and standard deviation of 50 N/mm2. What is the mean and standard deviation of margin of safety, if mean tensile stress of 250 N/mm2 and standard deviation of 65 N/mm2 acts on it?**  **a.** 23.45 N/mm2, 50 N/mm2 **b.** 50 N/mm2, 82 N/mm2 **c.** 82 N/mm2, 7.07 N/mm2 **d.** 7.07 N/mm2, 50 N/mm2 |
| Ans | **b.** 50 N/mm2, 82 N/mm2 |
| 3 | **What is meant by mean time to failure (MTTF)?**  **a.** Mean time between two successive failure components **b.** Maximum time between two successive failure components **c.** Sum of survival time for number of components divided by number of failures **d.** Sum of number of failures divided by survival time for number of components |
| Ans | **c.** Sum of survival time for number of components divided by number of failures |
| 4 | **If a relief valve has reliability of 0.989, how many failures are expected in testing 1000 such relief valves?**  **a.** 111 **b.** 100 **c.** 10 **d.** 11 |
| Ans | **d.** 11 |
| 5 | **Failure rate for safety valve working for 400 hours is 3 x 10–6 failures/hour. What is the reliability of safety valve?**  **a.** 0.998 **b.** 0.989 **c.** 0.888 **d.** 0.899 |
| Ans | **a.** 0.998 |
| 6 | **What is meant by hazard rate?**  **a.** Number of failures per unit time per number of items when exposed for same time **b.** Probability of test specimen fails between time t1 and t1 + dt1 which survives for time t1 **c.** Both a. and b. **d.** None of the above |
| Ans | **c.** Both a. and b. |
| 7 | **What is the standard deviation of clearance population for the diameter of shaft and hole assembly specified below? Shaft diameter = 30 ± 0.15 Hole diameter = 30.5 ± 0.25**  **a.** 0.097 mm **b.** 0.059 mm **c.** 0.036 mm **d.** 0.390 mm |
| Ans | **a.** 0.097 mm |
| 8 | **Which of the following curves have the mean value equal to zero in the graph of frequency vs random variable?**  **a.** Normal distribution curve **b.** Standard normal distribution curve **c.** Both a. and b. **d.** None of the above |
| Ans | **b.** Standard normal distribution curve |
| 9 | **What is the relation between standard deviation(σ) and arithmetic mean (μ) to determine coefficient of variation (C)?**  **a.** C = σ + μ **b.** C = σ – μ **c.** C = σ / μ **d.** C = σ x μ |
| Ans | **c.** C = σ / μ |
| 10 | **Assignable causes are caused due to changes in \_\_\_\_\_\_\_\_\_**  **a.** manufacturing process **b.** material **c.** inspection process **d.** all of the above |
| Ans | **d.** all of the above |
| 11 | Which of these does not come into the general model of a process? a) Input b) Controllable input factors c) Uncontrollable inputs factors d) Acceptance sampling |
| Ans | d) Acceptance sampling |
| 12 | The uncontrollable factors are the factor \_\_\_ a) That varies according to a normal distribution b) That does not vary at all c) That can be controlled by the user d) That cannot be changed according to the wish of the user |
| Ans | d) That cannot be changed according to the wish of the user |
| 13 | The uncontrollable factors are also called \_\_\_\_ a) Designed factors b) Noise factors c) Acceptance factors d) Sound factors |
| Ans | b) Noise factors |
| 14 | Which of these steps are not conducted when the design of experiment procedure is adopted? a) Determining which variable is most influential to output b) Determining where to set the influential controllable factors so that output is near the nominal requirement c) Deleting the uncontrollable factors d) Determining where to set the influential controllable inputs so that the variability in the output is smallest |
| Ans | c) Deleting the uncontrollable factors |
| 15 | Experimental design methods are not used \_\_\_\_ a) Evaluating the process capability b) In process development c) In process troubleshooting to improve process performance d) To obtain a process that is robust and insensitive to external sources of variability |
| Ans | a) Evaluating the process capability |
| 16 | The designed experiments are the part of \_\_\_ step of DMAIC process. a) Define b) Measure c) Analyze d) Control |
| Ans | c) Analyze |
| 17 | The design of experiment is used to determine the variables which are \_\_\_ affecting the state of the process. a) The most b) The least c) Not d) Not changing or |
| Ans | a) The most |
| 18 | Which of these can be used to develop a new process? a) Design of experiments b) Acceptance sampling c) Control charts d) Histogram |
| Ans | a) Design of experiments |
| 19 | **The types of frequency distribution are**   1. a) 3 2. b) 4 3. c) 5 4. d) 2 |
| Ans | 1. d) 2 |
| 20 | **The minimum value in the class limit is called**   1. a) primary limit 2. b) upper limit 3. c) lower limit 4. d) secondary limit |
| Ans | 1. c) lower limit |
| 21 | **The total of frequency up to an upper class limit or boundary is known as**   1. a) average frequency 2. b) cumulative frequency 3. c) frequency distribution 4. d) frequency polygon |
| Ans | 1. b) cumulative frequency |
| 22 | **The data presented in the form of frequency data is known as**   1. a) grouped data 2. b) ungrouped data 3. c) secondary data 4. d) calculated data |
| Ans | 1. a) grouped data |
| 23 | **A tabular arrangement for classifying data into different groups is called**   1. a) standard deviation 2. b) frequency distribution 3. c) class mn 4. d) arithmetic mean |
| Ans | 1. b) frequency distribution |
| 24 | Why is it sometimes easier to use a frequency table to interpret data than to examine a distribution of raw scores?  A. A frequency table transforms the raw scores by showing the means. B. Frequency tables display patterns, organizing the data by how often each score occurs. C. Raw scores are not based on the sample. D. Raw scores do not represent the data. |
| Ans | B. Frequency tables display patterns, organizing the data by how often each score occurs |
| 25 | [In comparing frequency tables with grouped frequency tables for the same set of data, which of the following would be true?](https://www.proprofs.com/discuss/q/481258/comparing-frequency-tables-with-grouped-for-the-same-set-dat)   1. Depending on the width of class intervals it is possible that some scores may not be counted in a grouped frequency table. 2. If the data set is large the grouped frequency table would be easier to decipher. 3. Because of overlapping class intervals, the total frequency for a grouped frequency table would exceed that of a frequency table. 4. It is generally harder to spot patterns in the data when using a grouped frequency table. |
| Ans | b) If the data set is large the grouped frequency table would be easier to decipher. |
| 26 | A bar graph is usually used with \_\_\_\_\_\_\_\_\_\_ data while a histogram is used with \_\_\_\_\_\_\_\_\_ data.   1. Interval; nominal 2. Ratio; scale 3. Nominal; scale 4. Nominal; ordinal |
| Ans | 1. Interval; nominal |
| 27 | A normal distribution is:   1. Symmetric. 2. Bell-shaped, symmetric, and unimodal. 3. Unimodal. 4. Bell-shaped. |
| Ans | 1. Bell-shaped. |
| 28 | The sum of frequencies for all classes will always equal a. 1 b. the number of elements in a data set c. the number of classes d. a value between 0 and 1 |
| Ans | c. the number of classes |
| 29 | **A bar chart constructed in which the area of each bar is proportional to the number of items in each group is known as**   1. a) pi chart 2. b) histogram 3. c) frequency distribution table 4. d) polygon |
| Ans | 1. b) histogram |
| 30 | **The table which shows the frequency of each score is called a**   1. a) polygon 2. b) pi chart 3. c) histogram 4. d) frequency distribution table |
| Ans | 1. d) frequency distribution table |
| 31 | **A many sided closed figure used in frequency distribution is termed as**   1. a) frequency polygon 2. b) frequency hexagon 3. c) frequency pentagon 4. d) frequency decagon |
| Ans | 1. a) frequency polygon |
| 32 | **The number of times each value appears is called the value's**   1. a) range 2. b) mode 3. c) frequency 4. d) standard Deviation |
| Ans | c) frequency |
| 33 | 1. Normal Distribution is applied for \_\_\_\_\_\_\_\_\_\_\_ a) Continuous Random Distribution b) Discrete Random Variable c) Irregular Random Variable d) Uncertain Random Variable |
| Ans | a) Continuous Random Distribution |
| 34 | The shape of the Normal Curve is \_\_\_\_\_\_\_\_\_\_\_ a) Bell Shaped b) Flat c) Circular d) Spiked |
| Ans | a) Bell Shaped |
| 35 | Normal Distribution is symmetric is about \_\_\_\_\_\_\_\_\_\_\_ a) Variance b) Mean c) Standard deviation d) Covariance |
| Ans | b) Mean |
| 36 | For a standard normal variate, the value of mean is? a) ∞ b) 1 c) 0 d) not defined |
| Ans | c) 0 |
| 37 | The area under a standard normal curve is? a) 0 b) 1 c) ∞ d) not defined |
| Ans | b) 1 |
| 38 | The standard normal curve is symmetric about the value \_\_\_\_\_\_\_\_\_\_\_ a) 0.5 b) 1 c) ∞ d) 0 |
| Ans | d) 0 |
| 39 | For a standard normal variate, the value of Standard Deviation is \_\_\_\_\_\_\_\_\_\_\_ a) 0 b) 1 c) ∞ d) not defined |
| Ans | b) 1 |
| 40 | Normal Distribution is also known as \_\_\_\_\_\_\_\_\_\_\_ a) Cauchy’s Distribution b) Laplacian Distribution c) Gaussian Distribution d) Lagrangian Distribution |
| Ans | c) Gaussian Distribution |
| 41 | Skewness of Normal distribution is \_\_\_\_\_\_\_\_\_\_\_ a) Negative b) Positive c) 0 d) Undefined |
| Ans | c) 0 |
| 42 | In Normal distribution, the highest value of ordinate occurs at \_\_\_\_\_\_\_\_\_\_\_ a) Mean b) Variance c) Extremes d) Same value occurs at all points |
| Ans | a) Mean |
| 43 | The shape of the normal curve depends on its \_\_\_\_\_\_\_\_\_\_\_ a) Mean deviation b) Standard deviation c) Quartile deviation d) Correlation |
| Ans | b) Standard deviation |
| 44 | In Standard normal distribution, the value of mode is \_\_\_\_\_\_\_\_\_\_\_ a) 2 b) 1 c) 0 d) Not fixed |
| Ans | c) 0 |
| 45 | In Standard normal distribution, the value of median is \_\_\_\_\_\_\_\_\_\_\_ a) 1 b) 0 c) 2 d) Not fixed |
| Ans | b) 0 |
| 46 | In a normal curve, the highest point on the curve occurs at the mean, μ, which is also the:  (a) Median and mode  (b) Geometric mean and harmonic mean  (c) Lower and upper quartiles  (d) Variance and standard deviation |
| Ans | (a) Median and mode |
| 47 | The shape of the normal curve depends upon the value of:  **(a) Standard deviation**  (b) Q1  (c) Mean deviation  (d) Quartile deviation |
| Ans | **(a) Standard deviation** |
| 48 | The normal distribution is a proper probability distribution of a continuous random variable, the total area under the curve f(x) is:  **(a) Equal to one**  (b) Less than one  (c) More than one  (d) Between -1 and +1 |
| Ans | **(a) Equal to one** |
| 49 | Process capability generally uses \_\_\_\_ a) Specifications **b) Control Limits** c) Process standard deviation d) Mean of any one sample |
| Ans | b) Control Limits |
| 50 | **In case of a brittle material,  the factor of safety is** (a) Real stress/unit stress (b) Ultimate stress/allowable stress (c) Allowable stress/ Yield stress (d) None |
| Ans | (b) Ultimate stress/allowable stress |
| 51 | **What is accounted for by the factor of safety?** (a) Uncertainties (b) Linear displacements (c) Parabolic displacements (d) None |
| Ans | (a) Uncertainties |
| 52 | **Other common name of the factor of safety is** (a) Strength (b)Strain (c)Ignorance (d) None |
| Ans | (c)Ignorance |
| 53 | **Under exact analysis of stresses,what will be value of factor of safety  in a body?** (a) More (b) Less (c) Zero (d) None |
| Ans | (c) Zero |
| 54 | **Effect of higher factor of safety on cost of the material?** (a) Increases (b) Decreases (c) No change (d) None |
| Ans | (a) Increases |
| 55 | In normal distribution curve the random variable is   1. 0 2. X 3. Y 4. 1 |
| Ans | 1. x |
| 56 | In standard normal distribution curve, the mean is equal to   1. 1 2. 0 3. -1 4. 2 |
| Ans | 1. 0 |
| 57 | In normal distribution curve, the area under curve is equal to the total population.  a) total population  b) standard deviation  c) mean  d) 1 |
| Ans | a) total population |
| 58 | In standard normal distribution curve, the area under curve is equal to the total population.  a) total population  b) standard deviation  c) mean  d) 1 |
| Ans | d) 1 |
| 59 | In normal distribution curve, the standard deviation is any value.  a) total population  b) ̂σ  c) mean  d) 1 |
| Ans | b) ̂σ |
| 60 | In standard normal distribution curve, the standard deviation is any value.  a) total population  b) ̂σ  c) mean  d) 1 |
| Ans | d) 1 |
| 61 | In normal distribution curve, the value in X-axis is  a) X  b) ̂σ  c) Z  d) no. of populations |
| Ans | a) X |
| 62 | In standard normal distribution curve, the value in X-axis is  a) X  b) ̂σ  c) Z  d) no. of populations |
| Ans | c) Z |
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