D 144470 (Pages : 11) Name.....

Reg. No.....

CALICUT UNIVERSITY COMMON ENTRANCE TEST (CU-CET), APRIL 2026

STATISTICS

Time : Two Hours Maximum : 300 Marks

Each question carries 4 marks.
One *mark will be deducted for each wrong answer.*

1. Let $A = \{x \in \mathbb{R} : |x| \leq 2\}$. Which of the following is true ?

   (a) A is an open set.
   (b) A is an closed set.
   (c) A is unbounded.
   (d) A has no limit points.

2. Which of the following sequences converges ?

   (a) $a_n = (-1)^n n$.
   (b) $a_n = \frac{n+1}{n}$.
   (c) $a_n = \sin n$.
   (d) $a_n = \frac{n}{2}$.

3. The series $\sum_{n=1}^{\infty} \frac{1}{n^3}$ converges by :

   (a) Ratio test.
   (b) Root test.
   (c) Comparison test.
   (d) Divergence test.

4. Which of the following functions is continuous on $\mathbb{R}$?

   (a) $f(x) = \frac{1}{x}$.
   (b) $f(x) = |x|$.
   (c) $f(x) = \frac{1}{x-1}$.
   (d) $f(x) = \sqrt{x}$.

5. The Maclaurin series of $\sin x$ is :

   (a) $x - \frac{x^3}{3!} + \frac{x^5}{5!} - \ldots$
   (b) $1 + x + \frac{x^2}{2!} + \ldots$
   (c) $x + \frac{x^3}{3!} + \frac{x^5}{5!} + \ldots$
   (d) $1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \ldots$

6. If $f(x) = x^3 - 6x^2 + 9x$, then $f(x)$ has a local minimum at :

(a) $x = 0$. (b) $x = 1$.

(c) $x = 2$. (d) $x = 3$.

7. The value of the integral $\int_0^1 2x\,dx$ is :

(a) 1. (b) 2.

(c) $\frac{1}{2}$. (d) 0.

8. If $\Gamma(n) = (n-1)!$ for positive integers n, then $\Gamma(4)$ equals :

(a) 6. (b) 24.

(c) 3. (d) 12.

9. Which of the following matrices s symmetric ?

(a) $\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$. (b) $\begin{pmatrix} 2 & 1 \\ 1 & 3 \end{pmatrix}$.

(c) $\begin{pmatrix} 0 & 1 \\ 2 & 0 \end{pmatrix}$. (d) $\begin{pmatrix} 1 & 0 \\ 2 & 1 \end{pmatrix}$.

10. The determination of the matrix $\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$ is :

(a) -2. (b) 2.

(c) 5. (d) -5.

11. In a distribution, the mean is greater than the median. What does this indicate about the distribution ?

(a) Negatively skewed distribution.

(b) Positively skewed distribution.

(c) Symmetric distribution.

(d) Uniform distribution.

12. Which of the following measures of central tendency is least affected by extreme values ?

(a) Mean. (b) Median.

(c) Geometric mean. (d) Harmonic mean.

13. If all observations in a dataset are increased by the same constant, which of the following remains unchanged ?

(a) Mean. (b) Standard deviation.

(c) Median. (d) Mode.

14. Which of the following diagrams is most appropriate for representing the frequency distribution of continuous data ?

(a) Pie chart. (b) Histogram.

(c) Bar diagram. (d) Pictogram.

15. Which positional measure divides the dataset into ten equal parts ?

(a) Quartiles. (b) Deciles.

(c) Percentiles. (d) Interquartile range.

16. The interquartile range of a dataset is defined as :

(a) $Q_1 + Q_3$. (b) $Q_3 - Q_1$.

(c) $Q_2 - Q_1$. (d) $Q_3 - Q_2$.

17. If the co-efficient of variation of dataset A is smaller than that of dataset B, then :

(a) Dataset A has greater variability.

(b) Dataset B has greater variability.

(c) Both datasets have equal variability.

(d) No comparison can be made.

18. Which of the following measures is most suitable for studying relative dispersion ?

(a) Range. (b) Standard deviation.

(c) Co-efficient of variation. (d) Quartile deviation.

19. The second central moment about the mean is equal to :

(a) Mean. (b) Variance.

(c) Standard deviation. (d) Skewness.

20. A distribution with a very high peak compared to the normal distribution is called :

(a) Platykurtic. (b) Mesokurtic.

(c) Leptokurtic. (d) Symmetric.

21. If the Karl Pearson correlation coefficient between two variables is $r = -1$, then the variable have :

(a) Perfect positive linear relationship.

(b) Perfect negative linear relationship.

(c) No relationship.

(d) Non-linear relationship.

22. If the regression co-efficients are $b_{yx} = 0.8$ and $b_{xy} = 0.5$, then the correlation co-efficient is :

(a) 0.4. (b) 0.63.

(c) 0.8. (d) 1.3.

23. If the co-efficient of determination is 0.64, then the correlation coefficient may be :

(a) 0.64. (b) ± 0.8.

(c) ± 0.64. (d) 0.36.

24. Which of the following is not a component of a time series ?

(a) Trend. (b) Seasonal variation.

(c) Cyclc variation. (d) Standard deviation.

25. In a scatter diagram, if the points lie exactly on a straight line sloping upward from left to right, then the correlation co-efficient is :

(a) -1. (b) 0.

(c) 1. (d) 0.5.

26. If r is the Karl Pearson correlation coefficient between two variables, then the coefficient of determination represents :

(a) Unexplained variation.

(b) Proportion of variation explained by regression.

(c) Total variation.

(d) Sampling error.

27. Which index number satisfies both the time reversal rest and factor reversal test ?

(a) Laspeyres index. (b) Paasche index.

(c) Fisher's ideal index. (d) Simple aggregative index.

28. In time series analysis, seasonal variations usually occur within :

(a) Many decades. (b) One year.

(c) Several years. (d) Irregular intervals.

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(c) Several years. (d) Irregular intervals.

37. If the joint pdf is $f(x, y) = k$ for $0 < x < 1$, $0 < y < 1$, then the value of k is :

(a) 1.

(b) 2.

(c) $\frac{1}{2}$.

(d) 0.

38. The conditional density of X given $Y = y$ is defined as :

(a) $\frac{f(x,y)}{f_Y(y)}$.

(b) $f(x, y) f_Y(y)$.

(c) $\frac{f_Y(y)}{f(x,y)}$.

(d) $f_X(x) + f_Y(y)$.

39. If $P(A) = 0.6$, $P(B) = 0.5$ and $P(A \mid B) = 0.8$, then $P(A \cup B)$ equals :

(a) 0.7.

(b) 0.8.

(c) 0.9.

(d) 1.1.

40. If $F(x)$ is a distribution function, then which property must always hold ?

(a) $F(x)$ is decreasing.

(b) $F(x)$ is non-decreasing.

(c) $F(x) > 1$.

(d) $F(x) < 0$.

41. If $X \sim$ Binomial(n, p), then the moment generating function of X is :

(a) $\left(1 - p + pe^t\right)^n$.

(b) $\left(pe^t\right)^n$.

(c) $e^{np(e^t - 1)}$.

(d) $\left(1 + pe^t\right)^n$.

42. If $X \sim$ Poisson(λ), then $E\left(X^2\right)$ is :

(a) λ^2.

(b) $\lambda + \lambda^2$.

(c) 2λ.

(d) $\lambda^2 - \lambda$.

43. If X follows a geometric distribution with parameter p, then $P(X \geq 2)$ equals :

(a) $1 - p$.

(b) $(1 - p)^2$.

(c) $p(1 - p)$.

(d) $\frac{1}{p}$.

44. The mean of an exponential distribution with parameter λ is :

(a) λ. (b) $\frac{1}{\lambda}$.

(c) λ^2. (d) $\frac{1}{\lambda^2}$.

45. If $Z_1, Z_2, \ldots Z_n$ are independent standard normal variables, then $\sum_{i=1}^{n} Z_i^2$ follows :

(a) t distribution with n d.f. (b) F distribution.

(c) X^2 distribution with n d.f. (d) Normal distribution.

46. If $X \sim \chi^2_{v_1}$ and $Y \sim \chi^2_{v_2}$ are indepenent, then $\frac{(X/v_1)}{(Y/v_2)}$ follows :

(a) t distribution. (b) F distribution.

(c) Normal distribution. (d) Gamma distribution.

47. If $X \sim N(\mu, \sigma^2)$, then the standardized variable $Z = \frac{X - \mu}{\sigma}$ follows :

(a) N(0, 1). (b) N(1, 0).

(c) χ^2_1. (d) t_1.

48. If $X_1, X_2, \ldots X_n$ are i.i.d. normal variables with mean μ and variance σ^2, then $\frac{\bar{X} - \mu}{S/\sqrt{n}}$ follows:

(a) Normal distribution. (b) χ^2 distribution.

(c) t distribution with $n - 1$ d.f. (d) F distribution.

49. In a multinomial distribution with parameters $n, p_1, p_2, \ldots p_k$, the mean of X_i is :

(a) np_i. (b) p_i.

(c) $n + p_i$. (d) $\frac{n}{p_i}$.

50. If X and Y follow a bivariate normal distribution, then the marginal distributions of X and Y are :

(a) Binomial. (b) Normal.

(c) Poisson. (d) Gamma.

51. If $\hat{\theta}_1$ and $\hat{\theta}_2$ are two unbiased estimators of θ and $\text{Var}(\hat{\theta}_1) < \text{Var}(\hat{\theta}_2)$, then $\hat{\theta}_1$ is said to be :

(a) Consistent. (b) Sufficient.

(c) More efficient. (d) Biased.

52. If $\hat{\theta}_n$ is an estimator of θ such that $\hat{\theta}_n \xrightarrow{P} \theta$ as $n \to \infty$, then the estimator is :

(a) Unbiased. (b) Efficient.

(c) Sufficient. (d) Consistent.

53. The Cramér-Rao lower bound gives a lower bound for the :

(a) Bias of an estimator. (b) Variance of any unbiased estimator.

(c) Mean of an estimator. (d) Sample size.

54. According to the Neyman-Factorization theorem, a statistic T(X) is sufficient for θ if the likelihood can be written as :

(a) $L(\theta) = g(T(x))$. (b) $L(\theta) = g(T(x), \theta)h(x)$.

(c) $L(\theta) = h(\theta)$. (d) $L(0) = g(x)h(0)$.

55. In the method of maximum likelihood estimation, the estimator is obtained by :

(a) Minimizing the variance. (b) Maximizing the likelihood function.

(c) Minimizing the bias. (d) Maximizing the sample mean.

56. A 95 % confidence interval for a parameter means :

(a) The parameter lies in the interval with probability 0.95.

(b) 95 % of such constructed intervals contain the true parameter.

(c) The estimator equals the parameter with probability 0.95.

(d) The parameter changes with probability 0.95.

57. If the level of significance of a test is α, then α represents :

(a) Probability of Type II error.

(b) Probability of rejecting a true null hypothesis.

(c) Probability of accepting a false null hypothesis.

(d) Power of the test.

58. The power of a test is defined as :

(a) $P(\text{reject } H_0 \mid H_0 \text{ true})$. (b) $P(\text{accept } H_0 \mid H_1 \text{ true})$.

(c) $P(\text{reject } H_0 \mid H_1 \text{ true})$. (d) $P(\text{accept } H_1 \mid H_0 \text{ true})$.

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(c) $P(\text{reject } H_0 \mid H_1 \text{ true})$. (d) $P(\text{accept } H_1 \mid H_0 \text{ true})$.

59. The likelihood ratio test is closely related to :

(a) Neyman-Pearson lemma. (b) Cramér-Rao inequality.

(c) Central limit theorem. (d) Law of large numbers.

60. The sign test is mainly used to test :

(a) Equality of means in two large samples.

(b) Median of a population without assuming normality.

(c) Equality of variances. (d) Independence of attributes.

61. In systematic sampling, if the population size is N and the sample size is n, the sampling interval k is given by :

(a) $k = \frac{n}{N}$. (b) $k = \frac{N}{n}$.

(c) $k = N - n$. (d) $k = N + n$.

62. Which of the following sampling methods is classified as a non-probabilty sampling technique ?

(a) Stratified sampling. (b) Simple random sampling.

(c) Systematic sampling. (d) Convenience sampling.

63. Stratified sampling is particularly useful when :

(a) The population is homogeneous.

(b) The population contains distinct subgroups.

(c) The sampling size is very small.

(d) Sampling units are arranged randomly.

64. The standard error of the sample mean is simple random sampling from a populaton with variance σ^2 is :

(a) $\frac{\sigma}{n}$. (b) $\frac{\sigma}{\sqrt{n}}$.

(c) $\frac{\sigma^2}{n}$. (d) $\frac{\sqrt{n}}{\sigma}$.

65. In a Randomized Block Design (RBD), blocking is primarily used to :

(a) Increase sample size.

(b) Reduce experimental error due to nuisance factors.

72. If the sample size increases in a control chart for the mean, the width of the control limits will :

(a) Increase.
(b) Decrease.
(c) Remain unchanged.
(d) Become unpredictable.

73. In acceptance sampling, the Operating Characteristic (OC) curve represents :

(a) The probability of accepting a lot for different quality levels.
(b) The number of defective items in a lot.
(c) The sample size required for inspection.
(d) The variability of the production process.

74. In a transportation problem, if total supply is not equal to total demand, the problem is called :

(a) Balanced transportation problem.
(b) Unbalanced transportation problem.
(c) Degenerate transportation problem.
(d) Infeasible transportation problem.

75. In the simplex method of solving a linear programming problem, the optimal solution occurs when :

(a) All basic variables are zero.
(b) All reduced costs satisfy the optimality condition.
(c) The number of constraints equals the number of variables.
(d) The objective function value becomes zero.

D 123856 (Pages : 15) Name.....

Reg. No.....

CALICUT UNIVERSITY CENTRALIZED ENTRANCE TEST (CU-CET)
APRIL 2025

M.Sc. STATISTICS

Time : Two Hours Maximum : 300 Marks

Each question carries 4 marks.

1 mark will be deducted for each wrong answer.

1. Let $A = \{x \in R : x^2 < 3\}$ Which of the following statements is true ?

   (a) A is an open set.
   (b) A is a bounded set.
   (c) A is a closed set.
   (d) A is an uncountable set.

2. Which of the following sequences diverges ?

   (a) $a_n = \frac{1}{n}$.
   (b) $a_n = (-1)^n$.
   (c) $a_n = \frac{n^2}{n+1}$.
   (d) $a_n = \frac{\sin(n)}{n}$.

3. Which test should be used to determine the convergence of the series $\sum_{n=1}^{\infty} \frac{1}{n(\log n)^2}$.

   (a) Ratio test.
   (b) Integral test.
   (c) Comparison test.
   (d) Root test.

4. Which of the following functions is not continuous on the interval [0, 1] ?

   (a) $f(x) = x^2$.
   (b) $f(x) = 1/x$.
   (c) $f(x) = \sqrt{x}$.
   (d) $f(x) = \begin{cases} 1 & \text{if } x = 0 \\ 0 & \text{if } x \neq 0 \end{cases}$.

5. The Taylor series expansion of $f(x) = \ln(x + 1)$ centered at $x = 0$ is :

   (a) $x - x^2/2 + x^3/3 - \ldots\ldots$

   (b) $x + x^2/2 + x^3/3 + \ldots\ldots$

   (c) $\dfrac{x}{x+1} - \dfrac{x^2}{2(x+1)^2} + \dfrac{x^3}{3(x+1)^3} - \ldots$

   (d) $x - x^2/2 + x^3/3 + \ldots\ldots$

6. Which theorem guarantees the existence of a point c in the interval (a, b) such that $f'(c) = \{f(b) - f(a)\}/\{b - a\}$?

   (a) Rolle's theorem.
   (b) Mean value theorem.
   (c) Taylor's theorem.
   (d) Lagrange's theorem.

7. The integral $\int_{-\pi}^{\pi} \sin(x)\cos(x)\,dx$ is equal to :

   (a) 0.
   (b) 1.
   (c) π.
   (d) 2.

8. Which property is NOT true for diagonal matrices ?

   (a) They are always square matrices.
   (b) All elements outside the main diagonal are zero.
   (c) They are always invertible.
   (d) They can be symmetric matrices.

9. The determinant of the matrix $\begin{pmatrix} 2 & 1 \\ 1 & 3 \end{pmatrix}$ is :

   (a) 1.
   (b) 2.
   (c) 3.
   (d) 5.

10. How many solutions does the system of linear equations $2x + y = 4$, $x - 3y = 2$ have ?

    (a) None.
    (b) One.
    (c) Infinite.
    (d) Two.

11. In a dataset, the mean, median, and mode are all different. What can you infer about the distribution ?

(a) The distribution is symmetric.

(b) The distribution is negatively skewed.

(c) The distribution is positively skewed.

(d) The distribution is bimodal.

12. If the co-efficient of skewness of a dataset is zero, what can you infer about its shape ?

(a) The left tail is longer than the right tail.

(b) The right tail is longer than the left tail.

(c) The distribution is symmetric.

(d) The distribution is bimodal.

13. Which of the following statements about the co-efficient of kurtosis is true ?

(a) It measures the peakedness of a distribution relative to a normal distribution.

(b) It measures the spread of a distribution relative to its mean.

(c) It measures the skewness of a distribution.

(d) It measures the symmetry of a distribution.

14. What type of skewness does a distribution exhibit if its mean is equal to its median ?

(a) Positive skewness. (b) Negative skewness.

(c) Symmetrical skewness. (d) No skewness.

15. The range of a dataset is affected by outliers. Which measure of dispersion is more robust to outliers ?

(a) Quartile deviation. (b) Standard deviation.

(c) Range. (d) Mean absolute deviation.

16. The co-efficient of variation is used to compare the dispersion of datasets with different units, it is calculated as :

    (a) Standard deviation / Mean.

    (b) Mean / Standard deviation.

    (c) Range / Mean.

    (d) Standard deviation × Mean.

17. Which measure of dispersion divides the dataset into four equal parts ?

    (a) Quartiles. (b) Deciles.

    (c) Percentiles. (d) Interquartile range.

18. What percentage of the data lies within one standard deviation of the mean in a normal distribution ?

    (a) 34 %. (b) 50 %.

    (c) 68 %. (d) 95 %.

19. The geometric mean is appropriate for averaging :

    (a) Rates of change. (b) Ratios.

    (c) Ordinal data. (d) Nominal data.

20. In a positively skewed distribution, which measure of central tendency is typically the largest ?

    (a) Mean. (b) Median.

    (c) Mode. (d) Geometric mean.

21. Which correlation co-efficient is more robust against outliers and non-linear relationships ?

    (a) Karl Pearson correlation co-efficient.

    (b) Spearman correlation co-efficient.

    (c) Partial correlation co-efficient.

    (d) Multiple correlation co-efficient.

22. A dataset shows a scatterplot with a non-linear pattern. Which technique would be most appropriate for modeling this relationship ?

(a) Least squares regression.

(b) Spearman correlation co-efficient.

(c) Principle of least squares.

(d) Multiple regression analysis.

23. What does the co-efficient of determination (R-squared) measure in the context of linear regression ?

(a) The strength of the relationship between independent and dependent variables.

(b) The accuracy of the regression predictions.

(c) The proportion of variation in the dependent variable explained by the independent variable.

(d) The significance of the regression co-efficients.

24. A time series data exhibits a seasonal pattern with fluctuations around the trend. Which component represents these fluctuations ?

(a) Trend.

(b) Seasonal variation.

(c) Cyclical variation.

(d) Residuals.

25. What is the primary purpose of using index numbers in economics?

(a) To analyze time series data.

(b) To measure the central tendency of a dataset.

(c) To compare changes in variables over time or between different groups.

(d) To estimate the correlation co-efficient between variables.

26. An economist wants to calculate a price index to measure inflation. Which type of index number would be most suitable for this purpose ?

(a) Weighted index numbers.

(b) Unweighted index numbers.

(c) Fisher's ideal index numbers.

(d) Laspeyres index numbers.

27. In index number theory, what does the Laspeyres index measure ?

(a) The weighted average of price changes using base-period quantities.

(b) The weighted average of price changes using current-period quantities.

(c) The unweighted average of price changes using base-period quantities.

(d) The unweighted average of price changes using current-period quantities.

28. In a multiple regression analysis involving three predictor variables, what does the co-efficient of determination (R-squared) value of 0.85 indicate ?

(a) 85 % of the variation in the dependent variable is explained by the three predictor variables.

(b) The model has a good fit because R-squared is close to 1.

(c) There is a strong linear relationship between the predictor variables.

(d) The model is overfitting the data.

29. What is the relationship between the Karl Pearson correlation co-efficient and the Spearman correlation co-efficient for linear relationships ?

(a) They are equal

(b) The Karl Pearson correlation co-efficient is always higher

(c) The Spearman correlation co-efficient is always higher.

(d) There is no relationship between them.

30. A researcher wants to assess the relationship between income, education level, and job satisfaction using statistical analysis. Which technique would be most appropriate ?

(a) Simple linear regression.

(b) Multiple regression analysis.

(c) Spearman correlation co-efficient.

(d) Principle of least squares.

31. In a standard deck of 52 cards, what is the sample space of drawing two cards successively without replacement ?

(a) {red, black}.

(b) {heart, diamond, spade, club}.

(c) {face cards, number cards}.

(d) {red heart, red diamond, black spade, black club}.

32. If P (A) = 0.3, P (B) = 0.4, and $P(A \cap B) = 0.1$, what is $P(A \cup B)$?

(a) 0.2. (b) 0.3.

(c) 0.4. (d) 0.6.

33. What is the probability of drawing a red card or a face card from a standard deck of 52 cards ?

(a) 1/13. (b) 1/4.

(c) 1/2. (d) 3/4.

34. If P (A | B) = 0.6 and P (B) = 0.3, what is P (A and B) ?

(a) 0.18. (b) 0.20.

(c) 0.30. (d) 0.36.

35. In a bag, there are 5 red balls and 3 blue balls. If two balls are drawn without replacement, what is the probability of getting a red ball followed by a blue ball ?

(a) 5/16. (b) 15/56.

(c) 5/24. (d) 3/10.

36. What role does Bayes' theorem play in probability theory ?

(a) It calculates the probability of an event given prior knowledge and evidence.

(b) It determines the probability of independent events occurring simultaneously.

(c) It quantifies the distribution of discrete random variables.

(d) It measures the likelihood of events in a joint probability distribution.

37. If the joint probability distribution of two continuous random variables X and Y is given by $f(x, y) = kxy$ for $0 \leq x \leq 1$ and $0 \leq y \leq 2$, what is the value of k ?

(a) 1.

(b) 2.

(c) 3.

(d) 4.

38. What is the probability of rolling a number less than or equal to 4 on a fair six-sided die ?

(a) 1/6.

(b) 2/3.

(c) 3/6.

(d) 4/6.

39. If X and Y are independent random variables with probability density functions $f(x)$ and $g(y)$ respectively, what is the joint probability distribution of X and Y ?

(a) $f(x) * g(y)$.

(b) $f(x) + g(y)$.

(c) $f(x) / g(y)$.

(d) $f(x) - g(y)$.

40. What is the formula for the marginal probability distribution function of Y in terms of the joint probability distribution function $f(x, y)$?

(a) $\int f(x, y)\, dx$.

(b) $\int f(x, y)\, dy$.

(c) $\int f(x, y)\, dx\, dy$.

(d) $\int f(x, y)\, dx + \int f(x, y)\, dy$.

41. Which of the following distributions is characterized by a symmetric, bell-shaped curve and is often used to model natural phenomena such as height, weight, and test scores ?

(a) Uniform distribution.

(b) Exponential distribution.

(c) Normal distribution.

(d) Beta distribution.

42. The moment generating function (MGF) of a random variable X is given by $M(t) = e^{(3t + t^2)}$. What is the third moment of X ?

(a) 3.
(b) 9.
(c) 15.
(d) 21.

43. A random variable X follows a hypergeometric distribution with parameters N = 10, K = 4, and $n = 3$. What is the probability that exactly 2 successes occur in the sample ?

(a) 0.206.
(b) 0.363.
(c) 0.500.
(d) 0.667.

44. The distribution of the sum of squares of n independent standard normal random variables follows which sampling distribution ?

(a) Chi-square distribution.
(b) Student's t-distribution.
(c) F-distribution.
(d) Normal distribution.

45. In a Poisson distribution, if λ is the average rate of occurrence over a fixed interval of time or space, then the variance of the distribution is equal to :

(a) λ.
(b) 2λ.
(c) λ^2.
(d) $\sqrt{\lambda}$.

46. Which of the following distributions is often used to model the time until an event occurs, given a constant rate of occurrence ?

(a) Normal distribution.
(b) Gamma distribution.
(c) Binomial distribution.
(d) Lognormal distribution.

47. The sampling distribution of the sample mean, when the sample size is large, is approximately :

(a) Normal with mean 0 and standard deviation 1.
(b) Chi-square with n degrees of freedom.
(c) Student's t with n degrees of freedom.
(d) Normal with mean μ and standard deviation $\sigma / \sqrt{n}$.

48. Which distribution is used to model the number of successes in a sequence of independent trials with more than two possible outcomes on each trial ?

(a) Binomial distribution. (b) Multinomial distribution.

(c) Poisson distribution. (d) Hypergeometric distribution.

49. Which of the following statements regarding the moment generating function (MGF) is true ?

(a) The MGF is always defined for all random variables.

(b) The MGF uniquely determines the probability distribution of a random variable.

(c) The MGF is primarily used for discrete distributions.

(d) The MGF is equivalent to the probability generating function.

50. Which distribution is commonly used to model the joint distribution of two correlated random variables with normal marginal distributions ?

(a) Multinomial distribution. (b) Bivariate normal distribution.

(c) Poisson distribution. (d) Exponential distribution.

51. Which property of an estimator ensures that the estimator, on average, provides estimates that are close to the true parameter value ?

(a) Consistency. (b) Unbiasedness.

(c) Efficiency. (d) Sufficiency.

52. The Cramer-Rao lower bound establishes a limit on the variance of an unbiased estimator based on :

(a) The sample size.

(b) The parameter being estimated.

(c) The information provided by the sample.

(d) The population distribution.

53. According to the Neymann factorization theorem, a statistic T is sufficient for a parameter θ if and only if :

(a) The likelihood function is maximized.

(b) The joint distribution of the sample can be factorized into two functions.

(c) The estimator is unbiased.

(d) The estimator is consistent.

54. Which method of estimation involves equating sample moments to population moments ?

(a) Method of moments.

(b) Method of maximum likelihood estimation.

(c) Bayesian estimation.

(d) Least squares estimation.

55. What does a confidence interval represent in interval estimation ?

(a) The range of possible parameter values.

(b) The probability that the parameter lies within the interval.

(c) The level of significance of the test.

(d) The precision of the estimator.

56. Type I error in hypothesis testing refers to :

(a) Rejecting the null hypothesis when it is true.

(b) Failing to reject the null hypothesis when it is false.

(c) Rejecting the alternative hypothesis when it is true.

(d) Failing to reject the alternative hypothesis when it is false.

57. The power of a hypothesis test is influenced by :

(a) The level of significance. (b) The sample size.

(c) The variability of the data. (d) The null hypothesis.

58. The critical region of a hypothesis test consists of :

(a) All possible outcomes of the sample.

(b) Outcomes that lead to acceptance of the null hypothesis.

(c) Outcomes that lead to rejection of the null hypothesis.

(d) Outcomes that lead to rejection of the alternative hypothesis.

59. Which distribution is commonly used in hypothesis testing for comparing means of two independent samples ?

(a) Normal distribution.
(b) Student's t-distribution.
(c) Chi-square distribution.
(d) F-distribution.

60. The Kolmogorov-Smirnov test is used for :

(a) Testing normality of data.
(b) Comparing means of two independent samples.
(c) Testing the equality of variances in two samples.
(d) Testing the goodness of fit of a sample distribution to a theoretical distribution.

61. Which of the following is an example of a non-sampling error in statistical sampling ?

(a) Samplng bias.
(b) Measurement error.
(c) Nonresponse bias.
(d) Variability due to chance.

62. In simple random sampling, each member of the population has :

(a) An equal probability of selection.
(b) No chance of being selected.
(c) A probability of selection proportional to its size.
(d) A predetermined probability of selection.

63. What is the purpose of stratified random sampling ?

(a) To ensure that every member of the population has an equal chance of selection.
(b) To reduce sampling variability.
(c) To ensure representation from different subgroups within the population.
(d) To select every kth element from the population.

64. The standard error of the population mean is a measure of :

(a) Sampling variability.
(b) Sampling bias.
(c) Sampling efficiency.
(d) Sampling precision.

65. Which experimental design involves multiple independent variables and their interactions ?

(a) One-way ANOVA.

(b) Two-way ANOVA.

(c) Latin square design.

(d) Completely randomized design.

66. What is the formula to calculate the crude birth rate ?

(a) (Number of births / Total population) × 100.

(b) (Number of births / Number of women of childbearing age) × 1,000.

(c) (Number of births / Total population) × 1,000.

(d) (Number of births / Total population) × 10,000.

67. Age-specific death rates are calculated by dividing the number of deaths in a specific age group by :

(a) The total population.

(b) The number of deaths in all age groups.

(c) The number of births in all age groups.

(d) The population in that specific age group.

68. Which agency in India is responsible for conducting the National Sample Survey ?

(a) Registrar General and Census Commissioner of India.

(b) Ministry of Statistics and Programme Implementation.

(c) Central Statistical Office.

(d) Ministry of Home Affairs.

69. What does the agricultural census primarily focus on ?

(a) Yield of crops.

(b) Landholding patterns.

(c) Livestock population.

(d) Agricultural machinery.

70. The measurement of the total value of goods and services produced within a country's borders in a specific time period is known as :

(a) Gross Domestic Product (GDP).

(b) Gross National Product (GNP).

(c) Net National Product (NNP).

(d) National Income.

71. In statistical quality control, what does an "R-chart" primarily monitor ?

(a) Individual measurements of a process.

(b) Mean of a sample taken from the process.

(c) Range of measurements in a process.

(d) Variability within a sample from the process.

72. Which type of control chart is used to monitor the proportion of defective items in a sample ?

(a) X-bar chart.

(b) R-chart.

(c) P-chart.

(d) S-chart.

73. Acceptance sampling plans are often based on which statistical distribution ?

(a) Normal distribution.

(b) Poisson distribution.

(c) Binomial distribution.

(d) Exponential distribution.

74. The transportation problem deals with optimizing the :

(a) Allocation of resources to different tasks.

(b) Routing of vehicles between various locations.

(c) Assignment of workers to different shifts.

(d) Distribution of goods from multiple suppliers to multiple destinations.

75. Which method is commonly used to solve assignment problems in Operations Research ?

(a) Graphical method.

(b) Simplex method.

(c) Hungarian method.

(d) Genetic algorithm.

C 41700 (Pages : 15) Name.....

Reg. No.....

P.G./INTEGRATED P.G. ENTRANCE EXAMINATION, APRIL 2023

STATISTICS

Time : Two Hours Maximum : 300 Marks

Each question carries 4 marks.

1 mark will be deducted for each wrong answer.

1. The inverse of a square matrix exists if and only if it is.

   (a) Singular. (b) Non-singular.

   (c) Symmetric. (d) Skew-symmetric.

2. Let a non-singular square matrix A be such that $A^T = A^{-1}$, then A is :

   (a) A skew symmetric matrix. (b) Hermitan matrix.

   (c) Symmetric matrix. (d) An orthogonal matrix.

3. Rank of a matrix is :

   (a) The number of independent rows of the matrix.

   (b) The number of dependent rows of the matrix.

   (c) The sum of the diagonal elements.

   (d) Min {No. of rows, No. of columns}.

4. Let $g : A \to B$ be a function, then g^{-1}exists if and only if g is :

   (a) Injective. (b) Surjective.

   (c) Bijective. (d) Trijective.

5. Which of the following statement(s) is/are true ?

   I. If $f(x) = p(x) \cdot q(x)$, then $\lim_{x \to a} f(x) = f(a)$.

   II. If $f(x) = \frac{p(x)}{q(x)}$, then $\lim_{x \to a} f(x) = f(a)$.

   (a) I. (b) II.

   (c) Both I and II. (d) Neither I nor II.

6. A function is continuous at $x = c$ if and only if :

(a) $f(c)$ is defined.

(b) $\lim_{x \to c} f(x)$ exists.

(c) $\lim_{x \to c} f(x) = f(c)$.

(d) All the above.

7. Let $f(x) = \frac{x^3 + 2x^2 - 1}{x + 5}$, then the first derivative of $f(x)$ at $x = 0$ is :

(a) $\frac{1}{25}$.

(b) $-\frac{1}{25}$.

(c) $\frac{4}{25}$.

(d) $-\frac{4}{25}$.

8. The Maclaurin series expansion of e^{-x^2} is :

(a) $1 - x^2 + \frac{x^4}{2} - \frac{x^6}{3} + \frac{x^8}{4} + \ldots$

(b) $1 + x^2 + \frac{x^4}{2} + \frac{x^6}{3} + \frac{x^8}{4} + \ldots$

(c) $1 + x^2 + \frac{x^4}{2!} - \frac{x^6}{3!} + \frac{x^8}{4!} + \ldots$

(d) $1 + x^2 + \frac{x^4}{2!} + \frac{x^6}{3!} + \frac{x^8}{4!} + \ldots$

9. $1 + \frac{1}{4} + \frac{1}{4^2} + \frac{1}{4^3} + \ldots + \frac{1}{4^k} + \ldots$ equals :

(a) $\frac{4}{3}$.

(b) $\frac{1}{3}$.

(c) $\frac{2}{3}$.

(d) $\frac{5}{3}$.

10. Consider the given series and find its correct properties from the given statements

$$1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \frac{1}{6} \ldots$$

(i) The given series is divergent.

(iii) The given series is convergent series.

(ii) This is a harmonic series

(iv) This series is a geometric series.

(a) The statements (i) and (ii) are true.

(b) The statements (ii) and (iii) are true

(c) The statements (iii) and (iv) are true.

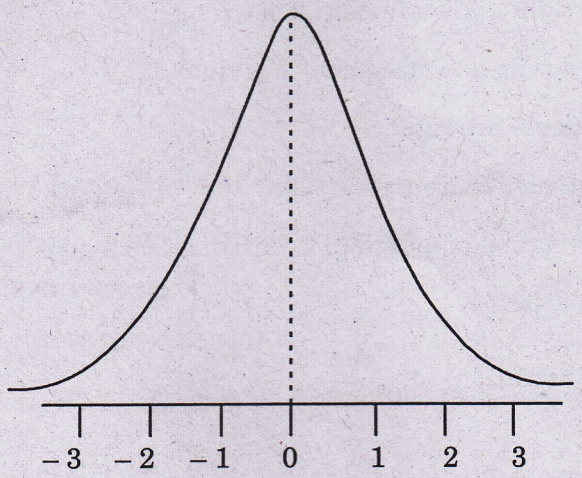
(d) The statements (i) and (iv) are true.

11. Find the value of $\int_1^4 (x+2)^2\, dx$.

(a) 36. (b) 63.

(c) 34. (d) 64.

12. Consider the statements based on the diagram and find the correct option.



(i) mean=median=mode.

(ii) mean>mode>median.

(iii) The given distribution is positively skewed.

(iv) The given distribution is symmetric.

(a) The statements (i) and (iii) are true.

(b) The statements (i) and (iv) are true.

(c) The statements (ii) and (iii) are true.

(d) The statements (ii) and (iv) are true.

13. The arithmetic mean of first 100 natural numbers is :

(a) 50.5.

(b) 50.05.

(c) 50.

(d) None of these.

14. Consider the data : 1, 4, 7, 12, 15, 20, 30, 50, ... 100. Let its arithmetic mean be "u". Then sum : $(1 - u) + (4 - u) + (7 - u) + (12 - u) + ((15 - u) + (20 - u) + (30 - u) + (50 - u) + \ldots + (100 - u)$ is :

(a) 1.

(b) – 1.

(c) 100.

(d) 0.

15. Find which of the given statement is true :

Statement 1 : Arithmetic mean is not affected by extreme values.

Statement 2 : Some distributions have multiple number of modes.

(a) Statement 1 is right and statement 2 is wrong.

(b) Statement 1 is wrong and statement 2 is right.

(c) Both the statements are right.

(d) None of the statements are true.

16. The ratio of standard deviation of a data to its arithmetic mean is :

(a) Co-efficient of variation.

(b) $\frac{\text{Co-efficient of variation}}{100}$.

(c) Co-efficient of variation × 100.

(d) Square root of co-efficient of variation.

17. Consider two sets of data :

X :	5	4	3	5	4	2
Y :	4	5	9	12	15	1

If the coefficient variation of X is greater than coefficient of variation of Y then,

(a) X is more consistent / homogenous than Y.

(b) Y is more consistent / homogenous than X.

(c) Both are equally consistent.

(d) None of the above.

18. The 5^{th} decile of a data is also known as :

(a) Mean. (b) Mode.

(c) Median. (d) Harmonic mean.

19. Find the wrong statement regarding the properties of Variance of a data is :

(a) Sum of squares of deviations of x from mean divided by n.

(b) Square of standard deviation

(c) Variance is independent on change of origin.

(d) Variance is independent on change of scale.

20. A distribution is said to be leptokurtic if :

(a) $\beta_2 < 3$. (b) $\beta_2 > 3$.

(c) $\beta_2 = 3$. (d) $\beta_2 \neq 3$.

21. Consider a random variable X with Var (X) = E (X^2) then:

Statement 1 : Mean = 0

Statement 2 : $E\left|X^2 + 5\right| = 0$.

(a) Statement 1 is right and statement 2 is wrong.

(b) Statement 1 is wrong and statement 2 is right.

(c) Both the statements are right.

(d) None of the statements are true.

22. Consider a set of data $x_1, x_2, ..., x_n$. If $\beta_1 = \beta_2$ and let $E(X - E(X))^4 = \mu_4$, $E(X - E(X))^3 = \mu_3$, $\mu_4 = \mu_3^2$. Then Variance of the data is :

(a) 2. (b) $\frac{1}{4}$.

(c) $\frac{1}{5}$. (c) 1.

23. Consider the following data :

X	:	45	6	2	7	50	20
Y	:	2025	46	4	49	2502	410

Here the Karl-Pearson coefficient of correlation between X and Y will be :

(a) Near to 1. (b) Near to – 1.

(c) Near to zero. (d) Will be more than 0.6.

24. If X and V are independent, the value of regression coefficient β_{XY} is :

(a) 1. (b) – 1.

(c) 0. (d) Undefined.

25. If the regression coefficients $\beta_{XY} = -\beta_{XY}$ then :

(a) The two regression lines are perpendicular to each other.

(b) The two lines of regression are coincident.

(c) Both (a) and (b) are true.

(d) None of (a) and (b) are true.

26. Let "α" be correlation between two variables X_1 and X_2 out of a set of variables (X_1, X_2, X_3) eliminating the common association of remaining variable X_3 with X_1 and X_2.

$$\alpha \frac{\text{cov}\,(X_1 - b_{13}\,X_3, X_2 - b_{23}\,X_3)}{\sqrt{\text{var}\,(X_1 - b_{13}\,X_3)\,\text{var}\,(X_2 - b_{23}\,X_3)}}$$

In which b_{13} and b_{23} are simple regression coefficient of X_1 on X_3 and X_2 on X_3 respectively Then "α" is usually known as :

(a) Correlation ratio. (b) Spurious correlation.

(c) Multiple correlation. (d) Partial correlation.

27. Let (X_1, X_2, X_3) be three variables and let r_{ij} be the simple correlation co-efficient between thes variables for $(i, j) = \{(1, 2), (1, 3), (2, 3)\}$. Let $r_{12}^2 + r_{13}^2 + r_{23}^2 - 2r_{12}\,r_{13}\,r_{23} = 1$, the regression planes X_1 on X_2 and X_3 ; X_2 on X_1 and X_3 and X_3 on X_1 and X_2.

(a) Coincides. (b) Not-coincides.

(c) Parallel. (d) None of the above.

28. Short term fluctuations of a time series is called :

(a) Seasonal variation. (b) Cyclic variation.

(c) Irregular variation. (d) All the above.

29. Consider the decomposed time series model : $y_t = T_t + S_t C_t R_t$, this kind of model is known as :

(a) Additive model. (b) Mixed model.

(c) Multiplicative model. (d) None of the above.

30. Let $P_{oi}^{La} = a$ and $P_{oi}^{Pa} = b$ be the Laspeyre's and Paasche's Index respectively whereas a and b are its values. Then the Fisher's index number (P_{oi}^{F}) and Dorbish-Bowley Index number, (P_{oi}^{DB}) are :

(a) $P_{oi}^{F} \sqrt{ab}$ and $P_{oi}^{DB} = \left(\frac{a-b}{2}\right)$. (b) $P_{oi}^{F} \sqrt{a+b}$ and $P_{oi}^{DB} = \left(\frac{a+b}{2}\right)$.

(c) $P_{oi}^{F} \sqrt{ab}$ and $P_{oi}^{DB} = \left(\frac{a+b}{2}\right)$. (d) $P_{oi}^{F} \sqrt{a+b}$ and $P_{oi}^{DB} = \left(\frac{a-b}{2}\right)$.

31. An index number is said to be time consistent if :

(a) $P_{oi} \times P_{io} = 1$. (b) $P_{oi} \times Q_{io} = 1$.

(c) $P_{oi} \times P_{io} > 1$. (d) $P_{oi} \times Q_{io} > 1$.

32. Find the correct statement :

Statement 1 : Tossing a biased coin is a random experiment.

Statement 2 : Getting a head while tossing a coin is called an event of the experiment.

(a) Statement 1 is right and statement 2 is wrong.

(b) Statement 1 is wrong and statement 2 is right.

(c) Both the statements are wrong.

(d) Both the statements are right.

33. If A and B are two events which are not disjoint, then P (A) + P (B) equals :

(a) $P(A \cup B)$. (b) $P(A \cap B)$.

(c) $P(A \cup B) + P(A \cap B)$. (d) $P(A \cup B) - P(A \cap B)$.

34. Let the cumulative distribution function of a continuous random variable X be F(x), then the cumulative distribution function of $Y = X + a$ is :

(a) $F(x + a)$.

(b) $F(x - a)$.

(C) $F(2x)$.

(d) None of the above.

35. Consider two events A and B, such that $P\{A|B) = P(A)$ and $P(B) \neq 0$, then :

(a) A is statistically dependent on B.

(b) A is statistically independent on B.

(c) $P(A \cap B) = P(A \cup B)$.

(d) $P(A \cap B) = P(A \Delta B)$.

36. If an event B has occurred with probability one, then the conditional probability of A given B is

(a) P (A).

(b) P (B).

(c) 0.

(d) 1.

37. If B is a subset of A then P (A|B) is :

(a) P (A).

(b) P (B).

(c) 0.

(d) 1.

38. Given that $P(A) = \frac{1}{5}$, $P(B) = \frac{1}{8}$ and $P(A|B) = \frac{1}{10}$, then the probability is P (B|A) is :

(a) $\frac{1}{9}$.

(b) $\frac{1}{16}$.

(c) $\frac{1}{19}$.

(d) $\frac{1}{15}$.

39. Three coins are tossed simultaneously, the probability of getting at most one head is :

(a) 0.

(b) 0.1.

(c) 0.5.

(d) 1.1.

40. A random variable X has the following probability function :

Values of $X = x$:	0	1	2	3	4	5	6
$P(x)$:	0	k	$2k$	$4k$	$2k$	$8k^2$	$2k^2$

Find the value of k :

(a) 1. (b) 2.

(c) 0.2. (d) 0.1.

41. Let $F_{Y\backslash X}(y\backslash x)$ denotes the distribution function of Y when X has already assumed the value x. Then $F_{Y|X}(y\backslash x)$ can be written as :

(a) $1 - P(Y \leq y\backslash X = x)$. (b) $1 - P(Y \geq y\backslash X = x)$.

(c) $1 - P(Y = y\backslash X = x)$. (d) None of the above.

42. Let X be a continuous random variable with finite mean. Then its variance :

$$\int_{-\infty}^{+\infty} (X - E(X))^2 f(x)\, dx :$$

(a) Exists always. (b) Never exist.

(c) Need not exists. (d) Always finite.

43. Let X_1, X_2, X_3 be any 3 random variables with mean $E|X_1| = 3$, $E(X_2) = 7$, $E(X_3) = 3$. Then the mean of $5X_1 + 2|- X_2| + 20X_3$ is :

(a) 7.5. (b) 75.

(c) 89. (d) 8.9.

44. Consider the values of X : – 1, 2, – 3, 4, – 5, 6, – 7, 8, –9, 10, ..., 100, then find the correct relation :

(a) $E(|3X|) < |3E(X)|$. (b) $E(|3X|) > |3E(X)|$.

(c) $E(|3X|) = |3E(X)|$. (d) None of the above.

45. Let X and Y be any two dependent random variables. Then which among the given statement is true ?

Statement 1 : Cov (X, Y) = E (XY) – E (X) E (X) ≠ 0.

Statement 2: Var (X – Y) = Var (X) + Var (Y).

(a) Statement 1 is true and 2 is wrong.

(b) Statement 2 is true and 1 is wrong.

(c) Both statements are true.

(d) Both statements are wrong.

46. Let X and Y be two random variables. Consider the relation Min (X, Y) = $\frac{1}{2}$ [(X + Y) – (X – Y)

consider the value of X.

X	:	1	1	8	4	6
Y	:	2	1	9	8	10

Then :

(a) E [Min (X, Y)] ≤ Min [E (X), E (Y)].

(b) E [Min(X, Y)] > Min [E (X), E (Y)].

(b) E [Min(X, Y)] > 2 Min [E (X), E (Y)].

(d) None of the above.

47. Consider the experiment of tossing an unbiased coin 'n' times as a random experiment and assumin binomial distribution it will be :

(a) Asymmetric.

(b) Negatively skewed.

(c) Positively skewed.

(d) Symmetric.

48. Let X ~ Binomial (n, p), if , $n \to \infty$, $p \to 0$ and $np = \alpha$ then X follows :

(a) Binomial, B (n, α).

(b) Poisson, P (α).

(c) Negative Binomial, NB (n, α).

(d) Geometric, G (α).

49. Let X ~ N (99, σ^2) then E (X ~ 99) ^{99} is :

(a) 1.

(b) 0.

(c) 0.5.

(c) 9.9.

50. Let X ~ N (0, 1) then $\int_0^\infty f(x)\,dx$ is equal to :

(a) 1.5. (b) 1.

(c) 0. (d) 0.5.

51. Consider a random variable X with probability density function.

$$f(x) = \frac{\left(\frac{1}{2}\right)^{\frac{n}{2}}}{\Gamma\left(\frac{n}{2}\right)}\left[\exp\frac{(-x)}{2}\right]x^{\left(\frac{n}{2}-1\right)}, 0 < x < \infty.$$

Then the distribution of X is :

(a) Gamma $\left(\frac{1}{2}, \frac{n}{2}\right)$. (b) Gamma $\left(\frac{n}{2}, \frac{n}{2}\right)$.

(c) Gamma $\left(\frac{1}{2}, \frac{1}{2}\right)$. (d) F $\left(\frac{1}{2}, \frac{n}{2}\right)$.

52. Let X and Y be two independent standard normal variates. If $Y = \frac{X}{Y}$, then Y follows :

(a) Standard Normal distribution. (b) Standard Cauchy distribution.

(c) Standard Laplace distribution. (d) Chi-square distribution.

53. Identify the correct statement :

Statement 1 : A statistic is a function of the random sample.

Statement 2 : An estimator is a statistic that is used to estimate an unknown parameter θ of the distribution.

(a) Statement 1 is right and statement 2 is wrong.

(b) Statement 2 is right and statement 1 is wrong.

(c) Both statements are right.

(d) Both statements are wrong.

54. Consider an estimator $T_n = T(X_1, X_2, ..., Xn)$. If $E(T_n) = g(\theta)$, $Var(T_n) \neq g(\theta)$, for all $\theta \in \theta$. Then

(a) T_n is a minimal sufficient estimator of $g(\theta)$.

(b) T_n is consistent estimator of $g(\theta)$.

(c) T_n is a complete sufficient estimator of $g(\theta)$.

(d) T_n is an unbiased estimator of $g(\theta)$.

55. An estimator T_1 is said to be efficient than another estimator T_2 if :

(a) $Var(T_1) < Var(T_2)$.

(b) $Var(T_1) > Var(T_2)$.

(c) $E(T_1) > Var(T_2)$.

(d) $Var(T_1) < E(T_2)$.

56. Let $X_1, X_2, ..., X_n$ be a random sample from $N(\mu, \sigma^2)$. Then the sufficient estimator for (μ, σ^2) is :

(a) $\left(\sum_{i=1}^{n} X_i^2, \sum_{i=1}^{n} X_i\right)$.

(b) $\left(\sum_{i=1}^{n} X_i, \sum_{i=1}^{n} X_i\right)$.

(c) $\left(\sum_{i=1}^{n} X_i, \sum_{i=1}^{n} X_i^2\right)$.

(d) $\left(\sum_{i=1}^{n} X_i^2, \sum_{i=1}^{n} X_i^2\right)$

57. Let T be an estimator for $g(\theta)$, then under the regularity conditions by Cramer-Rao inequality the lower bound of $Var(T)$ is :

(a) $\dfrac{\left\{\dfrac{d^2}{d\theta^2} g(\theta)\right\}}{E\left(\dfrac{\partial^2}{\partial\theta^2} \log L\right)}$.

(b) $\dfrac{\left\{\dfrac{d^2}{d\theta^2} g(\theta)\right\}}{E\left(\dfrac{\partial}{\partial\theta} \log L\right)^2}$.

(c) $\dfrac{\left\{\dfrac{d^2}{d\theta} g(\theta)\right\}^2}{E\left(\dfrac{\partial}{\partial\theta} \log L\right)^2}$.

(d) $\dfrac{\left\{\dfrac{d}{d\theta} g(\theta)\right\}^2}{E\left(\dfrac{\partial^2}{\partial\theta^2} \log L\right)}$.

58. Let 0, 1, 1, 0, 0, 0, 1, 2, 0, 1, 0, 0 be a random sample from a Poisson distribution with parameter λ. Now the moment estimator of λ is :

(a) 0.5. (b) 1.5

(c) 1. (d) 0.

59. Size of the critical region is known as :

(a) Power of the test. (b) Size of type I error.

(c) Size of type II error. (d) Size of the test.

60. Neyman-Pearson Lemma provides :

(a) An unbiased test. (b) A most powerful test.

(c) Uniformly most powerful test. (d) UMVUE.

61. Student's t Test was proposed by :

(a) C. R. Rao. (b) Ronald A Fisher.

(c) P. C. Mahalanobis. (d) William S. Gosset.

62. Degrees of freedom is related to :

(a) No. of observations in a set.

(b) Hypothesis under test.

(c) No. of independent observations in a set.

(d) None of the above.

63. Consider the random sample 2, 4, 6, 8 of size 4, then the sample variance is :

(a) $\frac{20}{3}$. (b) $\frac{20}{6}$.

(c) 5. (d) 1.

64. Errors in a survey other than sampling error is known as :

(a) Formula error.

(b) Non-sampling error.

(c) Planning error.

(d) None of the above.

65. A population is perfectly homogenous in respect of a characteristic. What sample of size will be more preferable ?

(a) A large sample.

(b) A small sample.

(c) A single item.

(d) No item.

66. Randomization is a process in which treatments are allocated to the experimental units :

(a) In a sequence.

(b) By the convenience of the investigator.

(c) With equal probability.

(d) None of the above.

67. Replication in an experiment eliminates :

(a) Human bias.

(b) Competition among neighbouring plots.

(c) Heterogeneity among groups.

(d) None of the above.

68. Control charts in statistical quality control are meant for :

(a) Describing the pattern of variation.

(b) Checking whether the variability in the product is within the tolerance limits or not.

(c) Uncovering whether the variability in the product is due to assignable causes or not.

(d) All the above.

69. Main tools of statistical quality control are :

(a) Shewart charts.

(b) Acceptance sampling plan.

(c) Both (a) and (b).

(d) None of the above.

70. Shewart control chart is meant to :

(a) Detect whether the process is under statistical quality control.

(b) Find the assignable causes.

(c) Reflect the selection of samples.

(d) All the above.

71. A defect in an item is classified as major if :

(a) It stops the function of the process.

(b) It is not detectable.

(c) It shortens the life of the system.

(d) All the above.

72. The control limit delimited by the consumer is called :

(a) Modified control limit. (b) Natural control limit.

(c) Specified control limit. (d) None of the above.

73. The death rate of children under one month is known as :

(a) Neonatal mortality rate. (b) Infant mortality rate.

(c) Maternal mortality rate. (d) Foetal death rate.

74. In a linear programming problem dual of a dual is :

(a) Dual. (b) Primal.

(c) Either dual or primal. (d) neither dual nor primal

75. Simplex method was proposed by :

(a) Abraham Wald. (b) G. Taguchi.

(c) G. B. Dantzig. (d) Bradley Efron.