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Paper Code		
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(To be filled in the OMR Sheet)

प्रश्नपुस्तिका क्रमांक
Question Booklet No.

O.M.R. Serial No. | | | | | | | | |

प्रश्नपुस्तिका सीरीज
Question Booklet Series
C

M.Sc (Biotechnology) First Semester, Examination, February/March-2022
MBT-1004
Fundamentals in Biostatistics and Biomathematics

Time : 1:30 Hours **Maximum Marks-100**

जब तक कहा न जाय, इस प्रश्नपुस्तिका को न खोलें

निर्देश : –

1. परीक्षार्थी अपने अनुक्रमांक, विषय एवं प्रश्नपुस्तिका की सीरीज का विवरण यथास्थान सही– सही भरें, अन्यथा मूल्यांकन में किसी भी प्रकार की विसंगति की दशा में उसकी जिम्मेदारी स्वयं परीक्षार्थी की होगी।
2. **इस प्रश्नपुस्तिका में 100 प्रश्न हैं, जिनमे से केवल 75 प्रश्नों के उत्तर परीक्षार्थियों द्वारा दिये जाने है। प्रत्येक प्रश्न के चार वैकल्पिक उत्तर प्रश्न के नीचे दिये गये हैं। इन चारों में से केवल एक ही उत्तर सही है। जिस उत्तर को आप सही या सबसे उचित समझते हैं, अपने उत्तर पत्रक (O.M.R. ANSWER SHEET)में उसके अक्षर वाले वृत्त को काले या नीले बाल प्वांइट पेन से पूरा भर दें। यदि किसी परीक्षार्थी द्वारा निर्धारित प्रश्नों से अधिक प्रश्नों के उत्तर दिये जाते हैं तो उसके द्वारा हल किये गये प्रथमतः यथा निर्दिष्ट प्रश्नोत्तरों का ही मूल्यांकन किया जायेगा।**
3. प्रत्येक प्रश्न के अंक समान हैं। आप के जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।
4. सभी उत्तर केवल ओ०एम०आर० उत्तर पत्रक **(O.M.R. ANSWER SHEET)** पर ही दिये जाने हैं। उत्तर पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।
5. ओ०एम०आर० उत्तर पत्रक **(O.M.R. ANSWER SHEET)** पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाय।
6. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी प्रश्नपुस्तिका बुकलेट एवं ओ०एम०आर० शीट पृथक–पृथक उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें।
7. निगेटिव मार्किंग नहीं है।

महत्वपूर्ण : – **प्रश्नपुस्तिका खोलने पर प्रथमतः जॉच कर देख लें कि प्रश्नपुस्तिका के सभी पृष्ठ भलीभॉति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कक्ष निरीक्षक को दिखाकर उसी सीरीज की दूसरी प्रश्नपुस्तिका प्राप्त कर लें।**

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1. What is the mode of the data 3,2,6, 2,1,1,1, 3,2,6, 2?

   (A) 1

   (B) 2

   (C) 3

   (D) 5

2. Multiple bar diagram is used to represent:

   (A) Differential frequencies of a variable

   (B) Frequency of one character

   (C) Continuous data

   (D) Frequency of two or more characters

3. What is the median of the following observation 100, 97, 110, 200, 75, 120, 150?

   (A) 100

   (B) 120

   (C) 110

   (D) 150

4. Chi-square value is always:

   (A) positively skewed

   (B) Negatively Skewed

   (C) Positively deflected

   (D) Negatively deflected

5. The ratio between experimental and observed results is represented by:

   (A) ANOVA

   (B) Variance ratio

   (C) t-test

   (D) Chi-square test

6. Select false statement:

(A) Regression model relates Y to a function of X and β

(B) Coefficient of determination is the square of correlation coefficient

(C) Regression line represents the dispersion of the data of standard deviation

(D) All are false statement

7. A paired T test consists of n pairs of observations. What is the number of degrees of freedom of the test?

(A) 2n-1

(B) 2n

(C) n-1

(D) n

8. In a hypothesis test, what does the p value signify?

(A) Smallest level of significance for rejection of Null Hypothesis

(B) Largest level of significance for rejection of Null Hypothesis

(C) Smallest level of significance for acceptance of Null Hypothesis

(D) Smallest level of significance for acceptance of Null Hypothesis

9. An important application of the chi-square distribution is:

(A) Making inferences about a single population variance

(B) Testing for goodness of fit

(C) Testing for the independence of two variables

(D) All of these alternatives are correct.

10. What is the mean and variance for standard normal distribution?

(A) Mean is 0 and variance is 1

(B) Mean is 1 and variance is 0

(C) Mean is 0 and variance is ∞

(D) Mean is ∞ and variance is 0

11. Which of these distributions is used for a testing hypothesis?

(A) Normal Distribution

(B) Chi-Squared Distribution

(C) Gamma Distribution

(D) Poisson Distribution

12. A simple linear regression equation is:

(A) $y = aX + b$

(B) $y = aX + bX$

(C) $y = a + bX$

(D) $y = a – bX$

13. In nonlinear regression the dependent and independent variables X and Y generate a

(A) Curve

(B) straight line

(C) Complicated pattern

(D) Ogive

14. What is the coefficient of Range of the data 60,70,80,160,180,200?

(A) 75%

(B) 64%

(C) 51%

(D) 54%

15. The statement that directly contradicts a null hypothesis:

(A) Theoretical hypothesis

(B) Alternate hypothesis

(C) Both (A) & (B)

(D) New hypothesis

16. What is the mean of a Chi Square distribution with 6 degrees of freedom?

(A) 4

(B) 12

(C) 6

(D) 8

17. Which Chi Square distribution looks the most like a normal distribution?

(A) A Chi Square distribution with 4 degrees of freedom

(B) A Chi Square distribution with 5 degrees of freedom

(C) A Chi Square distribution with 6 degrees of freedom

(D) A Chi Square distribution with 16 degrees of freedom

18. Select the wrong statement:

(A) Correlation represents strength of relationship between two variables

(B) Correlation is denoted by symbol r

(C) r = 1, represents perfect positive correlation.

(D) r is not a dimensionless quantity.

19. Value of mean provides concise numerical summary of:

(A) Variance

(B) Distribution

(C) Sample Space

(D) Probability

20. The test to be applied when numbers of observations are less than 30 and variance is not known:

(A) F-test

(B) Z-test

(C) T- test

(D) Chi-square test

21. Two types of errors associated with hypothesis testing are Type I and Type II. Type II error is committed when:

(A) We reject the null hypothesis whilst the alternative hypothesis is true

(B) We reject a null hypothesis when it is true

(C) We accept a null hypothesis when it is not true

(D) None of them

22. By taking a level of significance of 5% it is the same as saying:

(A) We are 5% confident the results have not occurred by chance

(B) We are 95% confident that the results have not occurred by chance

(C) We are 95% confident that the results have occurred by chance

(D) All of them

23. The original hypothesis is known as:

(A) Alternate hypothesis

(B) Null hypothesis

(C) Both (A) and (B) are incorrect

(D) Both (A) and (B) are correct

24. Which of the following statements is true about the regression line?

(A) A regression line is also known as the line of the average relationship

(B) A regression line is also known as the estimating equation

(C) A regression line is also known as the prediction equation

(D) All of the above

25. The independent variable is used to explain the dependent variable in _____.

(A) Linear regression analysis

(B) Multiple regression analysis

(C) Non-linear regression analysis

(D) None of the above

26. Which of the following statements is true about the type two error?

(A) Type two error means to accept an incorrect hypothesis

(B) Type two error means to reject an incorrect hypothesis

(C) Type two error means to accept a correct hypothesis

(D) Type two error means to reject a correct hypothesis

27. If the values of two variables move in the opposite direction, _____.

(A) The correlation is said to be linear

(B) The correlation is said to be non-linear

(C) The correlation is said to be positive

(D) The correlation is said to be negative

28. Which of the following statements is true for correlation analysis?

(A) It is a bivariate analysis

(B) It is a multivariate analysis

(C) It is a univariate analysis

(D) Both (A) and (C)

29. If $r = 0.8$, $b_{xy} = 0.32$ then what would be the value of b_{yx}:

(A) 0.48

(B) 0.42

(C) 2.0

(D) 1.0

30. If X and Y in a regression model is totally unrelated:

(A) The correlation coefficient would be -1

(B) The coefficient of determination would be 0

(C) The coefficient of determination would be 1

(D) All is correct

31. The process of constructing a mathematical model or function that can be used to predict or determine one variable by using another variable is called:

(A) Correlation

(B) Regression

(C) Residual

(D) Both (A) & (B)

32. In a tabular presentation, the summary and presentation of data with different non-overlapping classes are defined as:

(A) Frequency distribution

(B) Chronological distribution

(C) Ordinal distribution

(D) Nominal distribution

33. When the quantitative and qualitative data are arranged according to a single feature, the tabulation is known as?

(A) One-way

(B) Bivariate

(C) Manifold-division

(D) Dichotomy

34. The arrangement of data in rows and columns is called:

(A) Frequency distribution

(B) Cumulative frequency distribution

(C) Tabulation

(D) Classification

35. The control of the probability of a type I error represents:

(A) Alpha level of significance

(B) β level of significance

(C) Both (A) and (B)

(D) None of these

36. Probability of likelihood of the occurrence of an event varies between:

(A) 0 and 1

(B) -1 and 1

(C) -1 and 0

(D) 0 and 2

37. What is the probability of getting an even number in a single throw with a dice?

(A) 2/6

(B) 1/2

(C) 1/3

(D) 3/2

38. Which of the following measures is most affected by extreme values?

(A) Quartile deviation

(B) SD

(C) Range

(D) Mean deviation

39. Relative flatness or peakedness of the frequency curve is termed:

(A) Skewness

(B) Coefficient of skewness

(C) Negative skewness

(D) Kurtosis

40. Poisson distribution is which type of probability distribution:

(A) Discrete

(B) Continuous

(C) Both (A) & (B)

(D) None of them

41. Binomial distribution is associated with the:

(A) Probability of success

(B) Probability of failure

(C) Probability distribution of rare events

(D) Both (A) & (B)

42. In how many ways 4 boys and 3 girls can be seated in a row so that they are alternate?

(A) 144

(B) 288

(C) 28

(D) 12

43. Coefficient of variation is:

(A) X

(B) σ/X

(C) (SD/Mean) x 100

(D) (Mean/SD) + 100

44. The median of a series is 9. Two observations 7 and 18 are added to the series. What will be the median of the new series?

(A) 8

(B) 9

(C) 10

(D) 7

45. How many Permutations of the letters of the word APPLE are there?

(A) 600

(B) 120

(C) 240

(D) 60

46. Find the number of ways of arranging the letters of the words DANGER, so that no vowel occupies odd place:

(A) 36

(B) 48

(C) 144

(D) 96

47. Which would you choose to create a bar diagram?

(A) Edit, Chart

(B) Insert, Chart

(C) Tools, Chart

(D) Format, Chart

48. What happens when you press Ctrl + X after selecting some cells in Excel?

(A) The cell content of selected cells disappears from cell and stored in clipboard

(B) The cells selected are marked for cutting

(C) The selected cells are deleted and the cells are shifted left

(D) The selected cells are deleted and cells are shifted up

49. Cumulative frequency is used to find out the:

(A) Mode

(B) Class interval

(C) Range

(D) None of these

50. A large collection of data may be condensed by constructing:

(A) Classes

(B) Class limits

(C) Frequency polygon

(D) None of these

51. Select the correct statement about Primary data:

(A) is not original

(B) Unorganised and raw data

(C) is not a first had information

(D) Collected by records

52. The measure of partition value:

(A) Variance

(B) Standard deviation

(C) Standard error

(D) Quartile

53. For a given data Standard deviation is 20, If 3 is added to each observation, what is the new variance of the resulting data:

(A) 20

(B) 23

(C) 17

(D) 60

54. Select the false statement:

(A) Standard deviation is represented by sigma (σ)

(B) Only in symmetrical distribution, semi-interquartile range is one-fourth of the range

(C) Standard deviation is most widely used measure of variation

(D) Coefficient of correlation is always positive

55. Which of the following measures is most affected by extreme values?

(A) Quartile deviation

(B) Standard deviation

(C) Mean deviation

(D) Range

56. Range includes:

(A) 50% of the data

(B) 75% of the data

(C) 100% of the data

(D) All of them

57. Select the correct statement:

(A) Calculation of standard deviation does not involves mean

(B) Standard deviation is not a measurement of dispersion

(C) Standard deviation is based on all the observations

(D) All statements are correct

58. What is the mean deviation of the data: 15, 17, 19, 25, 30, 35, 48?

(A) 8.89

(B) 9.14

(C) 7.14

(D) 10.1

59. What is the quartile deviation from the data 8, 12, 13, 9, 11, 17, 23, 25, 20, 21, 27?

(A) 11

(B) 12

(C) 13

(D) 9

60. If the value of first quartile is 27 and third quartile is 49, then interquartile range is:

(A) 23

(B) 22

(C) 24

(D) 21

61. What is the Range of the data 2,9,12, 3, 21,12,13,14, 9, 19, 21, 14, 16, 29, 16, 11?

(A) 27

(B) 9

(C) 29

(D) None of them

62. The sum of all the squared deviations is divided by the total number of observations is:

(A) Sample variance

(B) Population variance

(C) Mean deviation

(D) Sample deviation

63. First quartile is also known as:

(A) Lower quartile

(B) Upper quartile

(C) Median

(D) Geometric mean

64. Chi-square test is:

(A) Test of significance of overall deviation square

(B) Variance ratio test

(C) Used to test the significance of difference between two means

(D) All of these

65. In statistics, a population consists of:

(A) All people living in a country

(B) All people living in the area under study

(C) All subjects or objects whose characteristics are being studied

(D) None of the above

66. Select the false statement:

(A) μ represents population mean

(B) The limits of correlation coefficient extends between zero to one

(C) Mode is most frequently occurring value in a data set

(D) Pie diagram is a two dimensional diagram

67. Zero correlation is seen:

(A) When two variables are completely dependent

(B) When two variables are partially dependent

(C) When two variables are negatively correlated

(D) When two variables are completely independent

68. Which of these is a parametric test?

(A) Student t-test

(B) F-test

(C) Both (A) & (B)

(D) None of them

69. Select the correct statement:

(A) An arithmetic mean is a positional average

(B) All positional averages are mathematical average

(C) Geometric mean is not affected by extreme values

(D) Decile divides the series into four equal parts

70. If an observation in a series is zero, its Geometric Mean will be:

(A) Positive

(B) Negative

(C) Zero

(D) Indeterminant

71. Select the incorrect statement:

(A) Mean = Sum of values ($\sum X$) divided by number of values

(B) Mean is affected by extreme values

(C) Mean is most common measure of central tendency

(D) Mean does not represent centre of a set of values

72. Which is incorrect statement for median?

(A) Median is the middle value of ranked data

(B) Median is not affected by extreme values

(C) Median is a not appositional average

(D) It cannot be subjected to algebraic treatment

73. The most stable measure of central tendency is:

(A) Mode

(B) Mean

(C) Median

(D) Harmonic Mean

74. If in a discrete series 75% values are greater than 15, then Q3 is:

(A) 45

(B) 25

(C) 60

(D) 30

75. Percentage frequency distribution is represented by:

(A) Frequency polygon

(B) Ogive

(C) Pie diagram

(D) Frequency table

76. Multiple bar diagram is used to represent:

(A) Differential frequencies of a variable

(B) Frequency distribution of more than one variable

(C) Continuous quantitative data

(D) Frequency of two or more characters

77. Continuous variables are represented by:

(A) Histogram

(B) Line diagram

(C) Bar diagram

(D) Pie chart

78. The frequency obtained by dividing the frequency of each class by the total number of observations is called:

(A) Relative frequency

(B) Percentage frequency

(C) Cumulative frequency

(D) Cumulative relative frequency

79. All of the following attributes are examples of nominal scale except:

(A) Marital Status

(B) Flower colour

(C) Blood pressure

(D) Religion

80. Which of the following is the discrete variable?

(A) Temperature

(B) Male Child

(C) Length

(D) All of them

81. Sample size depends on the:

(A) Type of problem investigated

(B) Resources available

(C) Required precision

(D) All of these

82. Select the correct statement for qualitative data:

(A) Is discrete and non-numerical

(B) Belongs to separate descriptive categories that are mutually exclusive

(C) Has only one variable i.e., frequency

(D) All are correct

83. The main source for the collection of biological data are:

(A) Experiments

(B) Surveys

(C) Records

(D) All of them

84. When constructing a frequency distribution table for a large data set it is wise to use:

(A) 5 to 20 classes

(B) 5 to 15 classes

(C) 5 to 10 classes

(D) More than 20 classes

85. The number of occurrence of a data value is called:

(A) The frequency

(B) Cumulative Frequency

(C) Relative frequency

(D) None of them

86. What is the primary purpose of ANOVA?

(A) Comparing means across three or more groups

(B) Comparing medians across three or more groups

(C) Examining the relationship between two categorical variables

(D) Identifying normally distributed data

87. Which is positional central tendency?

(A) Mean

(B) Median

(C) Mode

(D) All of them

88. Find the number of permutations if n = 12 and r = 2:

(A) 132

(B) 66

(C) 142

(D) 69

89. A normal distribution curve is based mainly on:

(A) Mean and sample size

(B) Mean and standard deviation

(C) Range and sample size

(D) Range and standard deviation

90. Which of the following can have more than one value?

(A) The mean

(B) The range

(C) The mode

(D) The median

91. In study carried out in the hospital ward, every 10th admitted patient was included in the sample, which sampling procedure is this?

(A) Random

(B) Stratified

(C) Convenient

(D) Systematic

92. Cumulative frequency curve also known as:

(A) Histogram

(B) Frequency polygon

(C) Ogive

(D) Grouped frequency

93. The median of the data 1, 2 ,4 ,6 ,8 ,10 ,11 ,13:

(A) 8

(B) 6

(C) 7

(D) 10

94. The application of statistical method to biology is called:

(A) Statistics in biology

(B) Biostatistics

(C) Statistics in vivo

(D) All of them

95. The branch of science that deals with testing of hypothesis, making predictions using data collected is called:

(A) Descriptive Statistics

(B) Inferential Statistics

(C) Comparative Statistics

(D) All of them

96. Height of students in a class is:

(A) Quantitative Variable

(B) Qualitative variable

(C) Discrete Variable

(D) Secondary data

97. The characteristics that vary from one individual to other is called:

(A) Data

(B) Variable

(C) Sample

(D) Item

98. Statistics is the science provides the investigator with:

(A) The results of chance

(B) The result of coordinated experiment

(C) Both (A) & (B)

(D) None of them

99. In Biostatistics group of individuals taken for study is called:

(A) Population

(B) Unit

(C) Variable

(D) All of these

100. Which of these is incorrect about SPSS:

(A) It is statistical software

(B) Operating system Windows, LINUX, macOS

(C) Developed for data management

(D) Size is smaller than 1 GB

******

Rough Work / रफ कार्य

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1. Examinee should enter his / her roll number, subject and Question Booklet Series correctly in the O.M.R. sheet, the examinee will be responsible for the error he / she has made.
2. **This Question Booklet contains 100 questions, out of which only 75 Question are to be Answered by the examinee. Every question has 4 options and only one of them is correct. The answer which seems correct to you, darken that option number in your Answer Booklet (O.M.R ANSWER SHEET) completely with black or blue ball point pen. If any examinee will mark more than one answer of a particular question, then the first most option will be considered valid.**
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