Roll. No. .....

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

| Question Booklet Number |
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# B.Sc. (PART-II) EXAMINATION, 2021
# BIOTECHNOLOGY (OLD COURSE)
## [ PAPER : Second (BBT-202) ]
## ( Biomathematics, Biostatics, Computer and Bioinformatics )

| Paper ID | | |
|---|---|---|
| 5 | 0 | 4 |

| Question Booklet Series |
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**Time : 1 : 30 Hours** **Max. Marks : 150**

**Instructions to the Examinee :**

1. Do not open this Booklet untill you are told to do so.

2. Candidates should fill their roll number, subject and series of question booklet details correctly, otherwise, in case of any discrepancy in the evaluation, it will be the responsibility of the examinee himself.

3. There are 100 questions in the booklet. Examinee is required to answer only 75 questions in the OMR Answer Sheet provided. Four alternative answer to each question are given below the question, out of these four only one answer is correct. The answer which you think is correct or most appropriate, completely fill in the circle containing its letter in your answer sheet (O.M.R. Answer Sheet) with black or blue ball point pen.

**परीक्षार्थियों के लिए निर्देश :**

1. जब तक कहा न जाये, इस प्रश्नपुस्तिका को न खोलें।

2. परीक्षार्थी अपने अनुक्रमांक, विषय एवं प्रश्नपुस्तिका की सिरीज का विवरण यथास्थान सही-सही भरें, अन्यथा मूल्यांकन में किसी भी प्रकार की विसंगति की दशा में उसकी जिम्मेदारी स्वयं परीक्षार्थी की होगी।

3. प्रश्न-पुस्तिका में 100 प्रश्न हैं। परीक्षार्थी को केवल 75 प्रश्नों का उत्तर दी गई OMR उत्तर-पत्रक में देना 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 बॉल प्वाइंट पेन से पूरा भर दें।

*(Remaining instructions on last page)* *(शेष निर्देश अन्तिम पृष्ठ पर)*

# ROUGH WORK

1. When data is arranged, middle value in set of observation is :

(A) Mean

(B) Variance

(C) Median

(D) Standard deviation

2. If arithmetic mean is multiplied to coefficient of variation, then resulting value is classified as :

(A) Coefficient of deviation

(B) Coefficient of mean

(C) Standard deviation

(D) Variance

3. Variables whose measurement is done in term such as weight, height and length are classified as :

(A) Continuous variables

(B) Measuring variables

(C) Flow chart variables

(D) Discrete variables

4. In statistics, distance or dispersion from central value is classified as :

(A) Standard variance

(B) Sample variance

(C) Standard root

(D) Standard deviation

5. If $a\,x^2 + bx + c = 0$ has equal root, then $c =$

(A) $\frac{-b}{2a}$

(B) $\frac{b}{2a}$

(C) $\frac{-b^2}{4a}$

(D) $\frac{b^2}{4a}$

6. If $x = 1$ is a common root of $ax^2 + ax + 2 = 0$ and $x^2 + x + b = 1$, then $ab =$

(A) 1

(B) 2

(C) 3

(D) 4

7. In regression analysis, the variable that is being predicted is the :

(A) dependent variable

(B) independent variable

(C) intervening variable

(D) none of the above

8. The brain of any computer is :

(A) ALU

(B) CPU

(C) Control unit

(D) Mouse

9. ALU stands for :

(A) Arithmetic Logic Unit

(B) Application Logic Unit

(C) Array Logic Unit

(D) All Logic Unit

10. Which of the following computer generation used the concept of artificial intelligence ?

(A) First Generation

(B) Second Generation

(C) Third Generation

(D) Fourth Generation

11. Which of the following is valid storage type ?

(A) CPU

(B) Keyboard

(C) Pen Drive

(D) Track Ball

12. The section of the CPU that is responsible for performing mathematical operation is :

(A) Memory

(B) Register unit

(C) Control unit

(D) ALU

13. Any storage device added to computer beyond the immediately usable main storage is known as :

(A) Floppy disk

(B) Hard disk

(C) Backing disk

(D) Punched card

14. Which of the following is an example of homology and similarity tool ?

(A) BLAST

(B) RasMol

(C) EMBOSS

(D) PROSPECT

15. How many sets of null hypothesis are with the two-way ANOVA ?

(A) 1

(B) 2

(C) 3

(D) N-sets

16. T-test sample has 7 pair of samples. The distribution should contain :

(A) 16 degrees of freedom

(B) 5 degrees of freedom

(C) 6 degrees of freedom

(D) 8 degrees of freedom

17. P- value less than 0.05 means :

(A) Reject the null hypothesis and accept the alternative hypothesis

(B) Accept null hypothesis and reject the alternative hypothesis

(C) It is not statistically significant

(D) Reject both hypotheses

18. P- value higher than 0.05 means :

(A) Statistically significant

(B) Retain null hypothesis

(C) Accept alternative hypothesis

(D) Reject null hypothesis

19. The shape of the normal curve depend upon the value of :

(A) Mean deviation

(B) Quartile deviation

(C) Standard deviation

(D) Q 1

20. The coefficient of skewness of a normal distribution is :

(A) Positive

(B) Negative

(C) Zero

(D) Three

21. Testing the significance of the association between two attributes is called :

(A) Z- Test

(B) ANOVA

(C) Chi-square test

(D) Kruskal Wallis Test

22. The chi-square goodness of fit test can be used to test for :

(A) Significance of sample statistics

(B) Difference between population means

(C) Normality

(D) Probability

23. Smaller P-values indicate more evidence in support of :

(A) Null hypothesis

(B) Alternative hypothesis

(C) Quality of the Researcher

(D) Further testing

24. The chi-square test can be too sensitive if the sample is :

(A) very small

(B) very large

(C) homogeneous

(D) predictable

25. Runs scored by batsman in 5 one day matches are 50, 70 82, 93 and 20. The standard deviation is :

(A) 25.79

(B) 40.39

(C) 45.12

(D) 5.12

26. Mode and median of data set :

15,11,9,5,18,4,15,13,17

(A) Mode 6, median 13

(B) Mode 19, median 16

(C) Mode 18, median 13

(D) Mode 12, median 6

27. The random variables x and y have variances 0.2 and 0.5 respectively. Let z = 5 x -2y. The variance of z is :

(A) 3

(B) 4

(C) 5

(D) 7

28. Increasing the sample size has the following effect upon sampling error :

(A) It increases the sampling error

(B) It reduces the sampling error

(C) It has no effect on sampling error

(D) All of the above

29. Sample is regarded as a subset of :

(A) data

(B) set

(C) distribution

(D) population

30. Any numerical value computed from the population is called :

(A) Bias

(B) Sampling error

(C) Statistic

(D) Parameter

31. Which of the following is not dependent upon the restrictive normality assumption of the population ?

(A) Statistical tests

(B) Mathematical tests

(C) Non-Parametric tests

(D) Parametric tests

32. Which of the following test is used to compare the mean of two independent population ?

(A) $X^2$ test

(B) ANOVA

(C) t- test

(D) z- test

33. The set of points where the function f given by $f(x)=[2x-1]\sin x$ differentiable is :

(A) R

(B) R = [12]

(C) $(0,\infty)$

(D) None of these

34. The function $f(x)=x^2$, for all real x, is :

(A) Neither decreasing nor increasing

(B) Increasing

(C) Decreasing

(D) None of these

35. The radius of a circle is increasing at the rate of 0.4 cm/s. The rate of increasing of its circumference is :

(A) $0.4\,\pi\ cm/s$

(B) $0.8\,\pi\ cm/s$

(C) $0.6\,\pi\ cm/s$

(D) None of these

36. Three dice are thrown simultaneously the probability that sum being 3 is :

(A) $1$

(B) $\frac{1}{216}$

(C) $\frac{2}{216}$

(D) $\frac{3}{216}$

37. An integer is chosen from 1 to 20. The probability that the number is divisible by 4 is :

(A) $\frac{1}{4}$

(B) $\frac{1}{3}$

(C) $\frac{1}{2}$

(D) $\frac{1}{10}$

38. If P (A) = 0.5, P(B) = 0.3 and the events A and B are independent then, $P(A\cap B)$ is :

(A) 0.8

(B) 0.15

(C) 0.08

(D) 0.015

39. A P-value is considered "convincing" if it is :

(A) less than 0.01

(B) between 0.01 and 0.05

(C) 0.05 and 0.10

(D) greater than 0.10

40. Typically one-way ANOVA is used in which of the following situation ?

(A) There are several distinct population

(B) Two sample population over 4000

(C) Randomly selected population

(D) Three sample population over 4000

41. Standard error of mean is :

(A) Directly proportional to sample size

(B) No relation to sample size

(C) Inversely proportional to the sample size

(D) Zero when sample size is very small

42. Less sampling errors and small value of the standard error of the mean when :

(A) Larger the sample

(B) Smaller the sample

(C) Very small the sample

(D) Variable sample

43. Sample to be truly representative of the population, it must be :

(A) Fixed

(B) Specific

(C) Casual

(D) Random

44. Summary measure that describes any given characteristic of the population is known as :

(A) Parameter

(B) Information

(C) Inference

(D) Statistics

45. The difference between statistic and the parameter is called :

(A) Probability

(B) Sampling error

(C) Random

(D) Non-Random

46. Which of the following statement is true ?

(A) Standard error is always one

(B) Standard error is always zero

(C) Standard error is always negative

(D) Standard error is always positive

47. A plan for obtaining a sample from a population is called :

(A) Population design

(B) Sampling design

(C) Sampling frame

(D) Sampling distribution

48. Which of the following is not characteristic of the mean ?

(A) It is affected by extreme scores

(B) It minimizes the sum of squared deviation

(C) The sum of deviation about the mean is zero

(D) It is best used to ordinal data

49. Which of the following is an absolute measure of dispersion ?

(A) Coefficient of variation

(B) Coefficient of dispersion

(C) Standard deviation

(D) Coefficient of skewness

50. If $n(A \times B) = 6 \; and \; A = \{1, 3\}$ ,then n(B) is :

(A) 1

(B) 2

(C) 3

(D) 6

51. The value of $\sqrt{(-144)}$ is :

(A) 12 i

(B) -12 i

(C) $\pm$ 12 i

(D) None of these

52. The modulus of 5 + 4 i is :

(A) $41$

(B) $-41$

(C) $\sqrt{41}$

(D) $-\sqrt{41}$

53. The quadratic equation has degree :

(A) 1

(B) 2

(C) 3

(D) 4

54. The cubic equation has degree :

(A) 1

(B) 2

(C) 3

(D) 4

55. If A is square matrix, then A-A' is :

(A) Diagonal matrix

(B) Skew- symmetric matrix

(C) Symmetric matrix

(D) None of these

56. If A is an m x n matrix such that AB and BA are both defined, then B is a :

(A) m x n matrix

(B) n x m matrix

(C) n x n matrix

(D) m x m matrix

57. If 'A' is any square matrix, then which of the following is skew-symmetric ?

(A) $A + A^T$

(B) $A - A^T$

(C) $AA^T$

(D) $A^T A$

58. What is the mean of the following set of data :

1,3,5,7,9

(A) 10

(B) 4

(C) 5

(D) 8

59. Which measure of central tendency takes into account the magnitude of scores ?

(A) Median

(B) Range

(C) Mode

(D) Mean

60. A measure of central tendency, given as the value above which half of the values fall and bellow which half of the values fall is called :

(A) Maxima

(B) Mode

(C) Median

(D) Mean

61. What is the median of the following set of scores :

19,5,12,10,14

(A) 10

(B) 14

(C) 19

(D) 12

62. The value which is obtained by multiplying the possible value of random variable with the probability of occurrence and is equal to weighted average is called :

(A) Discrete value

(B) Weighted value

(C) Expected value

(D) Cumulative value

63. The selling price of product is subtracted from purchasing price of product to calculate :

(A) Profit of product

(B) Loss of product

(C) Cumulative average

(D) Weighted average

64. The number of units multiply per unit multiply probability to calculate :

(A) Discrete profit

(B) Expected profit

(C) Weighted profit

(D) Continuous profit

65. If the calculated value of total sum of squares in sample variance is larger, then the variation in data is :

(A) Smaller

(B) Greater

(C) Zero

(D) Negative

66. What z-value is associated with a 95% confidence interval ?

(A) 1.28

(B) 1.65

(C) 1.96

(D) 2.58

67. Statement made about a population for testing purpose is called :

(A) Statistic

(B) Hypothesis

(C) Level of significance

(D) Test-statistic

68. It the assumed hypothesis is tested for rejection considering it to be true is called :

(A) Null hypothesis

(B) Statistical hypothesis

(C) Simple hypothesis

(D) Composite hypothesis

69. If the null hypothesis is false, then which of the following is accepted ?

(A) Null hypothesis

(B) Positive hypothesis

(C) Negative hypothesis

(D) Alternative hypothesis

70. Chi-square is used to analyse :

(A) Scores

(B) Ranks

(C) Frequencies

(D) None of the above

71. Which of the following does the critical value for chi-square statistic rely ?

(A) The degree of freedom

(B) The sum of the frequencies

(C) The row totals

(D) The number of variables

72. Which of the following distribution is continuous ?

(A) Binomial distribution

(B) Hypergeometric distribution

(C) F- distribution

(D) Poisson distribution

73. Variance of sample data sets :

12,15,18,16,14

(A) 5

(B) 20

(C) 4

(D) 6

74. Which of the following scientists created the first bioinformatics database ?

(A) Dayhoff

(B) Pearson

(C) Richard Durbin

(D) Michael.J. Dunn

75. The human genome contains approximately :

(A) 6 billion base pairs

(B) 5 billion base pairs

(C) 3 billion base pairs

(D) 4 billion base pairs

76. Which of the following tool is used for the identification of motif ?

(A) BLAST

(B) COPLA

(C) PROSPECT

(D) Pattern hunter

77. What is the deposition of cDNA into the inert structure called ?

(A) DNA Probes

(B) DNA Polymerase

(C) DNA micro arrays

(D) DNA fingerprinting

78. Proteomics refers to the study of :

(A) Set of Proteins in specific region of cell

(B) Biomolecules

(C) Set of proteins

(D) The entire set of expressed protein in the cell

79. If the value of two variables move in same direction, the correlation is said to be :

(A) Negative

(B) Positive

(C) Perfect Positive

(D) No correlation

80. When one regression coefficient is negative, the other would be :

(A) Negative

(B) Positive

(C) Zero

(D) None of them

81. The coefficient of correlation describes :

(A) The magnitude and direction

(B) Only magnitude

(C) Only direction

(D) No magnitude and No direction

82. A process by which we estimate the value of dependent variable on the basis of one or more independent variable is called :

(A) Correlation

(B) Residual

(C) Regression

(D) Slope

83. In two-way ANOVA the population from which the sample were obtained must be approximately :

(A) Positive skewed

(B) Negative skewed

(C) Normally distributed

(D) All of these

84. The standard deviation of first 50 natural number is :

(A) 45.43

(B) 14.43

(C) 20.43

(D) 16.43

85. The standard deviation of population is denoted by :

(A) $\Omega$

(B) $\omega$

(C) $\sigma$

(D) $\Sigma$

86. The price of cylinder for three days as 98,96,97,100 then the value of standard deviation with the assumed mean method is :

(A) 15

(B) 10

(C) 1

(D) 11

87. If the values of skewness and arithmetic mean is given as 4 and 17 respectively, then mode of the value is :

(A) 68

(B) 4.25

(C) 21

(D) 13

88. If the median is 12, mean is 15 and the standard deviation of data is 3, then Karl Pearson's coefficient of skewness is :

(A) 17

(B) 27

(C) 15

(D) 3

89. If all the value moves towards one tail of a distribution, then this scenario results in :

(A) Width of distribution

(B) Height of distribution

(C) Lengthening the tail

(D) Shortening the tail

90. The minimum value in the class limit is called :

(A) Primary limit

(B) Upper limit

(C) Lower limit

(D) Secondary limit

91. The total of frequency up to an upper class limit or boundary is known as :

(A) Average frequency

(B) Cumulative frequency

(C) Frequency distribution

(D) Frequency polygon

92. The data presented in the form of frequency data is known as :

(A) Grouped data

(B) Ungrouped data

(C) Secondary data

(D) Calculated data

93. The relation between the three measures : Mean < Median < Mode

(A) Distribution skewed to left

(B) Distribution skewed to right

(C) Symmetrical distribution

(D) None of the above

94. What is relationship between three measures, when distribution is symmetrical ?

(A) Mean < Median < Mode

(B) Mode < Median < Mean

(C) Mean = Median = Mode

(D) Median < Mean < Mode

95. Which is calculated by considering most frequent occurring value as central value ?

(A) Central mode

(B) Mode

(C) Frequent Value

(D) Percent Value

96. For a positively skewed distributions, mean is always :

(A) less than median

(B) less than mode

(C) greater than mode

(D) equal to mode

97. In case of positively skewed distribution, the extreme value lie in the :

(A) Middle

(B) Left tail

(C) Right tail

(D) Anywhere

98. The degree of peakedness or flatness of a unimodal distribution is called :

(A) Skewness

(B) Symmetry

(C) Dispersion

(D) Kurtosis

99. A distribution is skewed if mean, median and mode are :

(A) Equal

(B) Not equal

(C) Symmetric

(D) None of the above

100. If all the scores on examination cluster around the mean, the dispersion is said to :

(A) Small

(B) Large

(C) Normal

(D) Symmetrical

# ROUGH WORK

**Example :**

**Question :**

Q.1 Ⓐ ● Ⓒ Ⓓ
Q.2 Ⓐ Ⓑ ● Ⓓ
Q.3 Ⓐ ● Ⓒ Ⓓ

If more than 75 questions are attempted by candidate, then the first attempted 75 questions will be considered for evaluation.

4. Each question carries equal marks. Marks will be awarded according to the number of correct answers you have.
5. All answers are to be given on OMR Answer Sheet only. Answers given anywhere other than the place specified in the answer sheet will not be considered valid.
6. Before writing anything on the OMR Answer Sheet, all the instructions given in it should be read carefully.
7. After the completion of the examination, candidates should leave the examination hall only after providing their question booklet and OMR Answer Sheet separately to the invigilator.
8. There will be no negative marking.
9. Rough work, if any, should be done on the blank pages provided for the purpose in the booklet.
10. To bring and use of log-book, calculator, pager & cellular phone in examination hall is prohibited.
11. In case of any difference found in English and Hindi version of the question, the English version of the question will be held authentic.

**Impt. On opening the question booklet, first check that all the pages of the question booklet are printed properly. If there is any discrepancy in the question Booklet, then after showing it to the invigilator, get another question Booklet of the same series.**

**उदाहरण :**

**प्रश्न :**

प्रश्न 1 Ⓐ ● Ⓒ Ⓓ
प्रश्न 2 Ⓐ Ⓑ ● Ⓓ
प्रश्न 3 Ⓐ ● Ⓒ Ⓓ

यदि परीक्षार्थी द्वारा 75 से अधिक प्रश्नों को हल किया जाता है तो प्रारम्भिक हल किये हुए 75 उत्तरों को ही मूल्यांकन हेतु सम्मिलित किया जाएगा।

4. प्रत्येक प्रश्न के अंक समान हैं। आपके जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।
5. सभी उत्तर केवल ओ०एम०आर० उत्तर-पत्रक (OMR Answer Sheet) पर ही दिये जाने हैं। उत्तर-पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।
6. ओ०एम०आर० उत्तर-पत्रक (OMR Answer Sheet) पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाये।
7. 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।
8. निगेटिव मार्किंग नहीं है।
9. कोई भी रफ कार्य, प्रश्न-पुस्तिका में, रफ-कार्य के लिए दिए खाली पेज पर ही किया जाना चाहिए।
10. परीक्षा-कक्ष में लॉग-बुक, कैल्कुलेटर, पेजर तथा सेल्युलर फोन ले जाना तथा उसका उपयोग करना वर्जित है।
11. प्रश्न के हिन्दी एवं अंग्रेजी रूपान्तरण में भिन्नता होने की दशा में प्रश्न का अंग्रेजी रूपान्तरण ही मान्य होगा।

**महत्वपूर्णः प्रश्नपुस्तिका खोलने पर प्रथमतः जाँच कर देख लें कि प्रश्नपुस्तिका के सभी पृष्ठ भलीभाँति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कक्षनिरीक्षक को दिखाकर उसी सिरीज की दूसरी प्रश्नपुस्तिका प्राप्त कर लें।**