Roll. No. .....

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

Question Booklet Number

B.Sc. (PART-II) EXAMINATION, 2021
BIOTECHNOLOGY (NEW COURSE)
[PAPER : Second (BBT-202)]
(Biomathematics & Biostatics)

Paper ID		
5	0	3

Question Booklet Series

A

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. A matrix having m rows and n columns with $m \neq n$ is said to be a :

(A) Square matrix

(B) Rectangular matrix

(C) Identity matrix

(D) Scalar matrix

2. Select incorrect statement for complex number :

(A) Consist of both real and unreal numbers

(B) Complex number is expressed in the form $a + bi$

(C) Complex number is not consisted of real number

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

3. The Quadratic equation has degree :

(A) 0

(B) 1

(C) 2

(D) 3

4. A matrix [a, b, c] is called as :

(A) Zero matrix

(B) Diagonal matrix

(C) Column matrix

(D) Row matrix

5. The sum of the squares of two consecutive natural numbers is 313. The numbers are :

(A) 12, 13

(B) 14, 15

(C) 11, 12

(D) 13, 14

6. Which of the following is not a Quadratic equation ?

(A) $x^2 + 3x - 5 = 0$

(B) $x^2 + x^3 + 2 = 0$

(C) $x^2 - 9 = 0$

(D) $5 + x + x^2 = 0$

7. The differential coefficient of a constant is :

(A) 1

(B) 2

(C) 3

(D) 0

8. Which of the following is not correct ?

(A) Range = H − L

(B) Mean = $\frac{\sum x}{n}$

(C) $\int 1dx = x + c$

(D) None is correct

9. Boolean algebra can be used :

(A) For designing of the digital computers

(B) In building logic symbols

(C) For probability calculation

(D) All of the above

10. What are the canonical forms of Boolean Expressions ?

(A) OR and XOR

(B) NOR and XNOR

(C) MAX and MIN

(D) SOM and POM

11. Evaluate : $\lim_{x \to 1} \frac{x^2 - 1}{x^2 + 3x - 4}$

(A) 1/5

(B) 2/5

(C) 3/5

(D) 4/5

12. The polynomial equation $x(x+1) + 8 = (x + 2)(x - 2)$ is :

(A) Linear equation

(B) Quadratic equation

(C) Cubic equation

(D) Differential equation

13. Find the roots of the quadratic equation $x^2 + 2x - 15 = 0$?

(A) $-3, 5$

(B) 5, 2

(C) $-2, 5$

(D) $-5, 3$

14. If $P^2x^2 - q^2 = 0$, then x = ?

(A) $\pm q/p$ (B) $\pm p/q$

(C) p (D) q

15. Which of the following is not correct ?

(A) $\frac{d(x^2)^n}{dy} = 2x$

(B) $\frac{d(c)}{dx} = 0$

(C) $\frac{d}{dx}(x^n) = nx^{n-1}$

(D) $\frac{d}{dx}(x) = 1$

16. If $y = u^n$, where n is a real number and u is a function of x, then $\frac{dy}{dx}$ = ?

(A) $n\, u^{n-1}$

(B) $n\, x^{n-1}$

(C) $n\, u^{n-1} \cdot \frac{du}{dx}$

(D) None of the above

17. Find $\int \frac{2x}{1+x^2}\,dx$ = ?

(A) $2xdx$

(B) $\log|1+x^2|+c$

(C) $1+x^2\,dx$

(D) $\log|1+2x|+c$

18. Differentiate $Y = (2x-1)^5$ and choose the correct answer :

(A) $(2x-1)^4$

(B) $5(2x-1)$

(C) $5(2x-1)^3$

(D) $10(2x-1)^4$

19. If $y = \sin x$, then $\frac{d}{dx}(\sin x) = ?$

(A) $-\sin x$ (B) $-\cos x$

(C) $\cos x$ (D) $\sin^2 x$

20. Integrate $\sqrt{(3x-4)^3}$ with respect to x and choose the correct answer :

(A) $\frac{2}{15}(3x-4)^{5/2}+c$

(B) $15(3x-4)^{3/2}+c$

(C) $\frac{2}{15}(3x-4)^3+c$

(D) $\frac{2}{15}(3x-4)^2+c$

21. Among these, which sampling is based on equal chance ?

(A) Simple random sampling

(B) Sratified random sampling

(C) Systematic sampling

(D) Cluster sampling

22. The arrangement of data in rows and columns is known as :

(A) Frequecy distribution

(B) Classification

(C) Tabulation

(D) None of these

23. The discrete variables and continuous variables are two types of :

(A) Open end classification

(B) Time series classification

(C) Qualitative classification

(D) Quantitative classification

24. What is the class size for the following distribution :

0 – 0.25, 0.25 – 0.50, 0.50– 0.75

(A) 10

(B) 50

(C) 0.25

(D) 0.50

25. Which of the following equation of probability is not correct ?

(A) $P + q = 1$

(B) $P(E_1 \text{ or } E_2) = P(E_1) + P(E_2)$

(C) $P = 1 - q$

(D) $P(A.B) = P\left(\frac{A}{B}\right) \times P\left(\frac{B}{A}\right)$

26. If the probability of a child being Rh^- is 1/10, what will be the probability of being Rh^+ in a society ?

(A) 1/10

(B) 9/10

(C) 1/2

(D) 2/10

27. The probability of the occurence of an event varies between :

(A) -1 to $+1$

(B) 0 to $+1$

(C) -1 ot 0

(D) 0 and 2

28. Product rule of probability applies to :

(A) Dependent events

(B) Independent events

(C) Both (A) and (B)

(D) None of these

29. Binomial theorem is used to determine probability of :

(A) Ordered events

(B) Unordered events

(C) Any type of events

(D) None of these

30. When a coin is thrown twice (one after the other), what would be chances of getting heads only ?

(A) 1/2

(B) 2/4

(C) 1/4

(D) 3/4

31. Select the correct statement :

(A) The value of probability never be zero

(B) Sum of all probabilities of happening and not happening of an event is always equal to 1

(C) Probability is the chance that an event will occur

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

32. The probability of a mutually exclusive event is the sum of ..... of all the events.

(A) Probabilities

(B) Occurence

(C) Variables

(D) Independent

33. What will be the value of $P_{(Not\ E)}$ if P(E) = 0.07 ?

(A) 90

(B) 0.007

(C) 1.93

(D) 93

34. What is the probability of getting at least one head if three unbiased coins are tossed ?

(A) 7/8 (B) 1/8

(C) 1/2 (D) 7/9

35. The events that can not occur simultaneously are called as :

(A) Exhaustive events

(B) Mutually exclusive events

(C) Equally likely events

(D) Independent events

36. In a binomial distribution, successive traits are :

(A) Mutually exclusive

(B) Dependent

(C) Independent

(D) All of the above

37. The probability of selecting a bad egg is 0.035 from the lot of 400 eggs. What is the number of bad eggs in the lot ?

(A) 14 (B) 16

(C) 18 (D) 20

38. If P is the probability of an event, what is the probability of its complement ?

(A) 1 – 1/P

(B) P – 1

(C) 1 – P

(D) None of the above

39. Which of the following can be the probability of an event ?

(A) 10/7

(B) – 1.4

(C) 34/4

(D) 3/8

40. In 30 balls, a batsman hits the boundaries 6 times. What will be the probability that he did not hit the boundaries ?

(A) 1/5

(B) 3/5

(C) 4/5

(D) None of the above

41. A distribution is skewed if Mean, Median and Mode are :

(A) Equal

(B) Unequal

(C) Both (A) and (B)

(D) Symmetric

42. The mean of 40 observations was 160. It was detected on re-checking that value 165 was wrongly copied as 125. Find the correct Mean ?

(A) 4 (B) 151

(C) 650 (D) 161

43. In case of symmetrical distribution Mean, Median Mode are :

(A) Not equal

(B) Identical

(C) Skewed to right

(D) None of the above

44. Percentile divides the series into :

(A) Two equal parts

(B) Ten equal parts

(C) Hundred equal parts

(D) None of the above

45. Which of the following divides data into four equla parts ?

(A) Median

(B) Quartiles

(C) Range

(D) Standard error

46. The median is :

(A) Affected by extreme scores

(B) The highest number

(C) First number

(D) The middle point

47. Of the following sampling methods which is a probability methods ?

(A) Judgement

(B) Quota

(C) Simple random

(D) Convenience

48. Increasing the sample size has following effect on the sampling error :

(A) It reduces the sampling errors

(B) It increases the sampling errors

(C) No effect on sampling errors

(D) All of the above

49. The mean of 10 numbers is 58. If one of the numbers is 40, what is the mean of the other nine ?

(A) 540

(B) 60

(C) 40

(D) 180

50. A measure of central tendency, in which half of the values falls above and half below of the middle value is called :

(A) Mode

(B) Median

(C) Average

(D) Range

51. The number of occurence of a data value is called :

(A) Mean

(B) Range

(C) Frequency

(D) Relative Frequency

52. What is the Range of given data :

21, 22, 6, 4, 2, 35, 10

(A) 11

(B) 33

(C) 35

(D) 2

53. Calculate the Mean of the data given below :

20, 10, 30, 20, 20

(A) 10

(B) 20

(C) 30

(D) 50

54. Which of the following is not the application of derivative ?

(A) Rate of change of a quantity

(B) Minimum and Maximum value

(C) In calculation of Mode

(D) Tangent and Normal to a curve

55. Qualitative data presentation methods are :

(A) Pie chart

(B) Pictogram

(C) Bar diagram

(D) All of the above

56. Which of the following is not the part of 'Tabulation' ?

(A) Table Number

(B) Table Title

(C) Footnote

(D) Histogram

57. Objective of Tabulation are :

(A) To simplify the complex data in a systematic form

(B) For easy comparison

(C) Both (A) and (B)

(D) None of the above

58. A correlation coefficient of 1 indicates :

(A) No correlation

(B) A perpect correlation

(C) Very small correlation

(D) None of these

59. Which of the following is incorrect for Quartiles?

(A) Data arranged in ascending or descending order

(B) It is represented by Q

(C) Third quartile is 75th percentile of observation

(D) All are incorrect

60. What is 1st Quartile of series :

10, 12, 13, 15, 17, 19, 21, 27

(A) 12

(B) 13

(C) 15

(D) 17

61. What is skewness ?

(A) Degree of distortion from the formal distribution

(B) Symmetrical bell curve

(C) Tail of a distribution

(D) It is a measure of outliers

62. Biostatistics is the application of statistical methods to :

(A) Population and applied genetics

(B) In molecular biology

(C) Agriculture and Forestry

(D) All of these

63. Which of the following is correct for statistical data ?

(A) Set of facts expressed in qualitative and quantitative form

(B) Data can be classified into primary or secondary data

(C) It may qualitative

(D) All are correct

64. Mode is :

(A) Most frequent value

(B) Least frequent value

(C) Middle value

(D) None of these

65. Mode can be located graphically with the help of :

(A) Line diagram

(B) Bar diagram

(C) Histogram

(D) Pie diagram

66. Mean deviation can be computed from :

(A) Arithmetic mean

(B) Mode

(C) Median

(D) All of these

67. The range includes :

(A) 50% of the items

(B) 25% of the items

(C) 100% of the items

(D) None of these

68. The probability of not committing a Type II error is called :

(A) Statistical probability

(B) Power of hypothesis test

(C) Statistical inference

(D) Null hypothesis

69. Select the correct statement :

(A) Sample mean is represented by $\sqrt{\bar{x}}$

(B) At 5% significance level the critical value of $Z_{\alpha} = 2$

(C) The complement of null hypothesis is alternate hypothesis

(D) All are correct

70. Which of the following step is not included in carrying out Test of Significance ?

(A) Laying down a hypothesis

(B) Testing statistical hypothesis

(C) Fixation of level of significance

(D) Making dot plot

71. Which of the following is incorrect about null hypothesis ?

(A) No difference exists between sample mean and population mean

(B) The difference occurs between sample statistic and population parameter

(C) It is denoted by H_0

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

72. Select correct relationship between Mean, Median and Mode :

(A) Mode = 3 Median $-$ 2 Mean

(B) Median = 3 Mode $-$ 2 Mean

(C) Mode = 3 Mean $-$ 2 Median

(D) Median = 3 Mean $-$ 2 Mode

73. Calculate the median of the following data :

75, 97, 100, 120, 150, 175

(A) 100

(B) 120

(C) 115

(D) 110

74. If $\Sigma fx = 995$, $\Sigma f = 50$, then find mean :

(A) 19

(B) 0.0502

(C) 19.9

(D) None of these

75. Find the Mode of following data :

6, 11, 9, 4, 4, 6, 10, 11, 12, 14, 11, 12

(A) 4 (B) 12

(C) 6 (D) 11

76. Which of the following is not correct for Variance ?

(A) It is the average of the squared deviation from the mean for a data

(B) Sample variance = $\frac{\sum(x-\overline{x})^2}{n-1}$

(C) Population variance = $\frac{\sum(x_i-\mu)^2}{n}$

(D) All are incorrect

77. If standard deviation of a data is 0.12, find the variance :

(A) 0.144

(B) 0.0144

(C) 0.00144

(D) 144.0

78. A result is called "Statistically significant" whenever :

(A) The null hypothesis is true

(B) The alternate hypothesis is true

(C) The table P–value is less than or equal to calculated value

(D) P–value is larger than calculated value

79. Test to be applied when number of observation less than 30 and variance is known as :

(A) z – test

(B) t – test

(C) F – test

(D) Chi – Square test

80. A normal distribution in Kurtosis is named as :

(A) Lefto Kurtosis

(B) Normal Kurtosis

(C) Plety Kurtosis

(D) Meso Kurtosis

81. Interquartile range can be computed as :

(A) $Q_3 - Q_1$

(B) $Q_1 - Q_2$

(C) $Q_2 - Q_4$

(D) $Q_4 - Q_2$

82. F – distribution is also referred to as :

(A) Mean ratio distribution

(B) Standard ratio error distribution

(C) Residual term ratio distribution

(D) Variance ratio distribution

83. When we accept a false null hypothesis, it is called :

(A) Type I error

(B) Type II error

(C) Type III error

(D) Type IV error

84. ANOVA is a statistical approach for determining whether :

(A) Means of two samples are equal

(B) Means of two or more samples are equal

(C) Means of more than two samples are equal

(D) Means of two or more populations are equal

85. Following is the form of presentation of data except :

(A) Tabulation

(B) Bar diagram

(C) Caption presentation

(D) Pie diagram

86. Area diagrams are :

(A) One dimensional

(B) Two dimensional

(C) Three dimensional

(D) None of the above

87. Poisson distribution is applied for :

(A) Continuous random variable

(B) Discrete random variable

(C) Irregular random variable

(D) Uncertain random variable

88. Flower colour is :

(A) Quantitative variables

(B) Qualitative variables

(C) Absolute variables

(D) Continuous variables

89. The application of statistical method in biology is called :

(A) Statistic in biology

(B) Statistics of nature

(C) Biostatistics

(D) All of the above

90. Number of fruits in a tree is a :

(A) Quantitative variables

(B) Discrete variables

(C) Absolute variables

(D) Continuous variables

91. Which of the following is not correct for ANOVA ?

(A) All ANOVA require random sampling

(B) Testing of ANOVA requires calculation of sum of squares

(C) ANOVA does not require computation of Mean of square

(D) It was introduced by R.A. Fisher

92. Which of the following is not a test of significance ?

(A) t – Test

(B) Chi–Square Test

(C) ANOVA

(D) RT– PCR test for COVID

93. In biostatistics, group of individuals taken for study is called as :

(A) Block (B) Population

(C) Group (D) Family

94. Variables whose values can not be expressed numerically are called :

(A) Continuous variables

(B) Discrete variables

(C) Qualitative variables

(D) Finite variables

95. Chi–square test is :

(A) Used to test the significance difference between two means

(B) Give difference between parametric and non-parametric tests

(C) Test of significance of overall deviation square

(D) All of the above

96. Which of the following is not correct regarding t–test ?

(A) $t = \frac{\overline{X}_1 - \overline{X}_2}{SE_D}$

(B) $t = \frac{\overline{X}_1 + \overline{X}_2}{SE_D}$

(C) For paired t–test, df = n – 1

(D) For unpaired t – test, df = $n_1 + n_2 - 2$

97. Which test is used for testing "goodness of fit" ?

(A) Chi–square (B) t – test

(C) ANOVA (D) z – test

98. Criteria required for applying t – test is :

(A) Random samples

(B) Sample size less than 30

(C) Quantitative data

(D) All of these

99. Zero correlation is seen when :

(A) Two variables are completely dependent

(B) Two variables are partially dependent

(C) Two variables are negatively correlated

(D) To variables are completely independent

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

(A) Theta value

(B) Variance ratio

(C) Chi–square test

(D) F–Ratio

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।