Roll No. .....

Question Booklet Number

O. M. R. Serial No.

M. A./M. Sc. (Second Semester)
(NEP) EXAMINATION, 2025-26
MATHEMATICS
(Mathematical Statistics) (Elective)

Paper Code							
B	0	3	0	8	0	4	T

Questions Booklet Series
B

Time : 1:30 Hours] [*Maximum Marks : 75*

Instructions to the Examinee :

1. Do not open the booklet unless you are asked to do so.

2. The booklet contains 100 questions. Examinee is required to answer 75 questions in the OMR Answer-Sheet provided and not in the question booklet. All questions carry equal marks.

3. Examine the Booklet and the OMR Answer-Sheet very carefully before you proceed. Faulty question booklet due to missing or duplicate pages/questions or having any other discrepancy should be got immediately replaced.

परीक्षार्थियों के लिए निर्देश :

1. प्रश्न-पुस्तिका को तब तक न खोलें जब तक आपसे कहा न जाए।

2. प्रश्न-पुस्तिका में 100 प्रश्न हैं। परीक्षार्थी को 75 प्रश्नों को केवल दी गई OMR आन्सर-शीट पर ही हल करना है, प्रश्न-पुस्तिका पर नहीं। सभी प्रश्नों के अंक समान हैं।

3. प्रश्नों के उत्तर अंकित करने से पूर्व प्रश्न-पुस्तिका तथा OMR आन्सर-शीट को सावधानीपूर्वक देख लें। दोषपूर्ण प्रश्न-पुस्तिका जिसमें कुछ भाग छपने से छूट गए हों या प्रश्न एक से अधिक बार छप गए हों या उसमें किसी अन्य प्रकार की कमी हो, तो उसे तुरन्त बदल लें।

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

(Only for Rough Work)

1. The even moments about mean, of normal distribution are given by the reccurence formula :

(A) $\mu_{2n} = \sigma^2.(2n-1)\mu_{2n+2}$

(B) $\mu_{2n+2} = \sigma^2.(2n-1)\mu_{2n-2}$

(C) $\mu_{2n} = \sigma^2.(2n-1)\mu_{2n-2}$

(D) $\mu_{2n} = \sigma^2.(2n+1)\mu_{2n-2}$

2. The distribution function of rectangular distribution is given by $f(x)$ is equal to :

(A) Zero

(B) One

(C) Constant

(D) All of the above

3. The straight line fitted to the following data taking x as independent variable

x	y
0	1.0
1	1.8
2	3.3
3	4.5
4	6.3

(A) $y = 0.72 - 1.33x$

(B) $y = 0.72 + 3x$

(C) $y = 0.72 + 1.33x$

(D) $y = 0.72 - 3x$

4. Which of the following is true about correlation coefficient r ?

(A) $r = 0$ indicates variables are independent

(B) If variables are independent then $r = 0$

(C) Both (A) and (B)

(D) None of the above

5. If correlation coefficient between every pair of variables x_1, x_2, x_3 is equal to r, then the value of multiple correlation coefficient $R_{1(23)}$ is :

(A) r

(B) $r/2$

(C) $2r$

(D) None of the above

6. The region of acceptance for a large sample is :

(A) Mean ± 3 standard error

(B) Mean ± 2 standard error

(C) Mean ± standard error

(D) Not defined

7. The χ^2 distribution was discovered in 1875 by :

(A) Helmert

(B) Student

(C) Gauss

(D) Sterling

8. The coefficient of contingency for total frequency N is given by :

(A) $\sqrt{\frac{\chi^2}{\chi^2 + N}}$

(B) $\sqrt{\frac{\chi^2 + N}{\chi^2}}$

(C) $\sqrt{\frac{\chi^2}{\chi^2 - N}}$

(D) $\sqrt{\frac{\chi^2 - N}{\chi^2 + N}}$

9. If calculated value of χ^2 is less than tabulated value of χ^2, then the null hypothesis is :
(A) Accepted
(B) Rejected
(C) Alternative hypothesis is sought
(D) No result is obtained

10. The value of student's *t* for the following variable values – 4, – 2, – 2, 0, 2, 2, 3, 3 is :
(A) 0.2
(B) 0.27
(C) 0.3
(D) 0.37

11. For the data, intelligent father with intelligent son = 248, intelligent father with dull son = 81, dull fathers with intelligent son = 29, dull father with dull son = 579, the coefficient of association is :
(A) + 0.9
(B) – 0.9
(C) + 0.8
(D) – 0.8

12. Negative binomial distribution is also known as :
(A) Normal distribution
(B) Poisson distribution
(C) Pascal distribution
(D) Geometric distribution

13. The mode of χ^2 distribution for *n* degrees of freedom is :
(A) *n*
(B) *n* + 2
(C) *n* – 2
(D) 2*n*

14. The median of F-distribution is at F is equal to :
(A) 1
(B) 0
(C) –1
(D) 2

15. In analysis of variance method (two way classification) each unit undergoes :
(A) One treatment
(B) Two treatment
(C) More than two treatment
(D) Does not signify number of treatment

16. The sample mean is :
(A) Only unbaised estimator
(B) Only efficient estimator
(C) Both unbaised and efficient estimator
(D) Neither unbaised nor efficient estimator

17. The number of normal equations in the fitting of a third degree curve is :

(A) 1
(B) 2
(C) 3
(D) 4

18. The points of inflexion of the normal curve with mean m and standard deviation σ is :

(A) $m \pm \sigma$
(B) $2m \pm \sigma$
(C) $3m \pm \sigma$
(D) $4m \pm \sigma$

19. The mean of Poisson distribution is 5, its variance is :

(A) 25
(B) 625
(C) 5
(D) 0

20. If mean of Binomial distribution is 12 and $n = 48$, then its variance is :

(A) 3
(B) 2
(C) 4
(D) None of the above

21. A random variable takes values –2, 3, 1 with respective probabilities 1/3, 1/2, 1/6. Then E (X) is equal to :

(A) 0
(B) 1
(C) 3
(D) None of the above

22. If variance of variable x is k, then the variance of variable $y = 3x$ is :

(A) k
(B) $3k$
(C) $9k$
(D) $27k$

23. The mean of a frequency distribution is 5. If each variable is increased by 3, then the new mean will be :

(A) 8
(B) 5
(C) 3
(D) 0

24. Which of the following are not disadvantages of LSD ?

(A) Error variation is reduced
(B) Number of replications is necessarily equal to number of treatments
(C) Necessitates square field
(D) Sometimes becomes too large

25. For one way classification of ANOVA degrees of freedom for no of rows h and number of columns k, degrees of freedom for between classes is :

(A) $h + 1$
(B) $h - 1$
(C) $2h$
(D) $h + 2$

26. (Mean-mode) / standard deviation represents :

(A) Coefficient of correlation

(B) Coefficient of regression

(C) Coefficient of skewness

(D) Coefficient of association

27. For one way classification of ANOVA degrees of freedom for no of rows h and number of columns k, degree of freedom for within classes is :

(A) hk

(B) $hk - h$

(C) $hk + h$

(D) k

28. F-distribution is :

(A) Positively skewed

(B) Negatively skewed

(C) Unskewed

(D) None of the above

29. For order 0 how many attributes class exists :

(A) 0

(B) 1

(C) 2

(D) infinite

30. If difference of means is more than five times the standard error then :

(A) difference is due to fluctuations of sampling.

(B) difference cannot be due to fluctuations of sampling.

(C) no inference can be drawn.

(D) the two sample means can be regarded from same population.

31. Random samples of 500 and 400 have means 11.5 and 10.9. The difference of means is how many times standard error ?

(A) 1.78

(B) 1.79

(C) 1.8

(D) 1.7

32. The standard deviation for the distribution in which variable takes values 1, 2, 3 ..., n and each has frequency 1 is :

(A) $\sqrt{\frac{n^2-1}{12}}$

(B) $\sqrt{\frac{n^2+1}{12}}$

(C) $\sqrt{\frac{n^2-1}{2}}$

(D) $\sqrt{\frac{n^2-1}{3}}$

33. Sheppard's correction eliminates :

(A) the effect of frequencies concentrated at mid points of intervals

(B) likelihood of correlation error

(C) difference in estimated values

(D) None of the above

34. Four balls are drawn from a bag containing 5 black, 6 white and 7 red balls, for X being number of white balls drawn, the value of P(X = 0) is :

(A) 495/30

(B) 495/306

(C) 495/3060

(D) 0

35. For Poisson's distribution, mean = m Pearson's coefficient of skewness is :

(A) m

(B) $1/m$

(C) $1/m + 1$

(D) $1/2m$

36. For the normal distribution :

(A) Mean is greater than mode

(B) Mode is greater than median

(C) Mean is greater than median

(D) Mean = mode= median

37. In the least squares method residual is defined as :

(A) Difference between observed and expected value

(B) Sum of observed and expected value

(C) Expected value itself

(D) Observed value itself

38. The coefficient of correlation is affected by :

(A) Change of origin

(B) Change of scale

(C) Both change of origin and scale

(D) Unaffected by change of origin and scale

39. If coefficient of correlation is greater than six times probable error then :

(A) There is no correlation

(B) Correlation is significant

(C) No inference can be drawn

(D) There is error in calculation

40. If a_i and b_i represents ranks of variables x and y such that $x_i + y_i = n+1$ for all i, then value of coefficient of rank correlation is :

(A) 1

(B) –1

(C) 0

(D) Undeterminable

41. If the two regression lines coincide, then which of the following is true about value of correlation coefficient r ?

(A) $r = 0$

(B) $r = 1$

(C) $r = -1$

(D) $r = 1/2$

42. The product of two regression coefficients $b_{42.3}$ and $b_{21.3}$ is :

(A) $r_{12.3}$

(B) $r_{23.1}$

(C) $r_{13.2}$

(D) None of the above

43. The wrong decision of rejecting a null hypothesis when it is true is called :

(A) Type I error

(B) Type II error

(C) Error of estimation

(D) None of the above

44. A coin is thrown 400 times and it turns up heads 216 times. The standard error is :

(A) 7

(B) 8

(C) 9

(D) 10

45. *t*-statistic is of degree of freedom, for *n* sample values :

(A) n

(B) $n - 1$

(C) $n + 1$

(D) $2n$

46. Relation between *z*-distribution and F-distribution is :

(A) $z = 2F$

(B) $z = (1/2) \log_e F$

(C) $z \log_e F = 1$

(D) None of the above

47. If (N) = 1000, (A) = 800, (B) = 700, (AB) = 660, the value of $(\alpha\beta)$ equals :

(A) 100

(B) 160

(C) 180

(D) 220

48. Which coefficient is used to check association of attributes ?

(A) Yule's coefficient

(B) Spearman's coefficient

(C) Pearson's coefficient

(D) Bowley's coefficient

49. The expectation of the number of failures preceeding the first success in an infinite series of independent trials for constant probability of success *p* is :

(A) p

(B) $1/p$

(C) $(1/p) - 1$

(D) $p - 1$

50. The unit of coefficient of correlation is between the variables *x* and *y* is :

(A) Unit of variable *x*

(B) Unit of variable *y*

(C) No unit

(D) Unit other than the units of variables *x*, *y*

51. If x and y are two independent Poisson variates where P (X = 1) = P (X = 2) and P (Y = 2) = P (Y = 3), the variance of (X – 2Y) is :

(A) 12

(B) 13

(C) 14

(D) 15

52. Probable error is defined as k times Standard error, where value of k is :

(A) 0.6745

(B) 0.6746

(C) 0.6747

(D) 0.6748

53. Which is not an application of t-test ?

(A) Test the significance of mean of sample

(B) Test the significance of variation of sample

(C) Test the significance of sample coefficient of correlation

(D) Test the significance of sample coefficient of regression

54. The number of ultimate class frequencies for a class with n symbols corresponding to n attributes is :

(A) n

(B) $2n$

(C) 2^n

(D) $2 + n$

55. The following data was observed for hybrids of a seed in the form of frequency Flowers violet fruits pricky = 47, Flowers violet, fruit smooth =12, Flowers white, Fruits pricky = 21 and Flowers white and fruits smooth = 3. The value of coefficient of association is :

(A) 0.28

(B) – 0.38

(C) – 0.28

(D) 0.38

56. The sum of two independent Gamma Variates with para meter l and m is a Gamma variate with parameter equal to :

(A) l

(B) m

(C) $1 + m$

(D) $2m$

57. A random variable x has a mean value 3 and variance 2. The least value of $P\left[|x-3|<2\right]$ is :

(A) 1

(B) 1/3

(C) 1/2

(D) None of the above

58. For positive attribute A, which of the following is true :

(A) A.N = (A)

(B) A = 1 – α, where α is negative attribute of A

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

(D) None of (A) and (B) are true

59. For the two lines of regression, value $r = 0$ indicates which of the following :

(A) Lines do not intersect at their respective means

(B) Lines are parallel

(C) Lines are inclined at 45 degrees

(D) Lines are perpendicular

60. The mean proportion of success in a simple sample of attributes having mean m and standard deviation s for sample of n units is :

(A) m/n

(B) m

(C) n

(D) s

61. For the level of significance 0.05 which of the following is true about the confidence level in percentage ?

(A) 95

(B) 0.95

(C) 5

(D) 0.05

62. The standard deviation of a sampling distribution is also known as :

(A) Variance

(B) Standard error

(C) Level of significance

(D) Confidence limit

63. A sample of 900 days was taken and 100 of them were foggy days. The probable limits of foggy days is :

(A) 8 to 10 days

(B) 8 to 20 days

(C) 8 to 14 days

(D) 8 to 15 days

64. The range of Multiple Correlation Coefficient is :

(A) –1 to 1

(B) 0 to 1

(C) –1 to 0

(D) None of the above

65. Confidence limits are also known as :

(A) Fiducial limits

(B) Standard error

(C) Region of acceptance

(D) Region of rejection

66. Let X be a discrete random variate with values X_i, $i = 1, 2, 3, ... n$ with corresponding probabilities $p(x_i)$. Then the probability distribution $[x_i, p(x_i)]$ is known as :

(A) Uniform distribution

(B) Hypergeometric distribution

(C) Beta distribution

(D) Gamma distribution

67. The expectation of sum of two random variables is equal to :

(A) Expectation of first variable

(B) Expectation of second variable

(C) Sum of expectations of each variable

(D) Constant

68. The covariance of two independent variates is equal to :

(A) 1

(B) 0

(C) –1

(D) Can't determine

69. For $f(x)$ to be a probability distribution, which of the following is true ?

(A) $f(x)$ is greater than or equal to zero for every x

(B) $\int_{-\infty}^{\infty} f(x)\,dx = 1$

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

(D) None of (A) and (B) is true

70. Logarithm of a moment generating function is called :

(A) Cumulant generating function

(B) Probability density function

(C) Characteristic function

(D) None of the above

71. Second moment about origin of binomial distribution with probability of success p and number of trials n is :

(A) npq

(B) np

(C) nq

(D) $np + n^2 p^2$

72. The mean and variance of a binomial distribution are 4 and 4/3 respectively. The probability of 2 successes is :

(A) 20/243

(B) 19/243

(C) 19/242

(D) 0

73. If P (X = 0) = P (X = 1) = a for a Poisson distribution, then the value of a is :

(A) e

(B) $1/e$

(C) $e + 1$

(D) $e - 1$

74. The equations used to find the values of constants in the method of curve fitting are known as :

(A) Least square equations

(B) Curve fitting equations

(C) Principle equations

(D) Normal equations

75. When combined influence of two or more variates upon a variate is studied, it is :

(A) Partial correlation

(B) Multiple correlation

(C) Simple correlation

(D) Regression

76. Degrees of freedom for chi-square distribution for number of cells n and number of constraints c is given as :

(A) n
(B) c
(C) $n - c$
(D) $n + c$

77. Mean of Chi-square distribution for n degrees of freedom is :

(A) $n + 2$
(B) $n\,(n + 2)$
(C) n
(D) $n\,(n - 2)$

78. Which of the following is not a condition for applicability of chi-square distribution ?

(A) Constraints on cell frequency should be non-linear
(B) No cell frequency should be less than 5 or 10
(C) The members of the sample should be independent
(D) The total of frequency should exceed 50

79. The value of correlation coefficient for the given data is :

x	y
–3	9
–2	4
–1	1
1	1
2	4
3	9

(A) 1
(B) –1
(C) 0
(D) 0.5

80. The partial correlation coefficient $r_{80.\,3}$ is the simple correlation coefficient between the residuals :

(A) $x_{1.3}$ and $x_{2.3}$
(B) $x_{1.3}$ and $x_{2.1}$
(C) $x_{1.2}$ and $x_{2.3}$
(D) None of the above

81. For the contingency table, where $N = a + b + c + da + b\,(a + c)\,a$:

Attribute	B	β
A	a	b
α	c	d

The expected frequency for cell (1, 1) is :

(A) $(a + b)\,(a + c) / N$
(B) $(a + d)\,(b + c) / N$
(C) $a + b$
(D) $a + c$

82. The two lines of regression meet at :

(A) their respective variances
(B) their respective means
(C) their respective standard deviations
(D) None of the above

83. For Normal Distribution, which of the following is true ?

(A) All moments of odd order about origin vanish
(B) All moments of even order about origin vanish
(C) All moments about origin vanish
(D) None of the above

84. For the distribution $f(x) = 1$, for $1 \leq x \leq 2$, the value of arithmetic mean is :

(A) 1.2
(B) 1.3
(C) 1.4
(D) 1.5

85. The curve fitted to the given data using the method of least squares is affected by :

(A) Change of origin
(B) Change of scale
(C) Change of origin and scale
(D) Neither change of origin nor change of scale

86. The product of regression coefficients between two variables is always :

(A) Less than or equal to zero
(B) Less than or equal to one
(C) Equal to zero
(D) Equal to one

87. The quantity $x_{87.23}$ is called :

(A) Residual of first order
(B) Residual of second order
(C) Residual of third order
(D) Residual of zero order

88. In z-test, hypothesis is rejected if :

(A) $|z|$ is greater than one
(B) $|z|$ is greater than 2
(C) $|z|$ is greater than 3
(D) $|z| = 0$

89. Analysis of variation is applied in which of the following ?

(A) Homogeneity of observations
(B) Heterogeneity of observations
(C) Significance of population estimates
(D) Measure variability ascribed to more than two source

90. Which is not a basic principle for a good experimental design ?

(A) Local control
(B) Randomization
(C) Replication
(D) Chi square test

91. For a set of independent class frequencies, no ultimate class frequency should be negative. This condition states :

(A) Association
(B) Consistence
(C) Independence
(D) None of the above

92. The arithmetic mean of regression coefficients between two variables is always :

(A) Less than correlation coefficient
(B) More than correlation coefficient
(C) Equal to regression coefficient
(D) Equal to zero

93. The mode of Binomial distribution, for which mean is 4 and variance is 3, is :

(A) 1

(B) 2

(C) 3

(D) 4

94. The variance of number of points that will be obtained in a single throw with an ordinary die is :

(A) 35/2

(B) 35/3

(C) 35/4

(D) 35/12

95. A bag contains 9 balls numbered 1 to 9. Three balls are drawn without replacement, the expectation of the sum of number of these balls is :

(A) 12

(B) 13

(C) 14

(D) 15

96. The mathematical expectation of the sum of points on *n* number of dice is :

(A) $7n/2$

(B) $5n/2$

(C) $3n/2$

(D) $n/2$

97. The moment generating function of the sum of two independent variables is :

(A) product of their moment generating function

(B) sum of their moment generating function

(C) moment generating function of first variable

(D) moment generating function of second variable

98. Variance μ_2 is equal to which of the following ?

(A) $\mu_2' - (\mu_1')^2$

(B) $\mu_2' + (\mu_1')^2$

(C) $\mu_2' . (\mu_1')^2$

(D) $\mu_2' / (\mu_1')^2$

99. A variate assumes values 1 to *r* with respective probabilities ${}^{n}_{r}C$ where *n* is a positive integer. Mean of distribution is given by :

(A) *n*

(B) $n/2$

(C) $n/3$

(D) $2n$

100. For a distribution with mean and variance being equal values, the distribution is :

(A) Binomial

(B) Poisson

(C) Normal

(D) Uniform

(Only for Rough Work)

4. Four alternative answers are mentioned for each question as—A, B, C & D in the booklet. The candidate has to choose the correct answer and mark the same in the OMR Answer-Sheet as per the direction :

Example :

Question :

Q. 1 (A) ● (C) (D)
Q. 2 (A) (B) ● (D)
Q. 3 (A) ● (C) (D)

Illegible answers with cutting and over-writing or half filled circle will be cancelled.

5. Each question carries equal marks. Marks will be awarded according to the number of correct answers you have.
6. 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.
7. Before writing anything on the OMR Answer Sheet, all the instructions given in it should be read carefully.
8. After the completion of the examination candidates should leave the examination hall only after providing their OMR Answer Sheet to the invigilator. Candidate can carry their Question Booklet.
9. There will be no negative marking.
10. Rough work, if any, should be done on the blank pages provided for the purpose in the booklet.
11. To bring and use of log-book, calculator, pager and cellular phone in examination hall is prohibited.
12. 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.

4. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार सम्भावित उत्तर—A, B, C एवं D हैं। परीक्षार्थी को उन चारों विकल्पों में से सही उत्तर छाँटना है। उत्तर को OMR आन्सर-शीट में सम्बन्धित प्रश्न संख्या में निम्न प्रकार भरना है :

उदाहरण :

प्रश्न :

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

अपठनीय उत्तर या ऐसे उत्तर जिन्हें काटा या बदला गया है, या गोले में आधा भरकर दिया गया, उन्हें निरस्त कर दिया जाएगा।

5. प्रत्येक प्रश्न के अंक समान हैं। आपके जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।
6. सभी उत्तर केवल ओ. एम. आर. 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।
7. ओ. एम. आर. उत्तर-पत्रक (OMR Answer Sheet) पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाये।
8. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी OMR Answer Sheet उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें। परीक्षार्थी अपने साथ प्रश्न-पुस्तिका ले जा सकते हैं।
9. निगेटिव मार्किंग नहीं है।
10. कोई भी रफ कार्य, प्रश्न-पुस्तिका के अन्त में, रफ-कार्य के लिए दिए खाली पेज पर ही किया जाना चाहिए।
11. परीक्षा-कक्ष में लॉग-बुक, कैलकुलेटर, पेजर तथा सेल्युलर फोन ले जाना तथा उसका उपयोग करना वर्जित है।
12. प्रश्न के हिन्दी एवं अंग्रेजी रूपान्तरण में भिन्नता होने की दशा में प्रश्न का अंग्रेजी रूपान्तरण ही मान्य होगा।

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