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

Question Booklet Number

M. A./M. Sc. (Second Semester) (NEP) EXAMINATION, 2022-23

STATISTICS

(Multivariate Analysis)

Paper Code							
B	0	6	0	8	0	1	T

Questions Booklet Series
A

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. If $X \sim N(5,1)$, the probability density function for the normal variate x is :

(A) $\frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{X-1}{5}\right)^2}$

(B) $\frac{1}{5\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{X-1}{5}\right)^2}$

(C) $\frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}(X-5)^2}$

(D) $\frac{1}{5\sqrt{2\pi}} e^{-\frac{1}{2}X^2}$

2. If $X \sim N(5,25)$, the standard normal deviate Z will be :

(A) $Z = \frac{X-25}{5}$

(B) $Z = \frac{X-5}{25}$

(C) $Z = \frac{X-5}{5}$

(D) $Z = \frac{5-X}{5}$

3. The characteristic function of the multivariate normal distribution of a random vector variate $\underset{\sim}{X} \sim N\left(\underset{\sim}{\mu}, \Sigma\right)$ is :

(A) $\exp\left[it^{T}\underset{\sim}{\mu} - \frac{1}{2}t^{T}\Sigma t\right]$

(B) $\exp\left[it^{T}\underset{\sim}{\mu} - \frac{1}{2}\Sigma\right]$

(C) $\exp\left[t^{T}\underset{\sim}{\mu} - \Sigma\right]$

(D) None of the above

4. If in a variate normal distribution of the variables X and Y, $r_{XY} = 0$, it implies that X and Y are :

(A) uncorrelated but not independent

(B) independent but not uncorrelated

(C) independent and correlated

(D) uncorrelated and independent

5. Bivariate normal distribution is also named as :

(A) Gaussian distribution

(B) Bravais distribution

(C) Laplace-Gauss distribution

(D) All of the above

6. In M $\vee$ N in mod $|c|$ is :

(A) $\frac{1}{\sqrt{2\pi}}$

(B) $\frac{1}{\sqrt{|A|}}$

(C) $\frac{\sqrt{|A|}}{(2\pi)^{p/2}}$

(D) $\frac{|A|}{(2\pi)^{p/2}}$

7. The value of constant k is M. V. N. is :

(A) $\frac{|A|}{(2\pi)^{p/2}}$

(B) $\frac{\sqrt{|A|}}{(2\pi)^{p/2}}$

(C) $\sqrt{|A|}$

(D) None of the above

8. If Z is a $p \times q$ random matrix, L is a $r \times p$ real matrix, M is a $q \times s$ real matrix and N is a $r \times s$ real matrix, then $E(LZM + N)$ is :

(A) LZE (M) + N

(B) LE (Z) M + N

(C) LZM + E (N)

(D) None of the above

9. Varince of $M \vee N$ of $V\left(\underset{\sim}{X}\right)$ is :

(A) $E(X-\mu)(X-\mu)^T$

(B) $E(X-\mu)^T(X-\mu)$

(C) $E(X-\mu)^2$

(D) All of the above

10. The value of A in $M \vee N$ is :

(A) Σ^{-1}

(B) Σ

(C) $|\Sigma|$

(D) $\frac{1}{|\Sigma|}$

11. For the joint p. d. f. (x, y), the marginal distribution of Y given $X = x$ is given as :

(A) $\sum_{\text{all } x} f(x, y)$

(B) $\int_{-\infty}^{\infty} f(x, y)\, dx\, dy$

(C) $\int_{-\infty}^{\infty} f(x, y)\, dx$

(D) $\int_{-\infty}^{\infty} \int_{-\infty}^{\infty} f(x, y)\, dx$

12. $E\left(\frac{Y}{X = x}\right)$ is called the :

(A) regression curve of X on Y

(B) regression curve of Y on X

(C) Both (A) and (B)

(D) Neither (A) nor (B)

13. Let $\underset{\sim}{X} \sim N\left(\underset{\sim}{\mu}, \Sigma\right)$. If $Y = cX$, then $\underset{\sim}{Y} \sim$ is :

(A) $N\left(c\underset{\sim}{\mu}, c\Sigma c^{T}\right)$

(B) $N\left(\underset{\sim}{\mu}, c\Sigma c^{T}\right)$

(C) $N\left(c\underset{\sim}{\mu}, \Sigma\right)$

(D) $N\left(\underset{\sim}{\mu}, \Sigma\right)$

14. Consider two vector partition of X is :

$\underset{\sim}{X} = \left(\underset{\sim}{X}_1, \underset{\sim}{X}_2\right)^{T}$, then $V\left(\underset{\sim}{X}_1\right)$ is :

(A) $E\left\{\left(\underset{\sim}{X}_1 - \underset{\sim}{\mu}_1\right)\left(\underset{\sim}{X}_1 - \underset{\sim}{\mu}_1\right)^{T}\right\}$

(B) $E\left\{\left(\underset{\sim}{X}_2 - \underset{\sim}{\mu}_1\right)\left(\underset{\sim}{X}_1 - \underset{\sim}{\mu}_1\right)^{T}\right\}$

(C) $E\left\{\left(\underset{\sim}{X}_1 - \underset{\sim}{\mu}_1\right)\left(\underset{\sim}{X}_2 - \underset{\sim}{\mu}_1\right)\right\}$

(D) $E\left\{\left(\underset{\sim}{X}_1 - \underset{\sim}{\mu}_1\right)^{T}\left(\underset{\sim}{X}_2 - \underset{\sim}{\mu}_2\right)\right\}$

15. Consider two vector partition of $\underset{\sim}{X}$ is $\left(\underset{\sim}{X}_1, \underset{\sim}{X}_2\right)^{T}$, then a non-singular linear transformation $Y_1 = X_1 + MX_2$ and $Y_2 = X_2$, then Y_1 and Y_2 are :

(A) not independent.

(B) are independent.

(C) are partially correlated.

(D) None of the above

16. In M. V. N. $E\left(\underset{\sim}{\bar{X}}\right)$ is :

(A) μ

(B) $\underset{\sim}{\mu}$

(C) $\dfrac{1}{\underset{\sim}{\mu}}$

(D) $\underset{\sim}{\mu}^{2}$

17. In M $\vee$ N $\hat{\Sigma}$ is :

(A) $\dfrac{1}{n}S$

(B) nS

(C) $\dfrac{n}{S}$

(D) $n^{2}S$

18. In M $\vee$ NE ($\hat{\Sigma}$) is :

(A) $\frac{n-2}{n}\Sigma$

(B) $\frac{\Sigma}{n}$

(C) $\frac{n-1}{n}\Sigma$

(D) All of the above

19. Consider two vector partition of X is $\left(\underset{\sim}{X}_1, \underset{\sim}{X}_2\right)^T$. Then $E\left(\frac{\underset{\sim}{X}_1}{\underset{\sim}{X}_2}\right)$ is :

(A) $\underset{\sim}{\mu}_{(2)} + \Sigma_{21}\Sigma_{22}^{-1}\left(\underset{\sim}{X}_1 - \underset{\sim}{\mu}_2\right)$

(B) $\underset{\sim}{\mu}_{(2)} + \Sigma_{21}^{-1}\Sigma_{22}\left(\underset{\sim}{X}_1 - \underset{\sim}{\mu}_2\right)$

(C) $\underset{\sim}{\mu}_{(1)} + \Sigma_{12}\Sigma_{22}^{-1}\left(\underset{\sim}{X}_2 - \underset{\sim}{\mu}_2\right)$

(D) None of the above

20. Consider two vector partition X is $\left(\underset{\sim}{X}_1, \underset{\sim}{X}_2\right)^T$. Then $V\left(\frac{\underset{\sim}{X}_1}{\underset{\sim}{X}_2}\right)$ is :

(A) $\Sigma_{11} - \Sigma_{12}\Sigma_{22}^{-1}\Sigma_{21}$

(B) $\Sigma_{22} - \Sigma_{12}\Sigma_{22}^{-1}\Sigma_{21}$

(C) $\Sigma_{11} - \Sigma_{22}^{-1}\Sigma_{22}\Sigma_{21}$

(D) $\Sigma_{11} - \Sigma_{21}\Sigma_{12}^{-1}\Sigma_{22}$

21. In the M $\vee$ N analysis $\Sigma_{11.2}$ is expressed by :

(A) $\Sigma_{22} - \Sigma_{12}\Sigma_{22}^{-1}\Sigma_{21}$

(B) $\Sigma_{11} - \Sigma_{12}\Sigma_{22}^{-1}\Sigma_{21}$

(C) Both (A) and (B)

(D) Neither (A) nor (B)

22. In partial variance and covariance $\Sigma_{11.2}$ is :

(A) $\sigma_{ij.q+1......p}$

(B) $\sigma_{ii.q+1.......p}$

(C) $\sigma_{jj.q+1........p}$

(D) None of the above

23. The partial correlation coefficient is :

(A) $\frac{\sigma_{jj.q+1.........p}}{\sqrt{\sigma_{ii.q+1.........p}}\sqrt{\sigma_{jj.q+1.........p}}}$

(B) $\frac{\sigma_{ij.q+1.........p}}{\sqrt{\sigma_{ii.q+1.........p}}\sqrt{\sigma_{jj.q+1.........p}}}$

(C) Both (A) and (B)

(D) Neither (A) nor (B)

24. In multiple correlation coefficient $R_{i.q+1.........p}$ is :

(A) $\dfrac{\sigma_{(i)}, \Sigma_{22}^{-1} \sigma_{(i)}^{T}}{\sigma_{ij}}$

(B) $\sqrt{\dfrac{\sigma_{(i)}, \Sigma_{22}^{-1} \sigma_{(i)}^{T}}{\sigma_{jj}}}$

(C) $\sqrt{\dfrac{\sigma_{(i)}, \Sigma_{22}^{-1} \sigma_{(i)}^{T}}{\sigma_{ii}}}$

(D) None of the above

25. The range of multiple correlation coefficient $R_{1.q+1........p}$ is :

(A) Closed interval (0, 2)

(B) Closed interval (0, 3)

(C) Closed interval (0, 1)

(D) Closed interval (2, 3)

26. If X_1 and X_2 are two independent χ^2 variates, which of the following has also χ^2-distribution ?

(A) $X_1 + X_2$

(B) $\dfrac{X_1}{X_2}$

(C) $\dfrac{X_1}{X_1 + X_2}$

(D) $\dfrac{X_2}{X_1}$

27. The variable $y = -2\log x$ is distributed as U (0, 1) follows :

(A) t-distribution

(B) F-distribution

(C) χ^2-distribution

(D) None of the above

28. The Wishart's distribution is a multivariate generalization of :

(A) Normal distribution

(B) t-distribution

(C) Chi-square distribution

(D) F-distribution

29. Characteristic function of Wishart's distribution is :

(A) $|2\theta\Sigma|^{-\frac{M}{2}}$

(B) $|I - 2i\theta\Sigma|^{-\frac{M}{2}}$

(C) $|I - i\theta\Sigma|^{\frac{M}{2}}$

(D) None of the above

30. If the $A_i, i = 1, 2.......q$ are i.i.d. according to W (m_i, Σ) respectively, then $\mathbf{A} = \sum_{i=1}^{q} A_i$ is distributed as :

(A) $W(m_i, \Sigma)$

(B) $W(\Sigma)$

(C) $W\left(\sum_{i=1}^{q} m_i, \Sigma\right)$

(D) $W\left(\sum_{i=1}^{q} m_i\right)$

31. If $A \sim W(m, \Sigma)$, then $\frac{\sigma^{pp}}{a^{pp}}$ is follows as :

(A) $\chi^2(m)$

(B) $\chi^2(m+1)$

(C) $\chi^2(m-p+1)$

(D) $\chi^2(m-p)$

32. Which of the following relations is correct ?

(A) $r_{12.34} = r_{13.24}$

(B) $r_{12.3} = r_{21.3}$

(C) $r_{13} = r_{23}$

(D) $r_{12.3} = r_{13.2}$

33. b_{xy} as an estimate of B_{yx} is :

(A) a consistent estimator

(B) unbiased

(C) efficient

(D) All of the above

34. The range of simple correlation coefficient is :

(A) 0 to ∞

(B) $-\infty$ to ∞

(C) 0 to 1

(D) – 1 to 1

35. If $r_{xy} = 0$, then variables X and Y are :

(A) independent

(B) not linearly related

(C) linearly related

(D) None of the above

36. Significance of a simple correlation coefficient can be tested by :

(A) Z-test

(B) t-test

(C) F-test

(D) χ^2-test

37. If $R_{1.23}$ is multiple correlation coefficient, simple correlation coefficients r_{12}, r_{13} and r_{23}, then :

(A) $R_{1.23} \geq r_{12}, r_{13}, r_{23}$

(B) $R_{1.23} < r_{12}, r_{13}, r_{23}$

(C) Both (A) and (B)

(D) Neither (A) nor (B)

38. The formula for multiple correlation coefficient $R_{9.13}$ in terms of simple correlation coefficients r_{12}, r_{13} and r_{23} is :

(A) $\dfrac{r_{12}^2 + r_{13}^2 - 2r_{12}\, r_{23}}{1 - r_{23}^2}$

(B) $\sqrt{\dfrac{r_{12}^2 + r_{23}^2 - 2r_{12}\, r_{23}\, r_{13}}{1 - r_{13}^2}}$

(C) Both (A) and (B)

(D) Neither (A) nor (B)

39. In a multivariate study, the correlation between any two variable eliminating, the effect of all other variables is called :

(A) Simple correlation

(B) Multiple correlation

(C) Partial correlation

(D) All of the above

40. The partial correlation coefficient $r_{13.2}$ is called :

(A) First order partial correlation

(B) Zero order partial correlation

(C) Second order partial correlation

(D) None of the above

41. The idea of testing of hypothesis was first set forth by :

(A) R. A. Fisher

(B) J. Neyman

(C) A. Wald

(D) F. L. Lehman

42. The hypothesis under test is :

(A) Simple hypothesis

(B) Alternative hypothesis

(C) Null hypothesis

(D) None of the above

43. Degree 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

44. Student's *t*-test was invented by :

(A) R. A. Fisher

(B) W. S. Gosset

(C) W. G. Cochran

(D) G. W. Snedecor

45. Student's *t*-test is applicable in case of :

(A) small samples

(B) samples of size < 30

(C) large sample

(D) None of the above

46. Student's *t*-test is applicable only when :

(A) The variate values are independent.

(B) The variable is distributed normally.

(C) The sample is not large than 29.

(D) All of the above

47. To test $H_0 : \mu = \mu_0$ as $H_1 : \mu > \mu_0$, when S. D. is known, the appropriate test is :

(A) *t*-test

(B) Z-test

(C) F-test

(D) None of the above

48. Formula for obtaining 95% confidence limits for the mean μ for normal population $N\left(\mu, \sigma^2\right)$ with known σ are :

(A) $-1.96 \le \dfrac{\bar{x}-\mu}{\frac{\sigma}{\sqrt{n}}} \le 1.96$

(B) $P\left(-z_{\frac{\alpha}{2}} \le \dfrac{\bar{x}-\mu}{\frac{\sigma}{\sqrt{n}}} \le z_{\frac{\alpha}{2}}\right) = 0.95$

(C) Both (A) and (B)

(D) Neither (A) nor (B)

49. Confidence interval is specified by :

(A) Upper and lower limit

(B) Only upper limit

(C) Only lower limit

(D) None of the above

50. Interval estimate is determined in terms of :

(A) Confidence coefficient

(B) Location

(C) Minimax

(D) All of the above

51. In M $\vee$ N the Mahalanobis-D^2 is based on :

(A) $\chi^2 p$

(B) T^2

(C) F^2

(D) Z

52. In Hotelling's T^2-statistic, if $H_0 : \underset{\sim}{\mu} = \underset{\sim}{\mu}_0$,

then $n\left(\bar{X} - \underset{\sim}{\mu}_0\right)^T S^{-1}\left(\bar{X} - \underset{\sim}{\mu}_0\right)$ is :

(A) $\dfrac{T}{n-1}$

(B) $\dfrac{T^2}{n-1}$

(C) $\dfrac{n-1}{T}$

(D) $\dfrac{n}{T}$

53. In $M \vee N$, if we have $E\left(\underset{\sim}{X}\right) = \underset{\sim}{\mu} = 0$ the Hotelling's T^2 is :

(A) $n(n-1)\left(\bar{\underset{\sim}{X}}^T S^{-1} \bar{\underset{\sim}{X}}\right)$

(B) $(n-1)\left(\bar{\underset{\sim}{X}}^T S^{-1} \bar{\underset{\sim}{X}}\right)$

(C) Both (A) and (B)

(D) Neither (A) and (B)

54. $X_1 \sim N\left(\mu_1, \dfrac{\Sigma}{n_1}\right)$ and $X_2 \sim N\left(\mu_2, \dfrac{\Sigma}{n_2}\right)$. If Σ is unknown common variable, then $\bar{X}_1 - \bar{X}_2$ is :

(A) $N\left(0, \dfrac{n}{n_1 + n_2}\Sigma\right)$

(B) $N\left(0, \dfrac{n_1 n_2}{n}\Sigma\right)$

(C) $N\left(0, \dfrac{n_1 + n_2}{n_1 n_2}\Sigma\right)$

(D) None of the above

55. Hotelling's T^2 is :

(A) Sum of χ^2-variate

(B) Ratio of χ^2-variate

(C) Both (A) and (B)

(D) Neither (A) nor (B)

56. Test the hypothesis $H_0 : \mu_1 = \mu_2 ......\mu_p$, then $T^2 \geq T_0^2$, where T_0^2 is :

(A) $\dfrac{(n-1)(p-1)}{(n-p+1)} F_\alpha(p-1, n-p+1)$

(B) $\dfrac{(p-1)}{(n-p+1)} F_\alpha(n-p+1)$

(C) $\dfrac{(n-1)}{\lceil n-p+1} F_\alpha(p-1)$

(D) None of the above

57. In canonical correlation

$$E\left(U^2\right)=\alpha^T\Sigma_{11}\alpha$$

and $E\left(V^2\right)=\beta^T\Sigma_{22},\beta$,

then $E(UV)$ is :

(A) $\alpha^T\Sigma_{11}\beta$

(B) $\beta^T\Sigma_{22}\alpha$

(C) $\alpha^T\Sigma_{22}\beta$

(D) $\alpha^T\Sigma_{12}\beta$

58. In study of misclassification the individual belongs to π_1, but classified it as coming from population π_2 is denoted by :

(A) $c\left(\frac{1}{1}\right)$

(B) $c\left(\frac{2}{1}\right)$

(C) $c\left(\frac{2}{2}\right)$

(D) All of the above

59. We define the expected cost of misclassification as :

(A) $c\left(\frac{2}{1}\right)p\left(\frac{2}{1}\right)$

(B) $c\left(\frac{1}{2}\right)p\left(\frac{1}{2}\right)$

(C) Both (A) and (B)

(D) Neither (A) nor (B)

60. The conditional probability of coming from population π, given n is :

(A) $\frac{q_2p_2(x)}{q_1p_1(x)+q_2p_2(x)}$

(B) $\frac{q_1p_1(x)}{q_1p_1(x)+q_2p_2(x)}$

(C) $\frac{q_1p_1(x)}{q_2p_2(x)}$

(D) $\frac{q_2p_2(x)}{q_1p_1(x)}$

61. Which type of analysis involves three or more variables ?

(A) Univariate Analysis

(B) Bivariate Analysis

(C) Multivariate Analysis

(D) All of the above

62. Which type of analysis attempts to predict a categorical dependent variable ?

(A) Factor Analysis

(B) Discrimination Analysis

(C) Linear Analysis

(D) None of the above

63. Which multivariate analysis statistically identifies a reduced number of factors from a large number of variables ?

(A) Factor Analysis

(B) Regression

(C) Logit Analysis

(D) All of the above

64. The distribution of Hotelling's T^2 is multivariate generalization :

(A) Chi-square

(B) Normal

(C) F

(D) None of the above

65. Which of the following is an example of a dimensionality reduction technique ?

(A) Principal component analysis

(B) Support vector machine

(C) K-nearest neighbours

(D) All of the above

66. The mean vector of a random vector (X_1, X_2) is (3, 5), then the mean vector of $(X_1 + 2X_2, 2X_1 - X_2)$ is :

(A) (13, 1)

(B) (13, 5)

(C) (13, 11)

(D) None of the above

67. Principal components are :

(A) Orthogonal

(B) Uncorrelated

(C) Independent

(D) All of the above

68. For a multivariate normal random vector, the variance-covariance matrix is always :

(A) Square matrix

(B) Non-negative definite

(C) Symmetric

(D) All of the above

69. If $\underline{X} \sim N_p(\underline{\mu}, \Sigma)$, then for a vector $\underline{a}$, the variable $\underline{a}'\underline{X}$ follows which distribution ?

(A) $N_p(\underline{\mu}, \Sigma)$

(B) $N_p(\underline{\mu}, n\Sigma)$

(C) $N_p\left(\underline{\mu} - \frac{1}{n}\Sigma\right)$

(D) None of the above

70. A canonical correlation cannot be negative, because :

(A) we take only positive eigen values.

(B) it is generalisation of multiple correlation.

(C) we take only positive square root.

(D) we rejected negative value.

71. In factor analysis, if there are *k* variables and *m* factors, then :

(A) $k < m$

(B) $m < k$

(C) $m = k$

(D) None of the above

72. Among the principal component, what has principal component largest variance ?

(A) First

(B) Last

(C) (*p*/2)th

(D) None of the above

73. Let $\underline{X} \sim N_p(\underline{\mu}, \Sigma)$. The variance of A $\underline{X}$ is :

(A) $A\Sigma A^T$

(B) $A^T\Sigma A$

(C) $AA^T\Sigma$

(D) None of the above

74. A coefficient which examines the association between a dependent variable and independent variable after factoring out the effect of other independent variable is known as :

(A) Partial correlation coefficient

(B) Multiple correlation coefficient

(C) Regression coefficient

(D) All of the above

75. Which of the following is an orthogonal rotation in factor analysis ?

(A) Oblimin

(B) Oblimax

(C) Varimax

(D) All of the above

76. To determine which variables relate to which factors, a researcher would use :

(A) Factor loading

(B) Beta coefficient

(C) Eigen values

(D) None of the above

77. If you want to determine the amount of variance in the original variables that is associated with a factor, you would use :

(A) Factor loadings

(B) Eigen values

(C) Beta coefficient

(D) All of the above

78. Which of the following can be used determine how many factors to take from a factor analysis ?

(A) Eigen values

(B) Percentage of variance

(C) Both (A) and (B)

(D) Neither (A) nor (B)

79. The two basic groups of multivariate analysis are :

(A) dependence methods and interdependence methods

(B) primary methods and secondary methods

(C) simple methods and complex methods

(D) All of the above

80. If a bank wants to differentiate between successful and unsuccessful credit risks for home mortgage loans, it should use :

(A) Factor analysis

(B) MANOVA

(C) Discriminant analysis

(D) All of the above

81. In discriminant analysis, a linear combination of independent variables that explains group memberships is known as :

(A) regression function

(B) discriminant function

(C) ANOVA

(D) None of the above

82. A researcher has 57 variables in a large dataset and wishes to summarize the information from them into a reduced set of variables. Which multivariate technique should be used ?

(A) Factor Analysis

(B) Regression Analysis

(C) ANOVA

(D) All of the above

83. Correlation Analysis is :

(A) Association between two variables

(B) Prediction of values

(C) Both (A) and (B)

(D) Neither (A) nor (B)

84. The degree of linear association between two scaled variables is measured by :

(A) Pearson's correlation coefficient

(B) Significance level

(C) Analysis of variance

(D) None of the above

85. A statistical technique that develops and that relates as one variable to more variables is called :

(A) Simple correlation analysis

(B) Multiple correlation analysis

(C) Partial correlation analysis

(D) All of the above

86. A technique for the study of interrelationship among variables, usually for the purposes for data reduction and the discovery of underlying constructs is known as :

(A) Factor Analysis

(B) Regression Analysis

(C) Partial Correlation Analysis

(D) Multiple Correlation Analysis

87. If X and Y are two independent variables, then :

(A) E (XY) = E (X) E (Y)

(B) Cov (XY) = 0

(C) $r_{XY} = 0$

(D) All of the above

88. Joint distribution function of (X, Y) is equivalent to the probability :

(A) P $(X = x, Y = y)$

(B) P $(X \le x, Y \le y)$

(C) P $(X \le x, Y = y)$

(D) P $(X \ge x, Y \ge y)$

89. If the sample mean $\bar{x}$ is an estimate of population mean μ, then $\bar{x}$ is :

(A) unbiased and efficient

(B) biased and efficient

(C) biased and inefficient

(D) None of the above

90. The concepts of consistency, efficiency and sufficiency are due to :

(A) J. Neyman

(B) R. A. Fisher

(C) C. R. Rao

(D) All of the above

91. For a random sample $\left(x_1, x_2, \ldots\ldots\ldots, x_n\right)$ from a population N $\left(\mu, \sigma^2\right)$, the maximum likelihood estimator of σ^2 is :

(A) $\frac{1}{n} \sum_i \left(X_i - \bar{X}\right)^2$

(B) $\frac{1}{n-1} \sum_i \left(X_i - \bar{X}\right)^2$

(C) $\frac{1}{n} \sum_i \left(X_i - \mu\right)^2$

(D) $\frac{1}{n-1} \sum_i \left(X_i - \mu\right)^2$

92. For a random sample from a Poisson population P(λ), the maximum likelihood estimate of λ is :

(A) Mean

(B) Median

(C) Mode

(D) Geometric Mean

93. For two populations $N\left(\mu_1, \sigma^2\right)$ and $N\left(\mu_2, \sigma^2\right)$ with σ^2 unknown, the test statistics for $H_0 : \mu_1 = \mu_2$ based on small samples with usual notations is :

(A) $t = \dfrac{\bar{x}_1 - \bar{x}_2}{\sqrt{\dfrac{1}{n_1} + \dfrac{1}{n_2}}}$

(B) $t = \dfrac{\bar{x}_1 - \bar{x}_2}{s\sqrt{\dfrac{1}{n_1} + \dfrac{1}{n_2}}}$

(C) Both (A) and (B)

(D) Neither (A) nor (B)

94. Which of the following with usual notations is not a statistical hypothesis ?

(A) $H : \sigma^2 = \sigma_0^2$

(B) $H : \sigma_1^2 > \sigma_2^2$

(C) $H : \rho_1 = \rho_2$

(D) H : people suffering from T. B. belong to the poor section of the society.

95. The hypothesis which is under test for possible rejection is called :

(A) null hypothesis

(B) alternative hypothesis

(C) Both (A) and (B)

(D) Neither (A) nor (B)

96. A hypothesis contrary to null hypothesis is known as :

(A) Composite hypothesis

(B) Alternative hypothesis

(C) Both (A) and (B)

(D) Neither (A) nor (B)

97. Fisher-Behren's test use for $H_0 : \mu_1 = \mu_2$ under condition :

(A) $\sigma_1^2 \neq \sigma_2^2$

(B) $\sigma_1^2 = \sigma_2^2$

(C) Both (A) and (B)

(D) Neither (A) nor (B)

98. Estimation is possible only in case of a :

(A) random sample

(B) non-random sample

(C) point sample

(D) None of the above

99. The idea of correlation was given by :

(A) Karl Pearson

(B) C. R. Rao

(C) S. N. Bose

(D) A. K. Nigam

100. Second order partial correlation coefficient is :

(A) $r_{1.32}$

(B) $r_{12.34}$

(C) $r_{123.4}$

(D) All of the above

(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 ny 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।