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NCE-003-1172003

Seat No. ________

M. Sc. (Sem. II) (CBCS) Examination

May / June – 2017

MS-203 : Applied Multivariate Analysis

Faculty Code : 003

Subject Code : 1172003

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions : (i) Attempt all questions.

(ii) Each question carries equal marks.

1 Answer any seven of the following : **14**

(1) The distribution of $A = \sum_{a=1}^{N-1} Z_a Z_a^{'}$ is called _______ distribution.

(2) Principal component analysis is ______ reduction technique.

(3) ______ statistic is a generalization of Student's t-statistic.

(4) Test based on ______ is Unbiased, UPM and Admissible.

(5) Hotelling's T^2 test has a _____ power function.

(6) $\text{Exp}\left(it'\mu - \frac{1}{2}t'\Sigma t\right)$ is a characteristic function of ______ distribution.

(7) In _______ distribution, p=1 we obtain Chi-square distribution.

(8) In expression of Hotelling's T^2 the term $\left(\bar{X}^{(1)} - \bar{X}^{(2)}\right)' S^{-1}\left(\bar{X}^{(1)} - \bar{X}^{(2)}\right)$ is known as ______.

(9) If $X \sim W_p(n, \Sigma)$ then $CX \sim$ _______, where C is scalar.

(10) If $X_1, X_2, \ldots\ldots, X_N$ be a random sample of size N from $N_p(\mu, \Sigma)$ then $\bar{X} \sim$ _______.

2 Answer the following questions : (any **two**) **14**

(a) If $\underline{X} \sim N_p(\mu, \Sigma)$ define $\underline{Y} = C\underline{X}$ where C is a non-singular matrix then show that $\underline{Y} \sim N_p(C\mu, C\Sigma C')$.

(b) Obtain the maximum likelihood estimators of mean vector and VCM in $N_p(\mu, \Sigma)$.

(c) Explain any two properties of Wishart's distribution.

3 Answer the following questions : **14**

(a) Obtain marginal distribution of multivariate normal distribution.

(b) Find characteristic function of multivariate normal distribution.

OR

3 Answer the following questions : **14**

(a) Explain application of Hotelling's T^2 for one-sample problem and two-sample problem.

(b) Obtain conditional distribution of multivariate normal distribution.

4 Answer the following questions : (any **two**) **14**

(a) Define multivariate normal distribution. In usual notations, determine the value of A.

(b) Obtain characteristic function of Wishart's distribution.

(c) Show the Hotelling's T^2 is unaffected by the change of origin and scale.

5 Answer the following questions : (any **two**) **14**

(a) Derive the probability density function of Wishart's distribution.

(b) Explain Mahalanobis-D^2.

(c) Explain principle components in a population.

(d) Derive the distribution of Hotelling's T^2.