DII-003-017403 Seat No. ________

M. Sc. (Sem. - IV) (CBCS) (Statistics) Examination

May / June – 2015

STAT.CST : 4003 : Multivariate Analysis

Faculty Code : 003
Subject Code : 017403

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

Q-1 Answer any seven of the following. (14)

1. To test simple hypothesis versus composite hypothesis then ______ test can be used.
   a. UMP – test
   b. LRT – test
   c. M.L.E
   d. Method of moment
2. The parameter of symmetric multivariate normal distribution is _______
   a. $\frac{p+1}{2}+p$
   b. $\frac{p+1}{2}$
   c. $\frac{p}{2}$
   d. $\frac{p-1}{2}$
3. __________ is concerned with explaining the variance covariance structure through linear combination with objectives like data reduction and interpretations.
   a. Discrimination
   b. Classification
   c. Principle component analysis
   d. Sphericity test
4. In Whishart distribution, p=_______. We obtain ______ distribution.
   a. P = 0, chi-square distribution
   b. P = 1, chi-square distribution
   c. P = 0, normal distribution
   d. P = 1, normal distribution
5. If $X \sim N_p(\mu, \Sigma)$, define Y = CX where C is a non – singular matrix then Y follows _______.
   a. $Y \sim N_p(0, \Sigma)$
   b. $Y \sim N_p(0, C\Sigma C')$
   c. $Y \sim N_p(\mu, \Sigma)$
   d. $Y \sim N_p(\mu, C\Sigma C')$
6. By which type of hypothesis we get to test LRT test?
   a. Simple – simple
   b. Simple – Composite
   c. Composite – Simple
   d. Composite – Composite

7. Which method is use to explaining the variance covariance structure through a few linear combination of the original variables?
   a. Principal component
   b. Discrimination
   c. Mis-classification
   d. Maximum likelihood test
8. How can we find conditional distribution for any distribution?
   a. Conditional distribution = marginal x joint
   b. Conditional distribution = marginal - joint
   c. Conditional distribution = marginal / joint
   d. Conditional distribution = marginal + joint
9. The limiting distribution of Negative multinomial distribution when tructed at 0 follows which distribution?
   a. Multivariate logarithmic series distribution
   b. Multivariate normal distribution
   c. Multinomial distribution (Singular)
   d. Multinomial distribution (Non – Singular)
10. If a p-component vector Y ~ $N_p(0,T)$ where T is a NSM then $Y'T^{-1}Y$ follows which distribution?
   a. Chi – square with d.f. p
   b. Chi – square with d.f. p – 1
   c. Chi – square with d.f. p – 2
   d. Chi – square with d.f. n

Q – 2 Answer the following questions (Any Two) **(14)**

1. Let X_i (I = 1,2,...,k) be independently distributed as $N_p(\mu_i, \Sigma_i)$. define $\bar{Y} = C\bar{X}$ then show that $\bar{Y} = N_p(\mu, C\Sigma C')$.
2. Explain Mahalanobis – D^2.
3. Explain Multiple and Partial correlation coefficient for MND.
4. Explain Two – Sample Problem of Hotelling T^2.

Q – 3 Answer the following questions **(14)**

1. Define error of mis classification problem.
2. Define q – sample problem

OR

Q – 3 Answer the following questions **(14)**

1. Define following terms.
   Admissible, Minimax Rule and Bayes' Rule
2. Obtain the maximum likelihood estimators of μ and Σ in $N_p(\underline{\mu}, \Sigma)$.

Q - 4 Answer the following questions (Any Two) **(14)**

1. Define residual theorem of Wishart Distribution.
2. Prove that if a p – component vector y ~ $N_p(0,T)$ where T is a non singular matrix then $Y'T^{-1}Y$ is distributed as χ^2_p.
3. Explain the following terms.
   a. Invariant Property of T^2 test
   b. One sample Problem of T^2 test

4. Define following terms:
   a. Average Cost
   b. Complete Class
   c. Minimax Rule
   d. Bayes Rule

Q – 5 Answer the following questions (Any Two) **(14)**

1. Detail note on principal components.
2. Find characteristic function of normal distribution
3. Explain Sphericity Test.
4. Explain estimation of principal component.