DHH-003-017202 Seat No. _____

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

May / June – 2015

STAT. CST : 2002 : Linear Model & Regression Analysis

Faculty Code : 003
Subject Code : 017202

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

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

1. b'θ is estimable if_____.
   (a) E(C'Y) = b'θ (b) E(Y) = b'θ
   (c) E(Y) = bθ (d) none of these
2. Langrangian multiplies derived _____ .
   a) $A'Y = AA'\hat{\theta}$ b) $b = A'C = A'A\lambda$
   c) $b'\Theta = \lambda'A'Y$ d) $b_1 = b_2 = b_3 = b_4$
3. If all the unknown parameters are added to each other then it is called _____.
   (a) Non-orthogonal (b) homoscodastic
   (c) Addictive (d) Orthogonal
4. In the model $Y = A\Theta + \epsilon$, the sum of square due to error follows which distribution_____ .
   a) t – distribution with (n-1) degree of freedom
   b) t – distribution with (n-r) degree of freedom
   c) χ^2– distribution with (n-1) degree of freedom
   d) χ^2– distribution with (n-r) degree of freedom
5. Partial Correlation is also called as _____
   (a) Alternative Correlation (b) Pure Correlation
   (c) Joint Correlation (d) Net Correlation
6. In the model $y = \mu + \tau + \beta + e_{ij}$ are unknown and which are to be estimated using _____ method of estimation.
   (a) Least square (b) MLE
   (c) MOM (d) any method
7. In any linear model some of the parameter are fixed and the numering parameter are random then the model is called_____
   a) Fixed effect model b) Mixed effect model
   c) Random effect model d) None of these
8. _____ is called as regression co-efficient of X and Y
   (a) r (b) ρ
   (c) σ (d) δ

9. The correlation co-efficient between X and Y is defined as r = _____.

a) $\sqrt{\beta\rho}$ b) $\sqrt{\beta\alpha}$

c) $\sqrt{\beta\delta}$ d) $\sqrt{\beta_1\beta_2}$

10. _____ shows that the variance component is not maximum likelihood.

a) Thomson(1962) b) Herback(1959)

c) Ghosh(1952) d) Markoff(1966)

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

1. Prove that E(SSE) = (n-r) σ^2.
2. Show that (a) $\sigma^2 \frac{y}{x} = V(y/x) = \sigma_y^2 (1-\rho^2)$

   (b) $\sigma^2 \frac{x}{y} = V(x/y) = \sigma_x^2 (1-\rho^2)$
3. What is bi-variate Regression?
4. Relation between connecting partial Regression and partial correlation co-efficient.

Q-3 Answer the following questions. **(14)**

1. Write down the general structure of one way design.
2. What is Random effect model?

OR

Q-3 Answer the following questions. **(14)**

1. Analysis of non-orthogonal design?
2. Show that (correlation ratio)$^2 \geq$ (correlation index)^2

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

1. Explain Multiple correlation Co-efficient?
2. State and prove Markoof's theorem?
3. The Blue of b'Θ, that is λ'A'Y is unique even though the solution of A'Aλ = b is not unique.
4. Maximum Likelihood of Estimation method for variance component?

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

1. Define the following terms:-

   (a) Theory of linear estimation.
   (b) BLUE.
   (c) Homoscodastic.
   (d) Non-orthogonal.

2. Given 3 independent random variable Y_1, Y_2, Y_3 having the common variance σ^2. Such that $E(Y_1) = \theta_1 + \theta_2$, $E(Y_2) = \theta_1 + \theta_3$ and $E(Y_3) = \theta_1 + \theta_4$. Find the estimability of a linear parametric function $b'\theta = b_1\theta_1 + b_2\theta_2 + b_3\theta_3 + b_4\theta_4$.

3. b + rank (C) = V + rank (D)

Where $C_{(v*v)} = R - NK^{-1}N'$ and $D_{(b*b)} = R - N'R^{-1}N$.

The normal equation given below:-

$$\begin{bmatrix} G \\ \underline{B} \\ \underline{T} \end{bmatrix} = \begin{bmatrix} n & k' & \underline{r}' \\ \underline{k} & K & N' \\ \underline{r} & N & R \end{bmatrix} \begin{bmatrix} \hat{\mu} \\ \underline{\alpha} \\ \underline{\hat{t}} \end{bmatrix}$$

4. Show that SSE and SSR are independently distributed?