# CC-I

## DESCRIPTIVE STATISTICS

1. Describe various measure of central tendency.
2. What is correlation coefficient? Show that the correlation coefficients lies between -1 and +1.
3. Explain various scales of measurements.
4. Define regression and obtain lines of regression of x on y and y on x.
5. What is data? Explain various types of data with example.
6. Discuss various problems involved in the construction of index number.
7. Briefly discuss the weighted and unweighted index number.
8. What do you mean by skewness and kurtosis? Write different measure of skewness.
9. What are the uses of index number?
10. What are the advantages of diagrammatic representation of data?
11. Write condition for consistency for double attributes A and B.
12. Define partial and multiple correlation coefficients.
13. Clarify the difference between exclusive and inclusive class interval.
14. What are histogram and bar diagram?
15. Write different kinds of classification.
16. Define standard deviation with its advantages.

# CC-II Algebra

1) Find the inverse of Matrix A using elementary row operation:

$$A = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$$

2) Show that the matrix $A = \begin{bmatrix} 2 & -2 & -4 \\ -1 & 3 & 4 \\ 1 & -2 & -3 \end{bmatrix}$ is idempotent.

3) If A and B are square matrices of the same order then adj. (AB) = (adj. A) × (adj. B).

4) If $A = \begin{bmatrix} 2 & 3 & 4 \\ 5 & -3 & 8 \\ 9 & 12 & 16 \end{bmatrix}$ then find trace of A.

5) If $A = \begin{bmatrix} 4 & x+2 \\ 2x-3 & x+1 \end{bmatrix}$ is a symmetric matrix then find $x$.

6) If B and C are non-singular matrices then show that:

$$\begin{bmatrix} A & B \\ C & 0 \end{bmatrix}^{-1} = \begin{bmatrix} 0 & C^{-1} \\ B^{-1} & -B^{-1} A C^{-1} \end{bmatrix}$$

7) Show that $\begin{vmatrix} a-b-c & 2a & 2a \\ 2b & b-c-a & 2b \\ 2c & 2c & c-a-b \end{vmatrix}$

8) Solve the following equation by matrix method:

$x-y+z = 4$
$2x+y-3z = 0$
$x+y+z = 2$

9) Define basis and dimension of a vector space and give an example of one dimensional vector space.

10) Find the rank of the matrix A:

Where A= $\begin{bmatrix} 1 & 2 & 3 & 1 \\ 2 & 4 & 6 & 2 \\ 1 & 2 & 3 & 2 \end{bmatrix}$

11) Prove that the product of the characterstic roots of a square matrix of order n is equal to the determinant of the matrix.

12) Find the characterstic roots and corresponding characterstic vector for each of the following matrix:

$\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$

# G.E-II/CC-III
## INTRODUCTORY PROBABILITY

1. State and prove addition law of probability for two events
2. If two events A and B are independent prove that $\bar{A}$ and B are also independent.
3. Define mathematical expectation and explain its properties.
4. Write p.m.f of Poisson distribution and prove that mean and variance of Poisson distribution is same.
5. State and prove theorem of total probability.
6. If A and B are not mutually exclusive then prove that $P(A\cup B)=P(A)+P(B)-P(A\cap B)$
7. Write characteristics of normal distribution.
8. State Bayes theorem of probability.
9. Define random variable and give its example.
10. What do you understanding by a distribution function?
11. Give classical definition of probability.
12. What is an independent event? Give its example.
13. If a random variable has following probability mass function  x : 0   1    2   3   4
         F(x) :  k   k/2   k   2k-1/5      9/20
   Find $P(X=2), P(X\leq 1), P(X<4)$
14. Define and discuss variance.
15. Define sample space and sample points.
16. Write the p.d.f of exponential distribution and find its mean

# CC-VIII

## STATISTICAL INFERENCE

1. State and prove Neyman factorisation theorem.
2. Describe the method of maximum likelihood estimation.
3. State and prove Rao-Blackwell theorems.
4. Explain different properties of estimator.
5. Give in brief the idea of sequential probability ratio test.
6. Discuss the general approach of likelihood ratio test.
7. What is statistical hypothesis? Write the types of hypothesis with example.
8. Write the important assumptions of Cramer-Rao Inequality.
9. Find the maximum likelihood estimate for the parameter "$\lambda$" of a Poisson distribution on the basis of asample of size n.
10. Express the efficiency of an estimator.
11. Define most powerful test.
12. Discuss the level of significance.
13. What is type-I errors? Write its examples.
14. What properties the minimum chi-square estimators hold?
15. What do you understand by estimation?
16. Define simple and composite hypothesis with examples.
17. Define MVB estimator.

# CC-IX

## LINEAR MODEL

1. State and proves Gauss-Markov theorm.
2. Discuss estimation of error of variance.
3. What is simple regression analysis? Write P-model and estimate the parameters.
4. Find ANOVA table for two way classified data for fixed effect model.
5. Discuss the concept of model matrix and it's uses in estimation.
6. Write the assumption and properties of multiple regression model.
7. Find ANOCOVA tables for two way classified data.
8. What is Homoscedasticity and Collinearity?
9. Explain estimability of linear parameter function.
10. What is method of least square?
11. Write notes on fixed and random effect models in ANOVA.
12. Write the assumption of ANOVA list.
13. What is difference between regression model and estimated regression equation?
14. How do you interpret $\beta_1$ in simple linear regression?
15. What is residual?
16. What is model checking?
17. What is ANOCOVA?
18. Define slope and intercett variable for linear regression model.

# CC-X

## STATISTICAL QUALITY CONTROL

1. What do you understand by control chart in SQC? Discuss control chart for variable.
2. How do you set controllimits for R-chart in SQC.
3. What are the advantages and limitations of statistical quality control?
4. Give the idea of sequential probability ratio test.
5. How do you set controllimits for p-chart in SQC?
6. A machine is to deliver packets of a given weight 10 samples of size 5 each are recorded.

   Samples no: 1  2  3  4  5  6  7  8  9  10

   Mean:  17 16 18 17 15 15  18  17  14  18

   Range: 7  5   12  8  7  4   9  11  7  12

7. Explain the double sampling inspection plan.

8. Compare R-chart verses $\bar{x}$ chart.

9. What is meant by quality of a product?

10. What is 3 δ limit for control chart?

11. When should be the control chart for fraction defectives be prepare?

12. What do you understand by acceptance sampling plan?

13. Define a producer and producer's risk.

14. Define consumer's risk with example.

15. What do you understand by lot tolerance percentage defective?

16. What is total quality management?

# CC-XIII
## Design of Experiment

1. What is meant by RBD? Give the ANOVA table for the design.
2. Setup layout of CRD and obtain the efficiency of RBD compared to CRD.
3. Define Latin square design (LSD) and show how you split-up the total sum of square.
4. Work out the Analysis of variance for two way classified data.
5. Explain the various principle of design of experiment.
6. Write the set of orthoyonal contrast for main and interaction in $2^2$ factorial.
7. How can we implement confounding in $3^n$ factorial design?
8. Give the concept of fractional replication.
9. What is an experimental design?
10. Define experimental error.
11. Advantages of LSD over RBD.
12. Give statistical model and layout of LSD.
13. What effects are measured in factorial experiments?
14. What do you understand by confounding?
15. Differentiate between complete and partial confounding.
16. What is BIBD?

# DSE-III
## Demography and vital statistics

1. Give a brief about historical background of collection of vital statistics.
2. What purpose is served by sampling registration system in respect of vital statistics?
3. How can one calculate the crude death rate?
4. Define and discuss age specific death rates.
5. Discuss different measures of population growth.
6. Define and formulate TFR.
7. How can a life table be constructed?
8. Discuss gross reproduction rate.
9. Comment on the values of net reproduction rate.
10. What are the various uses of life table?
11. Define vital statistics.
12. Define crude birth rate.
13. In what ways can the IMR be calculated?
14. What is general fertility rate?
15. What are the drawbacks of NRR?
16. Give the concept of a life table.