

**VIKRAMA SIMHAPURI UNIVERSITY**  
**NELLORE**

**B.SC., STATISTICS WITH MATHS**



**UG (CBCS) SEMESTER PATTERN**  
**SYLLABUS**  
**I TO VI SEMESTER**

**VIKRAMA SIMHAPURI UNIVERSITY**  
**Common Framework of CBCS for Colleges in Andhra Pradesh**  
(A.P. State of Council of Higher Education)  
**B.Sc., Statistics With Maths**  
**Course Structure**

Semester	Paper	Title of course	Credits	Hrs	Marks		
					Int	SEE	Total
I	I	Paper - I Descriptive Statistics and Probability	3	3	25	75	100
		Practical	2	2	0	50	50
II	II	Paper II - Mathematical Expectation and Probability Distributions	3	5	25	75	100
		Practical	2	2	0	50	50
III	III	Paper - III Statistical Methods	3	5	25	75	100
		Practical	2	2	50	75	50
IV	IV	Paper IV Statistical Inference	3	5	25	75	100
		Practical	2	2	0	50	50
V	V	Paper - V Sampling Techniques and Design of Experiments	3	5	25	75	100
		Practical	2	2	0	50	50
	VI	Paper - VI - Quality, Reliability	3	5	25	75	100
		Practical	2	2	0	50	50
VI	VII One elective is to be chosen from the following	Elective					
		VII(A): Applied Statistics	3	5	25	75	100
		VII(A): Practical	2	2	0	50	50
		VII(B): Demography & Vital Statistics	3	5	25	75	100
		VII(B): Practical	2	2	0	50	50
		VIII One cluster of electives (A-1,2,3 or B-1,2,3 or C-1,2,3 to be chosen	Cluster Elective-I				
VIII(A1): Optimization Techniques	3		5	25	75	100	
VIII(A1): Practical	2		2	0	50	50	
VIII(A2): Numerical Analysis	3		5	25	75	100	
VIII(A2): Practical	2		2	0	50	50	
VIII(A3): Project Work	5	5	100	0	100		

BA/BSC I YEAR : STATISTICS SYLLABUS  
(With Mathematics Combination)  
Semester - I CBCS  
Paper - I Descriptive Statistics and Probability

**Unit - I**

Introduction to Statistics: Concepts of Primary and Secondary data. Methods of collection and editing of primary data, Secondary data. Designing a questionnaire and a schedule. Measures of Central Tendency - Mean, Median, Mode, Geometric Mean and Harmonic Mean.

**Unit - II**

Measures of dispersion: Range, Quartile Deviation, Mean Deviation and Standard Deviation. Descriptive Statistics - Central and Non-Central moments and their interrelationship. Sheppard's correction for moments. Skewness and kurtosis.

**Unit - III**

Introduction to Probability: Basic Concepts of Probability, random experiments, trial, outcome, sample space, event, mutually exclusive and exhaustive events, equally likely and favourable outcomes. Mathematical, Statistical, axiomatic definitions of probability. Conditional Probability and independence of events,

**Unit - IV**

Probability theorems: Addition and multiplication theorems of probability for 2 and for n events. Boole's inequality and Baye's theorems and problems based on Baye's theorem.

**Unit - V**

Random variable: Definition of random variable, discrete and continuous random variables, functions of random variable. Probability mass function. Probability density function, Distribution function and its properties. Bivariate random variable - meaning, joint, marginal and conditional Distributions, independence of random variables.

**Text Books :**

1. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
2. BA/BSc I year statistics - descriptive statistics, probability distribution - Telugu Academy - Dr M.Jaganmohan Rao, Dr N.Srinivasa Rao, Dr P.Tirupathi Rao, Smt.D.Vijayalakshmi.
3. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC. PHI

**Reference books :**

1. Willam Feller: Introduction to Probability theory and its applications. Volume -I, Wiley
2. Goon AM, Gupta MK, Das Gupta B : Fundamentals of Statistics , Vol-I, the World Press Pvt.Ltd., Kolakota.
3. Hoel P.G: Introduction to mathematical statistics, Asia Publishing house.
4. M. JaganMohan Rao and Papa Rao: A Text book of Statistics Paper-I.
5. Sanjay Arora and Bansi Lal: New Mathematical Statistics: Satya Prakashan , New Delhi
6. Hogg Tanis Rao: Probability and Statistical Inference. 7<sup>th</sup> edition. Pearson.
7. KVS Sarma: Statistics Made simple, Do it yourself on PC PH

**THREE YEAR B.A. / B.Sc DEGREE EXAMINATION**  
**I-B.Sc STATISTICS**  
**SEMESTER – I**  
(With Mathematics Combination)  
**DESCRIPTIVE STATISTICS AND PROBABILITY**

**Time: 3 Hours**

**Max. Marks : 75**

**SECTION – A**

**Answer any FIVE Questions :-**

**5 X 5 = 25M**

1. Explain various sources of secondary data. Give various methods collecting secondary data.
2. Define mean and explain merits and demerits
3. Explain sheppard correction for moments what is the need of it.
4. Define Skewness? Explain various measures of Skewness?
5. What are the various definitions of probability.
6. Explain the following:  
i) Random experiment ii) Sample space iii) Mutually exclusive events
7. State and prove multiplication theorem on probability.
8. State and prove Boole's inequality.
9. Explain Bivariate Random Variable.
10. Explain random variable and write its properties.

**SECTION - B**

**Answer any TWO questions :-**

**2 X 10 = 20M**

11. What is primary data. State various methods of collecting primary data and discuss their relative merits.
12. Explain various measures of Central tendency.
13. Explain clearly the various measures of dispersion. State their merits and demerits.
14. Define central and non-central moments. Derive central moments in terms of raw moments.

**SECTION - C**

**Answer any THREE questions :-**

**3 X 10 = 30M**

15. Explain the following :  
(a) Sample (b) Event (c) Exhaustive events (d) Equally likely events  
(e) Mutually exclusive events (f) Impossible event (g) Independent events.
16. If A and B are independent events. Then show that (a)  $\bar{A}, B$  (b)  $A, \bar{B}$   
(c)  $\bar{A}, \bar{B}$  are independent events.
17. State and prove addition theorem on probability for n events.
18. State and prove Baye's theorem.
19. Explain distribution function and its properties.
20. Explain the following concepts (a) Joint probability distribution  
(b) Marginal probability distribution (c) Probability mass function  
(d) Probability density function.

**Instruction to Paper Setter :**

**Two short answer questions (5 Marks) and two essay questions (10 Marks) must be given from each unit.**

# VIKRAMA SIMHAPURI UNIVERSITY :: NELLORE.

## BA/BSC I YEAR : STATISTICS SYLLABUS

(With Mathematics Combination)

Semester - II CBCS (I Year)

Paper - II Mathematical Expectation and Probability Distributions

### UNIT-I

Mathematical expectation : Mathematical expectation( ME) of a random variable and function of a random variable. Moments and covariance using mathematical expectation with examples. Addition and Multiplication theorems on expectation. Definitions of M.G.F, C.G.F, P.G.F, C.F its properties. Chebyshev and cauchy - Schwartz inequalities.

### UNIT-II

Discrete Distributions : Binomial and Poisson distributions, their definitions, 1<sup>st</sup> to 4 central moments, M.G.F, C.F, C.G.F, mean, variance, additive property if exists. Poisson approximation to Binomial distribution.

### UNIT-III

Negative Binomial, geometric, hyper geometric distributions - Definitions, means, variances, M.G.F, C.F, C.G.F, reproductive property if exists. Binomial approximation to Hyper Geometric Distribution, Poisson approximation to Negative binomial distribution.

### UNIT-IV

Continuous Distributions : Rectangular, Exponential, Gamma, Beta Distributions of two kinds. Other properties such as mean , variance, M.G.F, C.G.F, C.F, reproductive property.

### UNIT-V

Normal Distribution: Definition, Importance, Properties, M.G.F, additive properties, Interrelation between Normal and Binomial, Normal & Poisson distribution.

#### Text Books:

1. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
2. BA/BSc I year statistics - descriptive statistics, probability distribution - Telugu Academy - Dr M.Jaganmohan Rao, Dr N.Srinivasa Rao, Dr P.Tirupathi Rao, Smt.D.Vijayalakshmi
3. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC. PHI.

#### Reference books:

1. Willam Feller : Introduction to Probability theory and its applications. Volume –I, Wiley
2. Goon AM, Gupta MK, Das Gupta B : Fundamentals of Statistics , Vol-I, the World Press Pvt.Ltd., Kolakota.
3. Hoel P.G: Introduction to mathematical statistics, Asia Publishing house.
4. M. JaganMohan Rao and Papa Rao: A Text book of Statistics Paper-I.
5. Sanjay Arora and Bansil Lal: New Mathematical Statistics: Satya Prakashan , New Delhi
6. Hogg Tanis Rao: Probability and Statistical Inference. 7<sup>th</sup> edition Pearson.

**VIKRAMA SIMHAPURI UNIVERSITY :: NELLORE.**  
**THREE YEAR B.SC.(CBCS) DEGREE EXAMINATION**  
**FIRST YEAR - SEMESTER – II**  
**SUB : STATISTICS**  
*(With Mathematics Combination)*  
*Common to B.A / B.Sc*  
**MODEL PAPER**

*Time : 3 hours*

*Max marks : 75*

**SECTION - A**

*Answer any **FIVE** questions. Each question carries 5 Marks.*

*5 X 5 = 25M*

1. Define the mathematical expectation of a random variance.
2. Define moment generating function. What is the effect of change of origin and scale on m.g.f.
3. Define Binomial distribution. Find its mean.
4. Define Poisson distribution obtain its m.g.f.
5. State and prove memoryless property of geometric distribution.
6. Obtain the mean of Hypergeometric Distribution.
7. Define gamma distribution and show that Mean = variance.
8. Define Beta distribution of first kind, and derive its mean.
9. Define Cauchy Distribution. State the properties of Cauchy Distribution.
10. Explain the Area-properties of normal Distribution.

**SECTION - B**

*Answer any **TWO** Questions.*

*2 X 10 = 20M*

11. State and prove chebyshev's inequality.
12. State and prove addition theorem of mathematical Expenctation.
13. Derive Poisson distribution as a limiting form of Binomial Distribution.
14. Derive the recurrence relation of central moments of Poisson Distribution.

**SECTION - C**

*Answer any **THREE** Questions.*

*3 X 10 = 30M*

15. Obtain m.g.f. of negative binomial distribution. Hence obtain mean and variance of it.
16. Show that Poisson distribution as a limiting case of Negative binomial Distribution.
17. Define uniform distribution and derive its mean and variance.
18. Define exponential distribution and derive its mean and variance.
19. In normal distribution show that QD:MD:SD: :10:12:15.
20. In normal distribution show that Mean = Median = Mode.

**BA/BSC II YEAR : STATISTICS SYLLABUS**  
**(With Mathematics Combination)**  
**Semester - III CBCS**

**Paper - III Statistical Methods**

**Unit-I**

Correlation: Def., scatter diagram, its coefficient and its properties. , scatter diagram, computation of correlation coefficient for grouped and ungrouped data. spearman's rank correlation coefficient, properties of spearman's correlation coefficients and problems.

**Unit-II**

Regression: simple linear regression, properties of regression coefficients. Regression lines, Concept of Correlation ratio, partial and multiple correlation coefficients, correlation verses regression and their problems.

**Unit – III**

Curve fitting: Method of least square - Fitting of linear, quadratic, Exponential and power curves and their problems.

**Unit-IV**

Attributes : Introduction, of attributes consistency, Consistency of data and its conditions. Independence and association of attributes, co-efficient of association, coefficients of contingency and their problems.

**Unit –V**

Exact sampling distributions: Concept of population, Parameter, random sample, statistic, sampling distribution, standard error. Statement and Properties of  $\chi^2$ , t, F distributions and statements of their inter relationships.

**Text books**

1. BA/BSc II year statistics - statistical methods and inference - Telugu Academy by A. Mohanrao, N.Srinivasa Rao, Dr R.Sudhakar Reddy, Dr T.C. Ravichandra Kum.
2. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC. PHI.
3. Fundamentals of Mathematics statistics: VK Kapoor and SC Guptha.

**Reference Books:**

1. Outlines of statistics, Vol II : Goon Guptha, M.K.Guptha, Das Guptha B.
2. Introduction to Mathematical Statistics : Hoel P.G.

THREE YEAR B.A. / B.Sc DEGREE EXAMINATION

II-B.Sc STATISTICS  
SEMESTER – III  
(With Mathematics Combination)  
STATISTICAL METHODS

Time: 3 Hours

Max. Marks : 75

SECTION – A

Answer any FIVE Questions :-

5 X 5 = 25M

1. Define the properties of multiple correlation coefficient.
2. Derive the formula for rank correlation coefficient.
3. Derive the formula for angle between two regression lines.
4. Define regression and distinguish between correlation and regression.
5. Derive the normal equation for fitting exponential curve of second kind.
6. Explain fitting of quadratic equation by the method of Least squares.
7. Explain independent of Attributes.
8. Show that for n attributes and Association of Attributes  
 $A_1, A_2, \dots, A_n; (A_1, A_2, \dots, A_n) \geq (A_1) + (A_2) + \dots + (A_n) - (n - 1) N$ .
9. Define F-distribution write its properties.
10. Define (a) Population (b) Sample (c) Statistic (d) Parameter.

SECTION - B

Answer any TWO questions :-

2 X 10 = 20M

11. Define correlation coefficient. State and prove the properties of Correlation coefficient.
12. Derive the limits for rank correlation coefficient.
13. Derive the regression line of Y on X and state the properties of regression coefficient.
14. The equations of the two regression lines are  $8x - 10y + 66 = 0$ ;  $40x - 18y + 214 = 0$  and  $v(x) = 9$  then find (a) correlation coefficient (b) the S.D. (y).

SECTION - C

Answer any THREE questions :-

3 X 10 = 30M

15. Define curve fitting Explain the method of least squares in curve fitting.
16. Fit a curve of the form  $y = ax^b$  to the following data :

x	:	1	2	3	4	5	6
y	:	1200	900	600	200	110	50
17. Explain yules coefficient of association and colligation show that  $Q = \frac{2Y}{1+Y^2}$ . 18. (a)  
Define ultimate order class frequencies.  
(b) Define consistency of data. If three attributes A,B,C are given write the conditions for consistency
19. Define t-distribution. State its properties and uses.
20. Define  $\chi^2$ -distribution. State its properties and uses.

Instruction to Paper Setter :

Two short answer questions (5 Marks) and two essay questions (10 Marks) must be given from each unit.

**VIKRAMA SIMHAPURI UNIVERSITY::NELLORE**  
**BA/BSC II YEAR : STATISTICS SYLLABUS**  
**(With Mathematics Combination)**  
**SEMESTER - IV CBCS.**

**Paper - IV : STATISTICAL INFERENCE**

**UNIT-I**

Theory of estimation: Estimation of a parameter, criteria of a good estimator – unbiasedness, consistency, efficiency, & sufficiency and. Statement of Neyman's factorization theorem. Estimation of parameters by the methods of moments and maximum likelihood (M.L), properties of MLE's. Binomial, Poisson & Normal Population parameters estimate by ML method. Confidence intervals of the parameters of normal population.

**UNIT II**

Concepts of Statistical hypothesis: Null and alternative hypothesis, critical region, two types of errors, level of significance, power of a test. 1 tailed and 2 tailed tests, Neyman - Pearson's lemma. Examples in of Binomial. Poisson and Normal distributions.

**Unit-III**

Large Sample Tests : Large sample tests for single mean, two means, Single proportion, Two proportions, Standard Deviation of single and double samples and Fisher's Z transformation .

**Unit-IV**

Small sample tests: Tests of significance based on  $\chi^2$ , t and F.  $\chi^2$ -test for test for independence of attributes, t-test for single, double and paired tests, Variance Ratio Test(F-test).

**Unit-V**

Non-parametric tests - Advantages and Disadvantages one and Two sample run test, Two sample Median test and one and Two sample sign test.

**TEXT BOOKS**

1. B.A./B.Sc II year statistics - statistical methods and inference - Telugu Academy by A.Mohanrao, N.Srinivasa Rao, Dr R.Sudhakar Reddy, Dr T.C. Ravichandra Kumar.
2. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC. PHI.

**REFERENCE BOOKS:**

1. Fundamentals of Mathematics statistics : VK Kapoor and SC Guptha.
2. Outlines of statistics, Vol II : Goon Guptha, M.K.Guptha, Das Guptha B.
3. Introduction to Mathematical Statistics : Hoel P.G.

**VIKRAMA SIMHAPURI UNIVERSITY :: NELLORE.**  
**THREE YEAR B.SC.(CBCS) DEGREE EXAMINATION**  
**SECOND YEAR - SEMESTER – IV**  
**SUB : STATISTICS**  
**(With Mathematics Combination)**  
**Common to B.A / B.Sc**  
**MODEL PAPER**

*Time : 3hours*

*Max marks : 75*

**SECTION - A**

*Answer any FIVE questions. Each question carries 5 Marks.*

*5 X 5 = 25M*

1. Explain the concept of estimation of a parameter.
2. Discuss the method of moments and its merits & de-merits.
3. Explain the following concepts (i) Null hypothesis. (ii) Alternative hypothesis
4. Explain the following concepts (i) Two types of errors (ii) Critical Region
5. Discuss the test of significance for sample mean.
6. Explain the method of testing the significance of difference between sample standard deviation and population standard deviation.
7. Explain paired t-test.
8. Explain F-test.
9. Discuss the advantages and Dis-advantages of  $N_p$ -test.
10. Describe the sign test.

**SECTION - B**

*Answer any TWO Questions.*

*2 X 10 = 20M*

11. Discuss the properties of a good estimator.
12. Explain maximum likelihood estimation method with properties.
13. State and prove Neymann – Pearson lemma.
14. Find the B.C.R. for testing  $H_0 : \lambda = \lambda_0$  against  $H_1 : \lambda = \lambda_1$  taking a sample of size  $n$  from Poisson population.

**SECTION - C**

*Answer any THREE Questions.*

*3 X 10 = 30M*

15. Large sample test for difference of standard deviations.
16. Explain fisher's Z-transformation.
17. Describe chi-square test for independence of attributes.
18. Explain small sample 't' for 2 means.
19. Difference b/w parametric and non parametric tests.
20. Explain run test for randomness.

BA/BSC III YEAR : STATISTICS SYLLABUS  
(With Mathematics Combination)  
Semester-V CBCS.  
Paper - V Sampling Techniques and Design of Experiments

Unit-I

Sampling Theory: Principle steps in a sample survey, Censes versus sample survey, sampling and Non-sampling errors. Types of sampling - subjective, probability and mixed sampling methods.

Unit-II

Simple Random Sampling: Meaning of Samples and methods to draw, estimation of population mean, variances in SRSWR & SRSWOR.

Unit-III

Stratified random sampling: Proportional and optimum allocation of sample sizes in stratification. Variances in these methods. Systematic sampling : Systematic sampling when  $N = nk$  comparison of their relative efficiencies. Advantages and Disadvantages of above methods of sampling.

Unit-IV

Analysis of Variance: One way with equal and unequal classifications and two way classifications.

Unit - V

Design of Experiments: Principles of experimentation in Designs, analysis of completely randomised design (CRD), Randomised block design (RBD) and Latin square design (LSD) including one missing observation . efficiency of these designs and concept of factorial Experiment.

**Text Books:**

1. Telugu Academy BA/B.Sc III year paper - III Statistics - applied statistics - Telugu academy by prof.K.Srinivasa Rao, Dr D.Giri. Dr A.Anand, Dr V.Papaiah Sastry.
2. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC. PHI.

**Reference Books:**

1. Fundamentals of applied statistics : VK Kapoor and SC Gupta.
2. Indian Official statistics - MR Saluja.
3. Anuvarthita Sankyaka Sastram - Telugu Academy.

VIKRAMA SIMHAPURI UNIVERSITY :: NELLORE.

THREE YEAR B.A. / B.Sc DEGREE EXAMINATION  
III-B.Sc STATISTICS  
SEMESTER – V (PAPER-V)  
(With Mathematics Combination)  
SAMPLING TECHNIQUES AND DESIGN OF EXPERIMENTS

**Time: 3 Hours**

**Max. Marks : 75**

**SECTION – A**

**Answer any FIVE Questions :-**

**5 X 5 = 25M**

1. Define sampling write its uses.
2. Define Mixed sampling method.
3. Explain random numbers method.
4. In SRSWOR; Show that  $E(\bar{y}) = \bar{Y}$ .
5. Define stratified random sampling write its uses.
6. Explain proportional and optimum Allocation.
7. Explain one way classification.
8. Derive expectation of various sum of squares in two way classification.
9. Explain the Description and lay out of C.R.D.
10. Define Replication and Randomization.

**SECTION - B**

**Answer any TWO questions :-**

**2 X 10 = 20M**

11. Explain the difference between sampling and census.
12. Explain Sampling errors and non-sampling errors.
13. Define simple random sampling Explain lottery method.
14. In SRSWOR; Show that  $V(\bar{y}) = \frac{N-n}{Nn} S^2$ .

**SECTION - C**

**Answer any THREE questions :-**

**3 X 10 = 30M**

15. If F.P.C. is neglected, with usual notations show that  $V_{ran}(\bar{y}) \geq V_{prop}(\bar{y}_{st}) \geq V_{opt}(\bar{y}_{st})$ .
16. Explain Systematic random Sampling. Discuss its advantages and Disadvantages.
17. Explain the necessity of ANOVA. Write its assumptions.
18. Explain Two way classification.
19. Derive an expression to estimate missing plot in R.B.D. Also write its statistical analysis.
20. Explain the statistical analysis of L.S.D.

**Instruction to Paper Setter :**

**Two short answer questions (5 Marks) and two essay questions (10 Marks) must be given from each unit.**

BA/BSC III YEAR : STATISTICS SYLLABUS

(With Mathematics Combination)

Semester-V CBCS.

Paper - VI Quality and Reliability

Unit-I

Importance of SQC in industry, statistical basis of shewart control charts, uses of control charts. Interpretation of control charts, control limits, Natural tolerance limits and specification limits.

Unit – II

Variable Control Chart: Construction of  $\bar{X}$ , R charts for variables, Attribute control charts- NP, P charts, C chart.

Unit-III

Acceptance sampling plans: Scope, Producer's risk and consumer's risk . Concepts of AQL and LTPD.

Unit-IV

Sampling Plans: Single and double sampling plans, OC and ASN functions, Double and single Sampling plans for attributes using Binomial.

Unit-V

Reliability: Introduction, failure rates, Hazard function, estimation of reliability, exponential distribution as life model, its memoryless property.

**Text Books:**

- 1.BA/BSc III year paper - IV Statistics - applied statistics - Telugu academy by Prof.K.Srinivasa Rao, Dr D.Giri. Dr A.Anand, Dr V.Papaiah Sastry.
2. Fundamentals of applied statistics : VK Kapoor and SC Gupta
3. S.K Sinha: Reliability and life testing. Wiley Eastern.

**Reference Books :**

- 1.. R.C.Gupta: Statistical Quality Control

**VIKRAMA SIMHAPURI UNIVERSITY :: NELLORE.**  
**THREE YEAR B.A. / B.Sc DEGREE EXAMINATION**  
**III-B.Sc STATISTICS**  
**SEMESTER-V (PAPER-VI)**  
(With Mathematics Combination)  
**QUALITY AND RELIABILITY**

**Time: 3 Hours**

**Max. Marks : 75**

**SECTION - A**

**Answer any FIVE Questions :-**

**5 X 5 = 25M**

1. Explain (a) Assignable causes (b) Chance causes.
2. Explain control Limits.
3. Explain the construction and applications of C-Chart.
4. Explain the difference between variable control charts and attribute control charts.
5. Explain the objective of acceptance sampling.
6. Explain 100% Inspection.
7. Explain single sampling plan.
8. Explain the comparison between Single and Double Sampling plans.
9. Explain the meaning and concept of reliability.
10. Explain various failure models.

**SECTION - B**

**Answer any TWO questions :-**

**2 X 10 = 20M**

11. Define the necessity of S.Q.C. in industry. Also write its uses.
12. Define (a) Specification limits (b) Tolerance Limits.
13. Explain the construction of  $\bar{x}$  - R Charts.
14. Define Attribute control charts. Explain the construction of  $P$  and  $nP$  Charts.

**SECTION - C**

**Answer any THREE questions :**

**3 X 10 = 30M**

15. Define sampling Inspection. Also write its uses.
16. Define the following (a) AQL (b) LTPD (c) Producer's Risk (d) Consumer's risk (e) ATI.
17. Explain the Double sampling plan.
18. Explain O.C. curve in detail.
19. Describe exponential distribution as life model.
20. Explain the lack of memory property of exponential in light of reliability theory.

**Instruction to Paper Setter :**

**Two short answer questions (5 Marks) and two essay questions (10 Marks) must be given from each unit.**

**VIKRAMA SIMHAPURI UNIVERSITY :: NELLORE.**  
**THREE YEAR BA/B.SC (CBCS) DEGREE EXAMINATION**  
**THIRD YEAR : SEMESTER-VI**

**Elective Paper – VII(A) : APPLIED STATISTICS**

**3 Hrs/Week**

**Unit-I**

**Analysis of times series:** Components of times series: meaning and examples, trend by least squares (straight line and parabola) methods and moving average methods. Seasonal indices by simple averages, ratio to moving average, ratio to straight-line trend

**Unit-II**

**Index numbers:** Meaning, problems involved in the construction of index numbers, simple and weighted index numbers. Criteria of good index numbers. Fixed base and chain base index numbers. Cost of living index numbers, wholesale price index numbers

**Unit-III**

**Official Statistics:** Functions and organization of CSO and NSSO. Agricultural Statistics, Area Statistics, Yield statistics, National income and its computation.

**Unit-IV**

**Vital statistics:** Meaning, Definition, uses, sources of vital statistics, various Death rates- CDR, ASDR, STDR and Birth rates - CBR, ASFR, TFR.

**Unit-V**

**Reproduction Rates:** Measurement of population growth, crude rate of natural increase, Pearle's vital index, Gross Reproduction Rate[GRR], Net Reproduction Rates[NRR]. Life tables (Introduction and uses only)

**Text Books:**

1. Fundamentals of applied statistics : VK Kapoor and SC Gupta.
2. BA/BSc III year paper - III Statistics - applied statistics - Telugu academy by Prof.K.Srinivasa Rao, Dr D.Giri. Dr A.Anand, Dr V.Papaiah Sastry.

**Reference Books:**

1. Indian Official statistics - MR Saluja.
2. Anuvarthita Sankyaka Sastram - Telugu Academy.

**Practical's–Semester-VI Pape r-VII(A) Conduct any 6 of the following**

1. Measurement of Linear Trend
2. Measurement of Seasonal Indices-Link Relatives method
3. Reversal tests.
4. Cost of living Index Numbers.
5. Mortality, Fertility & Re-production rates.
6. Life tables.
7. Any one of the above Using MS-Excel

**VIKRAMA SIMHAPURI UNIVERSITY :: NELLORE.**  
**THREE YEAR BA/B.SC (CBCS) DEGREE EXAMINATION**  
**THIRD YEAR :: SEMESTER-VI :: SUB - STATISTICS**  
**Elective Paper – VII(A) : APPLIED STATISTICS**  
**(WITH MATHAMATICS)**  
**MODEL PAPER**

*Time : 3hours*

*Max marks : 75*

**PART - A**

*Answer any **FIVE** questions. Each question carries 5 Marks.      5 X 5 = 25M*

1. Define a time series and give its uses.
2. Describe linear trend by the method of least squares.
3. Define Index numbers and give their uses.
4. Discuss the uses of cost of living index numbers.
5. Explain Agricultural statistics in India.
6. Explain the concept of national Income.
7. Define vital statistics. Mention its uses.
8. Explain (i) CBR (ii) TFR.
9. What are the different measures of population Growth?
10. Define Vital index.

**PART-B**

*Answer any **TWO** questions. Each question carries 10 Marks.      2 X 10 = 20M*

11. Describe the components of a time series.
12. Describe the method of ratio to trend to find seasonal variations.
13. Explain briefly the problems involved in the construction of an index numbers.
14. Discuss various weighted index numbers.

**PART-C**

*Answer any **THREE** questions. Each question carries 10 Marks.      3 X 10 = 30M*

15. Describe the central statistical organization and its functions.
16. Discuss National sample survey organization and its functions.
17. Explain the methods of obtaining vital statistics.
18. Explain different death rates.
19. Define life table. Mention its uses.
20. Explain the Gross and Net Reproduction Rates.

## **Elective Paper – VII (B) : DEMOGRAPHY and VITAL STATISTICS**

**3 Hrs/Week**

### **Unit-I**

**Population Theories:** Coverage and content errors in demographic data, use of balancing equations and Chandrasekharan - Deming formula to check completeness of registration data. Adjustment of age data, use of Myer and UN indices, Population composition, dependency ratio.

### **Unit-II**

**Vital Statistics:** Introduction and sources of collecting data on vital statistics, errors in census and registration data. Measurement of population, rate and ratio of vital events, Measurements of Mortality: Crude Death Rate (CDR), Specific Death Rate (SDR), Infant Mortality, Rate (IMR) and Standardized Death Rates.

### **Unit – III**

**Vital Statistics:** Stationary and Stable population, Central Mortality Rates and Force of Mortality. Life (Mortality) Tables: Assumptions, description, construction of Life Tables and Uses of Life Tables.

### **Unit-IV**

**Vital Statistics:** Abridged Life Tables; Concept and construction of abridged life tables by Reed-Merrell method, Greville's method and King's Method. Measurements of Fertility: Crude Birth Rate (CBR), General Fertility Rate (GFR), Specific Fertility Rate (SFR) and Total Fertility Rate (TFR).

### **Unit –V**

**Vital Statistics:** Measurement of Population Growth: Crude rates of natural increase, Pearl's

Vital Index Gross Reproduction Rate (GRR) and Net Reproduction Rate (NRR).

#### **Suggested Reading:**

1. Mukhopadhyay P. (1999): Applied Statistics, Books and Allied (P) Ltd.
2. K.Srinivasan: Basic Demographic Techniques and Application
3. Gun, A.M., Gupta, M.K. and Dasgupta, B. (2008): Fundamentals of Statistics, Vol. II, 9<sup>th</sup> Edition, World Press.
4. Biswas, S. (1988): Stochastic Processes in Demography & Application, Wiley Eastern Ltd.
5. Croxton, Fredrick E., Cowden, Dudley J. and Klein, S. (1973): Applied General Statistics, 3<sup>rd</sup> Edition. Prentice Hall of India Pvt. Ltd.,
6. Keyfitz N., Beckman John A.: Demography through Problems S-Verlag New York.

### **PRACTICALS – SEMESTER-VI PAPER-VII(B)**

1. Measurements of Mortality
2. Measurements of Fertility:
3. Life Tables (Real Population Method)
4. Life Tables (Hypothetical cohort method)
5. Construction of Abridged Life tables

## 6. Reproduction rates

## Cluster Elective Paper – VIII(A1) : OPTIMIZATION TECHNIQUES

### UNIT –I                    3 Hrs/Week

**Introduction:** Origin and development of OR, Nature and features of OR, Meaning and Definitions of OR, Applications and Limitations of OR.

### UNIT – II

**Linear Programming Problem:** Introduction, Mathematical formulation of the LPP, Canonical and standard form of LPP. Graphical solution of a Linear Programming Problem , Problems.

### UNIT – III

**Solution of LPP:** Definitions of BFS, IBFS, Degenerate solution, Slack and Surplus variables, Optimum solution, Computational procedure of Simplex method , Big- M method and Problems.

### UNIT – IV

**Transportation Problem:** Introduction, Transportation Table, General Transportation problem Initial basic feasible solution(IBFS) by North West Corner Rule, Least cost method and Vogel's Approximation Method (VAM), Un-Balanced Transportation Problem

### UNIT –V

**Assignment problem:** Introduction, Mathematical formulation of the problem, Optimal solution by Hungarian method. Un balanced assignment problem, The travelling salesman problem.

#### Text Book :

1. B.A/B.Sc III Year Paper-IV Statistics- Quality Reliability and Operations Research TeluguAcademy by Dr T.C.Ravichandra Kumar, Dr R.V.S.Prasad, Dr D.Giri, Dr.G.S.Devasena
2. Classical Optimization techniques by A.L.Cambo

#### List of reference books:

1. Taha, H. A. (2007): Operations Research: An Introduction, 8th Edition, Prentice Hall of India.
2. KantiSwarup, Gupta, P.K. and Manmohan (2007): Operations Research, 13th Edition, Sultan Chand and Sons.
3. S.Kalavathy, Operations Research, 4<sup>th</sup> Edition, Vikas Publishing

#### Practicals – Semester-VI Paper-VIII(A1)

Conduct any six of the following

1. Solution of LPP by Graphical Method
2. Solution of LPP by Simplex Method
3. Solution of LPP by Big M Method
4. Solution of TP by North West Corner Rule to find IBFS
5. Solution of TP by Least Cost Method to find IBFS
6. Solution of TP by VAM to find IBFS

7. Solution of Unbalanced TP
8. Solution of Assignment problem by Hungarian Method
9. Solution of unbalanced Assignment problem.
10. Solution of traveling salesman problem.

## Cluster Elective Paper – VIII(A2) : NUMERICAL ANALYSIS

3 Hrs/Week

### UNIT – I

**Finite Differences:** Definitions of operators  $\Delta$ ,  $\nabla$  and  $E$ , - Properties - Relationship among operators-Difference Table- Uses- Estimation of single and Two Missing values- Newton's Binomial expansion rule- Problems

### UNIT – II

**Interpolation and Extrapolation:** Assumptions- uses- Newton's forward formula- Newton's back ward formula- Interpolation at unequal intervals- Divided differences- properties- Newton's divided differences formula- Lagrange's formula- Problems

### UNIT – III

**Central Difference:** Gauss Forward and Backward formulae- Sterling's formula- Bessel's formula- Laplace everett's formula - Problems

### UNIT – IV

**Numerical Differentiation:** First and Second order derivatives-Newton's forward and Back ward Differentiation formulae-, Gauss Forward and Backward differentiation formulae- Sterling's and Bessel's differentiation formulae- Problems

### UNIT – V

**Numerical Integration:** Importance- General Quadrature rule- Trapezoidal Rule- Simpson's -1/3 Rule- Simpson's -3/8 Rule - Problems

#### List of reference books:

1. Statistical Methods by S.C.Gupta,
2. Gupta, S. C. and Kapoor, V.K. (2008): Fundamentals of Mathematical Statistics, New Edition(Reprint), Sultan Chand & Sons
3. Statistics and Numerical methods by Dr. A. Singaravelu, ARS Publications.
4. Sankhya Visleshanam- Telugu Academy

#### Conduct any six of the following

1. Newton's back ward formula
4. Lagrange's formula
5. Sterling's central difference formula
6. Bessel's central difference formula
7. Gauss forward differentiation formula
8. Gauss backward differentiation formula
9. Sterling's differentiation formula
10. Bessel's differentiation formula
11. Simpson's 1/3 and 3/8 rule

**Cluster Elective Paper – VIII(A3) : PROJECT WORK**

VIKRAMA SIMHAPURI UNIVERSITY :: NELLORE.

THREE YEAR B.SC.(CBCS) DEGREE EXAMINATION

SUB : STATISTICS

(With Mathematics Combination)

QUESTION PAPER STRUCTURE

MODEL PAPER

Time : 3hours

Max marks : 75

**SECTION - A**

Answer any **FIVE** questions. Each question carries 5 Marks.

5 X 5 = 25M

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

**SECTION - B**

Answer any **TWO** Questions.

2 X 10 = 20M

- 11.
- 12.
- 13.
- 14.

**SECTION - C**

Answer any **THREE** Questions.

3 X 10 = 30M

- 15.
- 16.
- 17.
- 18.
- 19.
- 20.

**Instruction to Paper Setter :**

Two short answer questions (5 Marks) and two essay questions (10 Marks) must be given from each unit.