

SRR & CVR Govt Degree College (A), Vijayawada
BSC II YEAR : STATISTICS (CBCS) SYLLABUS (w.e.f 2020-21 Admitted Batch) 2021-22
(With Mathematics Combination)
Semester - IV
Course – IV: Sampling Techniques & Design of Experiments

Theory

Total Hrs. of Teaching: 60@ 4 h / Week

(Code: STA N-4306-4)

Total Credits: 04

Objective:

- To provide basic knowledge to use a proper sampling technique in relevant areas for estimation
 - To enhance the knowledge to design an experiment (simple and factorial) and analyse it
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UNIT I (12 hours)

Simple Random Sampling (with and without replacement): Notations and terminology, various probabilities of selection. Random numbers tables. Methods of selecting simple random sample, lottery method, method based on random numbers. Estimates of population total, mean and their variances and standard errors, determination of sample size.

UNIT II (12 hours)

Stratified random sampling: Stratified random sampling, Advantages and Disadvantages of Stratified Random sampling, Estimation of population mean, and its variance. Stratified random sampling with proportional and optimum allocations. Comparison between proportional and optimum allocations with SRSWOR.

Systematic sampling: Systematic sampling definition when $N = nk$ and merits and demerits of systematic sampling - estimate of mean and its variance. Comparison of systematic sampling with Stratified and SRSWOR.

UNIT III (12 hours)

Analysis of variance: Analysis of variance (ANOVA) –Definition and assumptions. Concept of Gauss-Markoff linear model-One-way with equal and unequal classification, Two- way classification.

Design of Experiments: Definition, Principles of design of experiments, CRD: Layout, advantages and disadvantages and Statistical analysis of Completely Randomized Design (C.R.D).

UNIT IV (12 hours)

Randomized Block Design (R.B.D) and Latin Square Design (L.S.D) with their layouts and Analysis, Missing plot technique in RBD and LSD. Efficiency of RBD over CRD, Efficiency of LSD over RBD and CRD.

UNIT V (12 hours)

Factorial experiments – Main effects and interaction effects of 2^2 and 2^3 factorial experiments and their Statistical analysis. Yates procedure to find factorial effect totals

Course Out Comes (CO's);

After completion of this course, the students shall get

CO 01: Introduced to various statistical sampling schemes such as simple, stratified and systematic sampling.

CO 02: an idea of conducting the sample surveys and selecting appropriate sampling techniques,

CO 03: Knowledge about comparing various sampling techniques.

CO 04: carry out one way and two way Analysis of Variance,

CO 05: understand the basic terms used in design of experiments,

CO 06: use appropriate experimental designs to analyze the experimental data

Text Books:

1. Fundamentals of applied statistics: VK Kapoor and SC Gupta.
2. Telugu Academy 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.
3. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC.PHI.

Reference Books:

1. Anuvarthita Sankyaka Sastram – Telugu Academy.
3. Parimal Mukhopadhyay : Applied Statistics .New Central Book agency.B.L.Agarwal: Basic Statistics.New Age publications.
4. S.C.Gupta : Statistical Methods. Sultan Chand and Sons.
5. .Pratirupa Sidhanthamulu – Telugu Academy.
6. PrayogaRachana and Visleshana – TeluguAcademy.

Practical – Course-IV

Total Hrs. of Teaching: 30 @ 2 h / Week

(Code: STA N-4306-4P)

Credits: 01

Conduct any EIGHT (MS-Excel Mandatory)

Sampling Techniques:

Estimation of population mean and its variance by

1. Simple random sampling with and without replacement. Comparison between SRSWR and SRSWOR.
2. Stratified random sampling with proportional and optimum allocations. Comparison between proportional and optimum allocations with SRSWOR.
3. Systematic sampling with $N=nk$. Comparison of systematic sampling with Stratified and SRSWOR.

Design of Experiments:

4. ANOVA - one - way classification with equal and unequal number of observations
5. ANOVA - Two-way classification with one observation per cell.

6. Analysis of CRD.
7. Analysis of RBD Comparison of relative efficiency of CRD with RBD
8. Estimation of single missing observation in RBD and its analysis
9. Analysis of LSD and efficiency of LSD over CRD and RBD
10. Estimation of single missing observation in LSD and its analysis
11. Analysis of 2^2 with RBD layout
12. Analysis of 2^3 with RBD layout
13. Practical 4, 5, 6 and 7 using MS-Excel

Note: Training shall be on establishing formulae in Excel cells and deriving the results. The excel output shall be exported to MS Word for writing inferences.

SRR & CVR GOVT DEGRESS COLLEGE (Autonomous)

VIJAYAWADA-520004

BLUE PRINT FOR QUESTION PAPER SETTERS

Time: 3hrs

Marks: 60

Unit No	No. of essay question 8 marks	No. of short question 4 marks	Total no. of question with choice	Total marks allotted to the units
Unit-I	2	2	4	24
Unit-II	2	2	4	24
Unit-III	2	2	4	24
Unit-IV	2	2	4	24
Unit-V	2	2	4	24
Total no. of questions with choice			20	
Total marks with choice				120

Time :3hrs

Max.Marks:60

Section - A

Answer any five of the following

5x4=20 marks

1. Write merits and limitations of Simple random sampling.
2. Explain random numbers method to select a simple random sample
3. Define stratified random sampling.
4. Explain systematic sampling
5. List out the basic assumptions involved in ANOVA technique.
6. Write merits and demerits of CRD
7. Explain missing plot technique in LSD
8. Derive the efficiency of RBD over CRD.
9. Explain the interaction effects of 2^2 experimental design.
10. Explain the Yates procedure to find the factorial effect totals

Section – B

Answer ALL the questions

5x8=40 marks

11. A) In simple random sampling without replacement prove that sample mean square is an unbiased estimation of population mean square i.e. $E(S^2) = S^2$
(OR)
B) Derive the formula for the variance of the sample mean in SRSWOR.
12. (A) Explain the method of systematic sampling. Discuss the merits and demerits of systematic sampling.
(OR)
(B) Explain the proportional and optimum allocations. Show that $V(\bar{y}_{opt}) \leq V(\bar{y}_{prop})$
13. (A) Explain the ANOVA for two-way classification.
(OR)
(B) Explain the principles of experimental designs.
14. (A) Give a layout of RDB. Write its statistical analysis.
(OR)
(B) Give a layout of 4×4 LSD. Write the statistical analysis of LSD
15. (A) Explain the statistical analysis of 2^3 experimental design
(OR)
(B) Explain the statistical analysis of 2^2 experimental design

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BSC II YEAR : STATISTICS (CBCS) SYLLABUS (w.e.f 2020-21 Admitted Batch) 2021-22
(With Mathematics Combination)
Semester - IV
Course – V: Applied Statistics

Theory

Total Hrs. of Teaching: 60@ 4 h / Week
04

(Code: STA N-4306-5)

Total Credits:

Objective:

- To provide various concepts to understand and analyse the time series
 - To make the students to study the changes in a item/budget of a family or an organization from time to time
 - To enhance the knowledge to measure the demographic events
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UNIT I (12 hours)

Time Series: Time Series and its components with illustrations, additive, multiplicative models.

Trend: Estimation of trend by free hand curve method, method of semi averages. Determination of trend by least squares (Linear trend, parabolic trend only), moving averages method.

UNIT II (12 hours)

Seasonal Component: Determination of seasonal indices by simple averages method, ratio to moving average, Ratio to trend and Link relative methods, Deseasonalization.

UNIT III (12 hours)

Growth curves: Modified exponential curve, Logistic curve and Grompertz curve, fitting of growth curves by the method of three selected points and partial sums. Detrending- Effect of elimination of trend on other components of the time series

UNIT IV (12 hours)

Index numbers: Concept, construction, problems involved in the construction of index numbers, uses and limitations. Simple and weighted index numbers. Laspayer's, Paasche's and Fisher's index numbers, Criterion of a good index number, Fisher's ideal index numbers. Cost of living index number and wholesale price index number.

UNIT V (12 hours)

Vital Statistics: Introduction, definition and uses of vital statistics, sources of vital statistics.

Measures of different Mortality and Fertility rates, Measurement of population growth. Life tables: construction and uses of life tables.

Course Out Comes (CO's):

After completion of this course, the students shall know about

- CO 01: time series data, its applications to various fields and components of time series,
CO 02: measurement of trend by fitting and plotting of straight line , parabola and various growth curves such as modified exponential, Gompertz and logistic curve, and Moving Average method
CO 03: measurement of Seasonal Indices by Ratio-to-Trend , Ratio-to-Moving Average and Link Relative methods,
CO 04: Interpret and use a range of index numbers commonly used in the business sector
CO 05: Perform calculations involving simple and weighted index numbers
CO 06: Understand the basic structure of the consumer price index and perform calculations involving its use
CO 07: Various data collection methods enabling to have a better insight in policy making, planning and systematic implementation,
CO 08: Construction and implementation of life tables,
CO 09: Mortality, Fertility and population growth rates

Text Books:

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Reference Books:

3. AnuvarthitaSankyakaSastram - TeluguAcademy.
4. Mukopadhyay, P (2011). Applied Statistics, 2nd ed. Revised reprint, Books and Allied Pvt. Ltd.
5. Brockwell, P.J. and Devis, R.A. (2003). Introduction to Time Series Analysis. Springer.
6. Chatfield, C. (2001). Time Series Forecasting., Chapman & Hall.
7. Srinivasan, K. (1998). Demographic Techniques and Applications. Sage Publications
8. Srivastava O.S. (1983). A Text Book of Demography. Vikas Publishing House

Practical – Course-V

Total Hrs. of Teaching: 30 @ 2 h / Week

(Code: STA N-4306-5P)

Credits: 01

Conduct any EIGHT (MS-Excel Mandatory)

Time Series:

1. Measurement of trend by method of moving averages (odd and even period)
2. Measurement of trend by method of Least squares (linear and parabola)
3. Determination of seasonal indices by method simple averages
4. Determination of seasonal indices by method of Ratio to moving averages
5. Determination of seasonal indices by method of Ratio to trend
6. Determination of seasonal indices by method of Link relatives

Index Numbers:

7. Computation of simple index numbers.
8. Computation of all weighted index numbers.
9. Computation of reversal tests.

Vital Statistics:

10. Computation of various Mortality rates
11. Computation of various Fertility rates
12. Computation of various Reproduction rates.
13. Construction of Life Tables
14. Practical 1, 2, 3, 5, 6, 13 using MS-Excel

Note: Training shall be on establishing formulae in Excel cells and deriving the results.

The excel output shall be exported to MS Word for writing inferences.

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Unit-V	2	2	4	24
Total no. of questions with choice			20	
Total marks with choice				120

S.R.R &&C.V.R GOVT. DEG.COLLEGE Autonomous)VJA.: 2021-2022

Department of Statistics

Model Question Paper

II YEAR B.Sc (with maths Combination) Semester - IV CBCS

Paper – IV: Applied Statistics (Code: STA N-4306-5)

Time :3hrs

Max.Marks:60

Section - A

Answer any five of the following

5x4=20 marks

1. Explain the mathematical models in time series
2. Explain the method of semi averages to measure trend.
3. Explain the method of simple averages.
4. Explain the method of link relatives.
5. Write a brief note on growth curves.
6. Explain detrending.
7. Write the uses of index numbers.
8. Explain the methods of finding CLI
9. Explain about Net Reproduction Rate.
10. Explain mortality rates

Section – B

Answer ALL the questions

5x8=40 marks

11. (A) Define Time series. Explain the components of time series.
(OR)
(B) Explain the least square method to measure Trend.
12. (A) Explain the method of ratio to trend to measure seasonal variations.
(OR)
(B) Explain the method of ratio to moving averages to measure seasonal variations
13. (A) Explain the method of three selected points to fit modified exponential curve.
(OR)
(B) Explain the method of three selected points to fit Gompertz curve
14. (A) What are the Problems or steps involved in the construction of Index Numbers?
(OR)
(B) Explain about the Criteria for Good Index Number
15. (A) Explain (i) General Fertility Rate. (ii) Specific Fertility Rate. (iii) Total Fertility Rate.
(B) State the meanings of various columns of a life table and mention the construction of a life table. Explain the relationship between different columns.