**P.R.GOVERNMENT COLLEGE (A), KAKINADA**

**III B.Sc. – Statistics / Semester- V (2018-19)**

**Paper-V**

**Course: sampling & design of experiments**

**Total Hrs. of Teaching: 52 @ 4 h / Week Total Credits: 03**

-------------------------------------------------------------------------------------------------------------------------------

**Objective:** In the design of experiments, the experimenter is often interested in the effect of some process or intervention (the "treatment") on some objects (the "[experimental units](http://en.wikipedia.org/wiki/Experimental_unit)"), which may be people, parts of people, groups of people, plants, animals, etc. Design of experiments is thus a discipline that has very broad application across all the natural and social sciences and engineering.

**Module -1**

**Sampling (14h)**

1. Concepts of sampling
2. Principle steps in sample survey
3. Sampling errors
4. Non sampling errors
5. Types of sampling ,Simple random sampling with replacement(SRSWR)
6. Simple random sampling without replacement(SRSWOR), expected value for

population mean, sample variance, variance of sample mean in SRSWR and SRSWOR

**Module - 2**

**Stratified and Systematic Sampling** **(12h)**

1. Stratified random sampling, Proportional and Optimum Allocation, variance of sample mean in both allocations
2. Systematic random sampling
3. Advantages & disadvantages of systematic & stratified random sampling

.

**Module - 3**

**Analysis of Variance (14h)**

1. One way classification. (mathematical model, statistical model & ANOVA table)
2. Two way classification (mathematical model, statistical model & ANOVA table)
3. Principles of design of experiments- randomization replication local control

 **Module - 4**

**Design of Experiments: (12h)**

**a.** Completely randomized design(mathematical model, statistical model & ANOVA table) **b.** Randomized block design(mathematical model, statistical model & ANOVA table)

**c.** Latin square design(mathematical model, statistical model & ANOVA table)

**d.** Advantages &disadvantages of CRD,RBD &LSD

 **List of text books:**

1. V.K.Kapoor and S.C.Gupta : Fundamentals of Applied Statistics. Sultan Chand

**List of reference books**

 1.Parimal Mukhopadhyay : Applied Statistics .New Central Book agency.

1. B.L.Agarwal: Basic Statistics.New Age publications.

3.S.C.Gupta : Statistical Methods. Sultan Chand and Sons.

4.Pratirupa Sidhanthamulu – Telugu Academy.

**Model blue print for the Question Paper setter**

**V Semester Paper-V Sampling & Design of Experiments**

**Max. Marks: 70 Time : 3 Hrs.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Unit / Chapter name** | **Very Short Answer Questions** | **Short Answer Questions** | **Essay Questions** | **Marks allotted to the Unit/Chapter** |
| **Unit – 1** |
| **Sampling** | **2** | **2** | **2** | **32** |
| **Unit – 2** |
| **Stratified and Systematic sampling** | **1** | **2** | **2** | **31** |
| **Unit – 3** |
| **Analysis of Variance**  | **1** | **2** | **2** | **31** |
| **Unit – 4** |
| **Design of Experiments** | **1** | **2** | **2** | **31** |
| **Any of the above Units (i.e., 1-4)** |
| - |  |  |  |  |
| **Total No. of Questions including choice (21)** | **5** | **8** | **8** | **-** |
| **Total marks allotted to all questions including choice =** | **125** |

**P.R.Government College (Autonomous), Kakinada**

**III year B.Sc., Degree Examinations- V Semester**

**Statistics Paper V: Sampling & Design of Experiments**

**(Model paper)**

**Time: 3 Hrs. Max. Marks: 70**

 **Section – A 5x1=5M**

**Answer all questions**

1. Define sampling unit.
2. What is parameter.
3. Define mixed sampling.
4. How many types are there in principle of design of experiments.
5. Define CRD.

 **Section – B 5x5 = 25 M**

**Answer any five of the following questions. Each question carries five marks.**

1. What are the errors involved in sample surveys.
2. State briefly the advantages of sampling over complete enumeration.
3. Explain the method of stratified random sampling.
4. Explain subjective sampling & mixed sampling.
5. List out the basic assumptions involved in ANOVA technique.
6. Write a note on principle of “Randomization”.
7. Write the advantages of C.R.D.
8. What is the efficiency of L.S.D over R.B.D.

 **Section – C**

**Answer any two questions. 2X10=20M**

1. What are the main steps involved in a sample survey. Discuss them briefly.
2. Explain SRSWR and SRSWOR.
3. In simple random sampling without replacement prove that sample mean square is an unbiased estimation of population mean square i.e. E()= 
4. Explain the method of systematic sampling. Discuss the merits and demerits of systematic sampling.

 **Section – D**

**Answer any two questions. 2X10=20M**

1. What is meant by two way classification. Give layout and analysis for a two way classification.
2. Explain about ANOVA Technique. Give layout and analysis for a one way classification.
3. What is meant by Randomized Block Design. Give the layout and analysis of a Randomized Block Design. Discuss the advantages and dis advantages of Randomized Block Design.
4. What is Latin Square Design. Give the layout and analysis of a Latin Square Design. Discuss the advantages and dis advantages of Latin Square Design.

**P.R.GOVERNMENT COLLEGE (A), KAKINADA**

**III B.Sc. – statistics / Semester- V ( 2018-19)**

**PAPER-VI**

**Course: Applied Statistics**

(Total Hours of Teaching: 45 @ 3 h / Week)

-------------------------------------------------------------------------------------------------------------------------------

**Objectives:** Statistics is an inductive science in which information is extracted from sample data in order to draw inferences. This most often involves planning experiments to ensure that valid answers to questions are obtained from the sample. Statistics is a subject that deals with the collection and analysis of data and affects most aspects of modern life.

-------------------------------------------------------------------------------------------------------------------------------

**Module-1 (11h)**

**Time Series**

1. Components of Time Series
2. Importance of Time Series
3. Measures of Trend
4. Measures of seasonal trend
5. Uses of Time Series
6. Models of Time Series

**Module -2 (12h)**

**Index Numbers**

1. Steps involved in the construction of index numbers.
2. Quantity index number
3. Weighted & Un Weighted index numbers
4. Criteria of good index number
5. Cost of living index number
6. Base Shifting, Splicing, Deflating of index numbers
7. Uses, importance of index numbers

**Module - 3** (**10h)**

**Vital Statistics**

 a. Collection of Vital Statistics

 b. Measures of Mortality

 c. Measures of Fertility.

 d. Measures of Population Growth.

 e. Construction & Uses of life Table.

**Module – 4** (**12h)**

**Demand Analysis**

 a. Demand& Supply-Laws of demand & supply-Price Elasticity’s of Demand & Supply.

 b. Time Series data

c. Family budget data

d. Leonitef’s Method for demand & Supply

e. Pareto’s law of income distribution

**Model – 5**

**Official Statistics**

 Functions and organization of CSO and NSSO. Agricultural Statistics, National Income and it’s computation.

**List of Text Books:**

1. V.K.Kapoor and S.C.Gupta : Fundamentals of Applied Statistics. Sultan Chand

 **List of reference books:**

 1.Parimal Mukhopadhyay : Applied Statistics . New Central Book agency.

1. Daroga Singh and Chowdhary: Theory and Analysis of Sample survey designs.

Wiley Eastern.

1. M.R.Saluja : Indian Official Statistics. ISI publications.
2. B.L.Agarwal: Basic Statistics.New Age publications.
3. S.P.Gupta : Statistical Methods. Sultan Chand and Sons.
4. PratirupaSidhanthamulu – TeluguAcademy.
5. PrayogaRachana and Visleshana – TeluguAcademy.

**V Semester Paper –VI-: Applied Statistics**

**Model blue print for the Question Paper setter**

**Max. marks: 70 Time : 3 Hrs.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Unit / Chapter name** | **Very Short Answer Questions** | **Short Answer Questions** | **Essay Questions** | **Marks allotted to the Unit/Chapter** |
| **Unit – 1** |
| **Time Series** | **1** | **2** | **2** | **31** |
| **Unit – 2** |
| **Index Numbers** | **2** | **2** | **2** | **32** |
| **Unit – 3** |
| **Vital Statistics** | **1** | **2** | **2** | **31** |
| **Unit – 4** |
| **Demand Analysis** | **1** | **2** | **2** | **31** |
| **Any of the above Units (i.e., 1-4)** |
|  |  |  |  |  |
| **Total No. of Questions including choice (21)** | **5** | **8** | **8** | **-** |
| **Total marks allotted to all questions including choice =** | **125** |

**P.R.Government College (Autonomous), Kakinada**

**III year B.Sc., Degree Examinations V Semester**

**Statistics Paper VI: Applied Statistics**

**(Model paper)**

**Time: 3 Hrs. Max. Marks: 70**

 **Section-A 5x1=5M**

**Answer all questions.**

1. Define time series.
2. What is meant by quantity index.
3. Write any two uses of index numbers.
4. Define vital statistics.
5. Define equilibrium price.

**Section – B 5x5 = 25 M**

**Answer any five of the following questions. Each question carries five marks.**

1. Explain the method of moving averages in time series data.
2. Explain cyclical component of a time series.
3. Explain weighted price Index.
4. What is meant by base shifting.
5. Write the uses of life table.
6. Explain about Net Reproduction Rate.
7. Describe the method for estimating the elasticity of demand for time series data.
8. Write about price elasticity of demand.

**Section – C 2x10 = 20 M**

**Answer any two questions**

1. What are the measurement of seasonal variation. Discuss briefly about the difference types of measurement of seasonal variation.

**15.** Describe the methods of Trend. Discuss briefly about the measures different types of Trend.

 **16.**What are the Problems or steps involved in the construction of Index Numbers?

 17. Explain about the Criteria for Good Index Number?

**Section – D 2x10 = 20 M**

**Answer any two questions**

 **18.**Explain (i) General Fertility Rate. (ii) Specific Fertility Rate. (iii) Total Fertility Rate.

 19. State the meanings of various columns of a life table and mention the construction of a life table. Explain the relationship between different columns.

 **20.** Describe demand and supply curves and the uses of these curves.

 21. Explain Pareto’s law of income distribution.

III Year: Statistics Practical Paper-III

**(With Mathematics Combination)**

##  Sampling Techniques

 Estimation of population mean, population total and variance of these estimates 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.

1. Systematic sampling with N=nk. Comparison of systematic sampling with Stratified and SRSWOR.

 **Design of Experiments:**

1. ANOVA – one – way classification with equal number of observations
2. ANOVA - one–way classification with equal number of observations using MS Excel.
3. ANOVA Two-way classification with equal number of observations.
4. ANOVA Two-way classification with equal number of observations using

 MS Excel

1. Analysis of CRD. Analysis of RBD with and without missing observation
2. Analysis of CRD. Analysis of RBD with and without missing observation using MS Excel
3. Analysis of LSD with and without missing observation
4. Analysis of LSD with and without missing observation using MS Excel.
5. Comparison of relative efficiency of CRD with RBD and comparison of relative efficiencies of LSD with RBD and CRD.

 **Time Series Analysis:**

 13. Measurement of trend by methods of Least squares and moving averages

14. Measurement of trend by method s of Least squares and moving averages using

 MS Excel.

15. Determination of seasonal indices by methods of Ratio to moving averages,

 Ratio to trend and Link relatives.

16. Determination of seasonal indices by methods of Ratio to moving averages, Ratio

to trend and Link relatives using MS Excel.

**Index Numbers:**

 17. Computation of simple and all weighted index numbers.

 18. Computation of reversal tests.

 19. Construction of cost of living index number and wholesale index number.

 20. Construction of fixed base and chain base index numbers.

 21. Base shifting, Splicing and Deflation.

 21 Computation of all weighted indices, cost of living index number, Base

 shifting, splicing and deflation using MS Excel.

 **Vital Statistics:**

 22. Computation of various Mortality rates, Fertility rates and Reproduction rates.

 23. Construction of Life Tables and Abridged life tables.

 24. Construction of various rates, life tables andabridged life tables using MS Excel

**Demand Analysis:**

 25. Construction of Lorenz curve.

 26. Fitting of Pareto law to an income data.

 27. Construction of Lorenz curve using MS Excel.

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

**Question paper pattern.** odd sem

**Theory:** Five Questions will be given.

 The Student has to answer three questions**. 3x12=36 M**

 **Record: 10M**

 **Viva: 4M**

**TOTAL: 50M**

Question paper pattern: even sem

**Theory:** Five Questions will be given.

 The Student has to answer three questions**. 3x12=36 M**

 **Record: 10M**

 **Viva: 4M**

**TOTAL: 50M**