A.G& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE

VUYYURU-521165, KRISHNA Dt., A.P.(Autonomous)

Accredited by NAAC with "A" Grade

2022-2023

DEPARTMENT OF STATISTICS

MINUTES OF BOARD OF STUDIES

EVEN SEMESTER

15-04-2023

Minutes of the meeting of BOS in Statistics for B.Sc(MSCs) Degree Courses of AG & SG Siddhartha Degree College of Arts & Science, Vuyyuru, held at 2.30 PM on 15-04-2023 through online mode.

N.V. SrinivasaRao *Presiding*

Members Present:

1) N.V. (N.V.Srinivasa Rao)	Chairman	Head, Department of Mathematics, AG & SG S Degree College.
2) P. R. (P. Ravi Kumar)	University Nominee	Department of Statistics, Pavitra Degree College, Machilipatnam.
3) G. Chakravarthi (G. Chakravarthy)	Subject Expert	Department of Statistics, P. B. Siddhartha College, Vijayawada
4) N. Siva Naga Raju. (N. Siva Naga Raju)	Member	Lecturer in Statistics AG & SG S Degree College.
5) D. Sunitha (D.Sunitha)	Member	Lecturer in Mathematics AG & SG S Degree College.
6) A. Bhargavi (A.Bhargavi)	Member	Lecturer in Mathematics AG & SG S Degree College.
7) (Noor Mohammad)	Member	Lecturer in Mathematics AG & SG S Degree College.
8) K. Rajya Lakshmi (K. Rajya Lakshmi)	Member	Lecturer in Mathematics AG & SG S Degree College.

Agenda of B.O.S Meeting:

1. To discuss and recommend the Syllabi, Model Question Papers and Guidelines to be followed by question paper setters in Statistics for 2nd Semester as per the guidelines and instructions prescribed APSCHE and Krishna University from the Academic Year 2022-23.

2. To discuss and recommend the Syllabi, Model Question Papers and Guidelines to be followed by question paper setters in Statistic for 4th Semester as per the guidelines and instructions prescribed APSCHE and Krishna University from the Academic Year 2022-23.
3. Discussed and recommended the teaching and evaluation methods for approval of Academic Council

4. Any other matter.

Resolutions.

1. Discussed and recommended thatno changes are required in Syllabi. Changes are required in Model Question Papers and Guidelines to be followed by the question paper setters in Statistics for 2nd Semester from the Academic year 2022-23.
2. To recommed the teaching and evaluation methods to be followed under Autonomous status. The maximum marks for IA is 30 and SE is 70. Each IA written examination is of 1 Hr. 30 min duration for 30 marks. The tests will be conducted centrally. To reduce two IA tests and is calculated for 20 marks. 5 marks will be allotted for attendanceand 5 marks are allotted for Assignment/ Activity. There is no minimum passing for IA and there is no provision for improvement in IA. Even though the candidate is absent for two IA exams/obtain zero marks the external marks are considered (if he/ she gets 40 out of 70) and the result shall be declared as 'PASS' from the Academic year 2022-23.

3. To introduce new Syllabi, Model Question Papers and Guidelines to be followed by the question paper setters in Statistics of 4th Semester from the Academic year 2022-23. The maximum marks for IA is 25 and SE is 75. Each IA written examination is of 1 Hr. duration for 15 marks. The tests will be conducted centrally. The average of two such IA is calculated for 15 marks. 5 marks will be allotted basing on Assignment and 5 marks are allotted for activity. There is no minimum passing for IA and there is no provision for improvement in IA. Even though the candidate is absent for two IA exams/obtain zero marks the external marks are considered (if he/ she gets 40 out of 75) and the result shall be declared as 'PASS' from the Academic year 2022-23.

4. Discussed and recommended for organizing seminars, Guest lecturers, Online Examinations and Workshops to upgrade the knowledge of students for Competitive Examinations for the approval of the Academic Council.

A.G. & S.G. Siddhartha Degree College of Arts & Science

Vuyyuru, Krishna District

Department of Statistics

Programme Specific Outcomes (PSOs)

PSO1 : Apply the concepts, principles and methods of statistics to various fields of study

PSO2 : Understand the importance and value of statistical principles and convert a problem description into testable research hypotheses

PSO3 : Select appropriate statistical tools to investigate a research hypothesis.

PSO4 : Perform data analysis by apply appropriate statistical methodology and interpret result in a variety of settings

PSO5 : Compute statistical measures using software and programs.

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VUYYURU – 521165

Reaccredited at 'A' level by NAAC

Autonomous -ISO 9001 – 2015 Certified

Title of the Course: Probability Distributions and Statistical Methods

Offered to: B.SC (MSCs) **Course Code : STAT21C**

Course Type: Core (Theory) **Year of Introduction:2019-20**

Year of Revision: 2021-22 **Percentage of Revision: 0%**

Semester: II **Credits: 4**

Hours Taught: 60periods **Max.Time:** 3 Hours

Course Prerequisites: Students required basic knowledge in Calculus, Algebra and Probability.

Course Description: This course helps the students to familiarize students with the ways in which we talk about uncertainty and look at everyday situations in which probability arises. Also this course aims at providing basic knowledge about theoretical distribution models that can suit different phenomena of interest measured as variables in a continuum.

Course Objectives:

1) To enable the students to develop basic knowledge in theoreticalProbability distributions
2) To provide understanding and applying standard continuous probability distribution to different situations.
3) To get the knowledge regarding qualitative factors
4) To understand the relation between quantitative factors
5) To make the estimated values using regression

Learning Out comes: At the end of the course, the student will

1) Acumen to apply standard discrete probability distribution to different situations.
2) ability to handle transformed random variables and derive associated distributions.
3) The parameters describe an underlying physical setting in such a way that their value affects the distribution of the measured data.

S. No	Programme Outcomes
PO1.	**Effective Communication**: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology
PO2.	**Effective Citizenship**: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
PO3.	**Ethics:** Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.

PO4.	**Environment and Sustainability**: Understand the issues of environmental contexts and sustainable development
PO5.	**Critical Thinking**: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.
PO6:	**Specialized Skills / Transferable Skills:** Acquisition of communication and soft, analytical and technological skills that aid in enhancing
PO7.	**Self-directed and Life-long Learning:** Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

Course Outcomes:		
Course Outcome	Upon successful completion of this course, students should have the knowledge and skills to:	**Programme Outcomes Mapping**
CO 1	Develop the basic knowledge in Probability distribution and uncertainty conditions we apply standard discrete probability distributions to identify the probability values.	PO - 5
CO 2	Obtained the knowledge of applications on standard continuous distributions. Also get the knowledge in respect of usage in day-to-day life.	PO - 5
CO3	Analyse the qualitative data	PO - 6
CO 4	Statistically analyze the strengths of relationship between variables.	PO - 7
CO 5	To outline the vital area of regression models applicable in a wide variety of real time situations	PO - 7

Syllabus

Unit	Learning Units	Lecture Hours
I	**Theoretical Probability Discrete Distributions** Rectangular, Binomial, Poisson, Negative Binomial, Geometric, Hyper Geometric distributions: Definitions, Means, Variances, M.G.F, C.G.F, P.G.F, additive property,limiting cases, memory less property if exists . Simple problems.	**12**
II	**Theoretical Probability Continuous Distributions** Rectangular, Normal, Exponential, Gamma, Beta Distributions: Definitions, Means, Variances, M.G.F, C.G.F, P.G.F, additive property,limiting cases, memory less property if exists . Simple problems.	**12**
III	**Theory of Attributes**: Notations, Dichotomy classification, class and class frequencies, order of classes and class frequencies. Ultimate class frequencies, relation between class frequencies. Consistency of data - Conditions for consistency of data for 2 and 3 attributes only. Independence of attributes- criterion of independence of two attributes. Association of attributes-Yule's coefficient of association and coefficient of colligation.	**12**

	Relationship between coefficient of association and colligation and simple problems.	
IV	**Correlation**: Meaning, Types of Correlation, Measures of Correlation- Scatter diagram, Karl Pearson's Coefficient of Correlation, Rank Correlation coefficient (with and without ties), Bi-variate frequency distribution, correlation coefficient for bi-variate data and simple problems. **Multiple and Partial Correlation**- Coefficients of multiple and partial correlations, properties of multiple and multiple correlation coefficients, coefficient of multiple determination. simple problems	**12**
V	**Curve fitting** Principle of least squares, fitting of straight line, fitting of second degree polynomial or parabola. Fitting of power curve and exponential curves. **Regression Analysis**: Introduction, Linear Regression- Regression coefficients, properties of regression coefficients, angle between two lines of regression. Standard error of estimate (residual variance), Explained and unexplained variation, coefficient of determination and simple problems	**12**

Text Book:

Fundamentals of Mathematical Statistics, 12th Edition, Sep 2020, S. C. Gupta and V. K. Kapoor, Sultan Chand & Sons, New Delhi

Reference Books:

1.B.A/B.Sc. Second Year Statistics(2010) , Telugu Akademi, Hyderabad.

2. Mathematical Statistics with Applications, 2009, K.M.Ramachandran and Chris P.Tsokos Academic Press(Elsevier), Haryana .

3.Probability and Statistics, Volume I & II, D. Biswas, New central book Agency (P) Ltd, NewDelhi.

4. An outline of Statistical theory, Volume II,3rd Edition,2010(with corrections) A.M.Goon,M.K. Gupta, B.Dasgupta ,The World Press Pvt.Ltd., Kolakota.

5.Sanjay Arora and Bansi Lal:. New Mathematical Statistics, Satya Prakashan , New Delhi.

Websites of Interest: **http://onlinestatbook.com/rvls/index.html**

Co-Curricular Activities in the class:

1. Pictionary
2. Case Studies on topics in field of statistics
3. Snap test and Open Book test
4. Architectural – To be build the procedures
5. Extempore – Random concept to students
6. Interactive Sessions
7. Teaching through real world examples

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Model Question Paper Structure for SEE

STAT21C **Max.: 70Marks**

Min.Pass:28 Marks

Section – A

Answer the following **5 x 4M = 20M**

1. a) In Binomial distribution mean and variance are 4 and 3 respectively. Find mode of the distribution. (CO-1,L-2)

(OR)

b) Show that in Poisson distribution mean and variance are equal. (CO-1,L-2)

2. a) Write the properties of normal distribution. (CO-2,L-2)

(OR)

b) Obtain the mean and variance of Beta distribution of 2^{nd} kind . (CO-2,L-2)

3. a) Explain the types of correlation (CO-3,L-2)

(OR)

b) Define class and class frequency of an attribute with examples. (CO-3,L-2)

4. a) Write the properties of regression coefficients. (CO-4,L-2)

(OR)

b) Explain the concept of rank correlation. (CO-4,L-2)

5. a) Write the properties of multiple correlation coefficient. (CO-5,L-2)

(OR)

b) Write the properties of Regression coefficient. (CO-5,L-2)

Section – B

Answer the following **5 x 10M = 50M**

6. a) Define Binomial distribution and derive the recurrence relation for central moments (CO-1,L-2)

(OR)

b) (i) A book contain 43 mistakes in 585 pages. Find the probability that there will be no mistake in randomly selected 10pages of the book.

(ii) If a Poisson distribution such that $3P(x=1) = 2P(x=3)$. Find $P(2 \leq X \leq 5)$ (CO-1,L-2)

7. a) Show that mean, median and mode are equal in Normal distribution. (CO-2,L-2)

(OR)

b) In a distribution exactly normal, 7% of the items are under 35and 89% are under 63. What are the mean and standard deviation of the distribution. (CO-2,L-2)

8. a) Write the criteria for independence of three attributes. Find all the remaining class frequencies for the following set of frequencies. N= 23713, (A) = 1618, (B) = 2015, (C) = 770, (AB) = 587, (AC) = 335, (BC) = 428, (ABC) = 158 (CO-3,L-3)

(OR)

b) The male population of a particular state is 250lakhs. The number of literate males is 20 lakhs and total number of male criminals is 26000. The number of literate male criminals is 2000. Do you find any association between literacy ad criminality. (CO-3,L-3)

9. a) State the Karl Pearson's correlation coefficient and prove that it has between -1 and +1 (CO-4,L-2)

(OR)

b) Obtain the rank correlation coefficient of marks of 12 students in statistics and computer science given below (CO-4,L-3)

X	58	64	65	55	44	80	65	75	40	55	64	55

Y	52	48	45	62	45	68	62	82	44	45	74	62

10. a) Derive the regression equation of y on x (CO-5,L-2)

(OR)

b) Fit the power curve of the type $y = ax^b$ to the following data (CO-5,L-3)

X	3	5	8	10	12	13
Y	17	41	94	139	191	220

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Autonomous -ISO 9001 – 2015 Certified

Title of the Course: Probability Distributions and Statistical Methods Lab

Offered to: B.Sc (M.S.Cs) **Course Code: STAP21C**

Course Type: Core (P) **Year of Introduction: 2019-2020**

Year of Revision: 2021-22 **Percentage of Revision: 0%**

Semester: II **Credits: 1**

Hours Taught: 30periods **Max.Time: 2** Hours

Course Prerequisites (if any): Nil

S. No	Programme Outcomes
PO1.	**Effective Communication**: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology
PO2.	**Effective Citizenship**: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
PO3.	**Ethics:** Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.
PO4.	**Environment and Sustainability**: Understand the issues of environmental contexts and sustainable development
PO5.	**Critical Thinking**: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.
PO6:	**Specialized Skills / Transferable Skills:** Acquisition of communication and soft, analytical and technological skills that aid in enhancing
PO7.	**Self-directed and Life-long Learning:** Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

Course Outcomes:		
Course Outcome	Upon successful completion of this course, students should have the knowledge and skills to:	**Programme Outcomes Mapping**

CO 1	To fit a data into various theoretical probability distributions.	PO – 5
CO 2	Apply and Analyze the qualitative data	PO – 6
CO3	Identify the relations between the variables and estimate.	PO - 7

List of Practicals

1. (a) Fitting of Binomial distribution (Direct Method). (CO – 1)
   (b) Fitting of Binomial distribution (Recurrence Method).(CO – 1)
2. (a) Fitting of Poisson distribution (Direct Method).(CO – 1)
   (b) Fitting of Poisson distribution (Recurrence Method). (CO – 1)
3. (a) Fitting of Normal distribution (Areas Method). (CO – 1)
   (b) Fitting of Normal distribution (Ordinates Method). (CO – 1)
4. Computation of Yule's coefficient of association. (CO – 2)
5. Computation of Pearson's and Tcherprows coefficient of contingency(CO – 2)
6. (a) Computation of correlation coefficient for ungrouped data. (CO – 3)
   (b) Computation of correlation coefficient for grouped data. (CO – 3)
7. (a) Fitting of a straight line by the method of least squares. (CO – 3)
   (b) Fitting of a parabola by the method of least squares. (CO – 3)
   (c) Fitting of power curve $y = ax^b$ by the method of least squares. (CO – 3)
   (d) Fitting of exponential curves $y = ae^{bx}$ & $y = ab^x$ by the method of least squares.(CO-3)
8. (a) Construction of regression lines for the ungrouped data. (CO – 3)
   (b) Construction of regression lines for the grouped data.(CO – 3)

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Structure of Practical Paper

Total Marks: 50 Marks

(i) For Continuous Evaluation : 15 marks (Internal Evaluation)
(ii) For semester end Practical Examination : 35 marks (External Evaluation)

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Title of the Course: Sampling Techniques and Design of Experiments

Offered to: B.SC (MSCs) **Course Code: STAT 41B**

Course Type: Core (Theory) **Credits: 4**

Year of Introduction: 2022-23 **Semester: IV**

Hours Taught: 60periods. **Max.Time:** 3 Hours

Course Prerequisites: Basic Knowledge of Mathematics, Counting principles, distributions, Estimation and Testing of Hypothesis.

Course Description: This course helps the students to understand the various sampling ideas to conduct the socio economics studies. Introduces the basic concepts and principles of experimental design

Course Objectives:

1) To impart basic concepts in Sampling Theory.
2) To explore various sampling techniques and understand their merits and drawbacks.
3) To understand the basic terminology in experimental design.
4) To develop the students ability to plan an experiment.
5) Obtaining relevant information from the experiment in relation to the statistical hypothesis under study.

Learning Outcomes: At the end of the course, the student will

1) Acumen to apply for collecting data for various studies.
2) ability to understand the design for comparing the various fields.
3) develop the skill of identifying important inputs that impact the output.

S. No	Programme Outcomes
PO1.	**Effective Communication**: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology
PO2.	**Effective Citizenship**: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

PO3.	**Ethics:** Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.
PO4.	**Environment and Sustainability**: Understand the issues of environmental contexts and sustainable development

PO5.	**Critical Thinking**: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.
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PO7.	**Self-directed and Life-long Learning:** Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

Course Outcomes:		
Course Outcome	Upon successful completion of this course, students should have the knowledge and skills to:	**Programme Outcomes Mapping**
CO 1	To understand the principles and principal steps of sampling, and different sampling techniques. Apply different sampling techniques to take samples and computeunbiased estimates and confidence limits of population parameters.	PO - 5
CO 2	To analyse the unbiasedness and efficiencies of estimates obtained using different sampling techniques.	PO - 6
CO3	To understand the basic concepts and principles of experimental designs.	PO - 5
CO 4	To Analyze the various design of experiment concepts and missing plot techniques.	PO - 6
CO 5	To Identify the factors and variable for the experiment for building statistical model.	PO - 7

Syllabus

Unit	Learning Units	Lecture Hours
I	**Introductory Concepts of sampling :** Concepts of Population and Sample, Basic principles of sample survey, The principles steps in a sample survey, Complete enumeration Vs Sampling, Sampling and non-sampling errors, Limitations of sampling, Types of sampling, Non Probability sampling methods, Probability sampling methods **Simple Random sampling:** SRSWR definition and procedure of selecting a sample, SRSWOR definition and procedure of selecting a sample , expectation of sample mean	**12**

	and variance of sample mean in srswor and srswr, advantages and disadvantages.	
II	**Stratified random sampling:** Stratified random sampling, Advantages and Disadvantages Allocation and types of allocation. Estimation of population mean, and its variance. Comparison between proportional and optimum allocations with SRSWOR. **Systematic sampling:** Procedure of construction, types, merits and demerits of systematic sampling. Comparison of systematic sampling with Stratified and SRSWOR	**12**
III	**Analysis of variance :** Analysis of variance(ANOVA) –Definition and assumptions. One-way classification, Two way classification.(one observation per cell) **Design of Experiments:** Terminology, Principles of design of experiments, CRD: Layout, advantages and disadvantage and Statistical analysis of Completely Randomized Design(C.R.D)	**12**
IV	Randomized Block Design (R.B.D) and Latin Square Design (L.S.D) with their layouts, advantages and disadvantage and Statistical analysis, Missing plot technique in RBD and LSD. Efficiency RBD over CRD, Efficiency of LSD over RBDand CRD.	**12**
V	**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.	**12**

Text Book:

Fundamentals of Applied Statistics, 11th Edition, 2010, S. C. Gupta and V. K. Kapoor, Sultan Chand & Sons, New Delhi

Reference Books:

1. B.A/B.Sc. Second Year Statistics(2010) , Telugu Akademi, Hyderabad.
2. Mathematical Statistics with Applications, 2009, K.M.Ramachandran and Chris P.Tsokos Academic Press(Elsevier), Haryana .
3. Probability and Statistics, Volume I & II, D. Biswas, New central book Agency (P) Ltd, NewDelhi.
4. An outline of Statistical theory, Volume II,3rd Edition,2010(with corrections) A.M.Goon,M.K. Gupta, B.Dasgupta ,The World Press Pvt.Ltd., Kolakota.
5. Sanjay Arora and Bansi Lal:. New Mathematical Statistics, Satya Prakashan , New Delhi.

Websites of Interest: **http://onlinestatbook.com/rvls/index.html**

Co-Curricular Activities in the class:

1. Pictionary
2. Case Studies on topics in field of statistics

3. Snap test and Open Book test
4. Architectural – To be build the procedures
5. Extempore – Random concept to students
6. Interactive Sessions
7. Teaching through real world examples

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Model Question Paper Structure for SEE

Max.: 75 Marks **Course Code: STAT 41B** **Min. Pass : 30 Marks**

Model Paper

Section A

Answer any FIVE of the following. **5 x 5M = 25M**

1. Write a short note on ANOVA
2. Define the terms (i) Treatments (ii) Blocks (iii) Experimental error
3. Write the applications of Completely randomized design
4. Explain the layout of Latin square design
5. Explain the layout of Randomized block design
6. Write the advantages of simple random sampling
7. Explain the construction of stratified random sampling
8. Explain the advantages of systematic sampling

Section – B

Answer the following. **5 x 10M =50M**

9 a) Explain basic principles of sampling

(OR)

b) In SRSWOR, the sample mean square is an unbiased estimate of the population mean square

10 a) Show that $V(\overline{y_{st}})_{Ney} \leq V(\overline{y_{st}})_P \leq V(\overline{y_n})_R$

(OR)

b) If the population consists of a linear trend then Show that

$$V(\overline{y_{st}}) \leq V(\overline{y_{sys}}) \leq V(\overline{y_n})_R$$

11 a) Explain the principles of design of experiments

OR

b) Explain analysis of Completely randomized design

12 a) Explain analysis of Randomized block design

(OR)

b) Explain analysis of Latin square design

13 a) Explain analysis of 2^2 – factorial design

OR

b) Explain analysis of 2^3 – factorial design

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VUYYURU – 521165

Reaccredited at 'A' level by NAAC

Autonomous -ISO 9001 – 2015 Certified

Title of the Course : Sampling Techniques and Design of Experiments Lab

Offered to: B.SC (MSCs) **Course Code: STAT 41BP**

Course Type: Core (Practical) **Credits: 1**

Year of Introduction: 2022-23 **Semester: IV**

Hours Taught: 30periods **Max.Time: 2** Hours

Course Prerequisites (if any): Nil

S. No	Programme Outcomes
PO1.	**Effective Communication**: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology
PO2.	**Effective Citizenship**: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
PO3.	**Ethics:** Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.
PO4.	**Environment and Sustainability**: Understand the issues of environmental contexts and sustainable development
PO5.	**Critical Thinking**: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

PO6:	**Specialized Skills / Transferable Skills:** Acquisition of communication and soft, analytical and technological skills that aid in enhancing
PO7.	**Self-directed and Life-long Learning:** Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

Course Outcomes:		
Course Outcome	Upon successful completion of this course, students should have the knowledge and skills to:	**Programme Outcomes Mapping**
CO 1	To draw the sample from the population using sampling techniques	PO – 5
CO 2	To Construct suitable designed experiment for a given real life data.	PO - 6

List of Practicals

1. Simple random sampling with and without replacement. Comparison between SRSWR & SRSWOR
2. Stratified random sampling – proportional & optimum allocations. Comparison between proportional & optimum allocations with SRSWOR
3. Systematic sampling with N = nk. Comparison of systematic sampling with stratified and SRSWOR
4. Analysis of CRD
5. Analysis of RBD. Relative efficiency of RBD over CRD
6. Estimation of single missing observation in RBD and its analysis
7. Analysis of LSD. Relative efficiency of LSD over CRD and RBD
8. Estimation of single missing observation in LSD and its analysis
9. Analysis of 2^2 with RBD layout

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Structure of Practical Paper

Total Marks: 50 Marks

(i) For Continuous Evaluation : 10 marks (Internal Evaluation)
(ii) For semester end Practical Examination: 40 marks (External Evaluation)

A.G & S.G SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE

VUYYURU – 521165

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Autonomous -ISO 9001 – 2015 Certified

Applied Statistics

Offered to: B.SC (MSCS) / STAT01
Course Type: Core (Theory)
Year of Introduction: 2022-23 **Percentage of Revision: 0%**
Semester: IV **Credits: 4**
Hours Taught: 60 periods. per Semester **Max. Time:** 3 Hours
Course Prerequisites: Students required knowledge in Mathematics and Statistical techniques
Course Description: This course provides the study of data related to population growth, construction index numbers. Also this course deals with industry problems and analyse and get solutions.
Course Objectives:

1) To enable the students to develop basic knowledge in Applied Statistics
2) To provide understanding in some advanced statistical techniques which are used for solving business problems.

Learning Outcomes: At the end of the course, the student will

1) have the hands on practice of working on the data and interpreting the results.
2) Acquire to apply the techniques related solve the real business problems.

S. No	Programme Outcomes
PO1.	**Effective Communication**: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology
PO2.	**Effective Citizenship**: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
PO3.	**Ethics:** Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.
PO4.	**Environment and Sustainability**: Understand the issues of environmental contexts and sustainable development
PO5.	**Critical Thinking**: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these

	assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.
PO6:	**Specialized Skills / Transferable Skills:** Acquisition of communication and soft, analytical and technological skills that aid in enhancing
PO7.	**Self-directed and Life-long Learning:** Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

Course Outcomes:		
Course Outcome	Upon successful completion of this course, students should have the knowledge and skills to:	**Programme Outcomes Mapping**
CO 1	Measure the Mortality and Fertility rates and the construction of Life tables	PO - 4
CO 2	construct the Quality Control charts for Variables.	PO – 6
CO3	construct the Quality Control charts for Attributes	PO – 6
CO 4	Obtain the knowledge on asses the population growth by using vital statistics	PO - 7
CO 5	Helps asses the normalization processes of different scores and estimating the IQ levels.	PO - 6

Syllabus

Course Details

Unit	Learning Units	Lecture Hours
I	**Index Numbers** Basic problems involved in the construction of index numbers. Construction of index numbers - Simple aggregate, Weighted aggregate, Simple price relative and Weighted price relative methods. The criteria of good index number. Cost of living index number. Uses and Limitations of index numbers.	**12**
II	**Statistical Quality Control – I** Introduction. Basis of SQC. Uses of SQC. Types of controls – Process &Product. Construction of 3-σ limits. Construction of Mean ($\bar{x}$) and Range (R) charts. Interpretation of $\bar{x} and R charts$	**12**
III	**Statistical Quality Control – II** Construction of p and c charts - Fixed control limits. Interpretation of p and c - charts. Natural and Specification limits. Acceptance sampling inspection plans – AQL, LTPD, AOQL and ASN. OC curves.	**12**
IV	**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.	**12**
V	**Statistics in Psychology & Education**	**12**

	Introduction. Scaling procedures – Scaling of scores – Z or σ scores, Standard and normalized scores, T and Percentile scores. Reliability of test scores – Def. index and parallel tests. Methods of determining test reliability. Validity of test scores.	

Text Book:

1. S.C. Gupta, (2016), Seventh Edition, Fundamentals of Statistics, Mumbai: Himalaya Publishing House.

2. Fundamentals of Applied Statistics, 2014, S.C. Gupta and V.K. Kapoor ; Sutan Chand &Sons , New Delhi.

Reference Books:

1. Levine, D.M., Berenson, M. L. & Stephan, D. (2012*), Statistics for managers using Microsoft Excel*, New Delhi: Prentice Hall India Pvt.
2. Aczel, A. D. & Sounderpandian, J. (2011), *Complete Business Statistics*, New Delhi: Tata McGraw Hill.
3. Sharma, J. K. (2013), *Business statistics*, New Delhi: Pearson Education
4. Anderson, D., Sweeney, D., Williams, T., Camm, J., & Cochran, J. (2013), *Statistics for Business and Economics*, New Delhi: Cengage Learning.
5. Agarwal, B.L. Basic Statistics, New Age International Publishers, New Delhi, 6th edition 2013

Websites of Interest: **http://onlinestatbook.com/rvls/index.html**

Co-Curricular Activities in the class:

1. Pictionary
2. Case Studies on topics in field of statistics
3. Snap test and Open Book test
4. Architectural – To be build the procedures
5. Extempore – Random concept to students
6. Interactive Sessions
7. Teaching through real world examples

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Model Question Paper Structure for SEE

Max.: 75 Marks **Min. Pass: 30 Marks**

Applied Statistics

Section – A

Answer any Five of the following **5 x 5M = 25M**

1. Define SQC and write its uses (L- 1, CO – 2)
2. Explain 3 –σ limits (L – 2, CO – 2)
3. What are the applications of C- chart (L – 3, CO – 3)
4. Explain base shifting in index numbers (L – 2, CO – 1)
5. From the following data calculate Index Number by simple (i) aggregate and (ii) relative method (L – 3, CO – 1)

Commodity	A	B	C	D
Price in 1980	162	256	257	132
Price in 1981	171	164	189	145

6. Explain the sources of vital statistics (L – 2, CO – 4)
7. Explain reproduction rates (L – 2, CO – 4)
8. Explain scaling methods (L – 2, CO – 5)

Section – B

Answer all the questions **5 x 10M = 50M**

9. (a) Explain the basic problems involved in the construction of index numbers (L – 2, CO – 1)

OR

(b) Find the cost of living index number by family budget method from the following data (L – 5, CO – 1)

Commodities	Base Year	Current Year	% of Weights
	Price	Price	

A	20	26	17
B	28	31	29
C	34	40	20
D	92	95	34

10. (a) Explain different fertility rates (L – 2, CO – 4)

OR

(b) Fill in the blanks of the following table which are marked with ? (L – 2, CO – 4)

Age	l_x	d_x	q_x	p_x	L_x	e_x^o
20	693435	?	?	?	?	35081126
21	690673	-	-	-	-	?

11. (a) Explain the construction of mean and range charts (L – 2, CO – 2)

OR

(b) Explain the statistical basis of SQC (L – 2, CO – 2)

12. (a) Explain the construction of fraction defective chart (L – 2, CO – 3)

OR

(b) Explain the construction of number of defects per unit chart (L – 2, CO – 3)

13. (a) Letter grades A,B,C,D and E are assigned by two teachers X and Y to the students of class for Honesty. The table gives the distribution of the proportion of individuals in each rating (L – 5, CO – 5)

Teacher	A	B	C	D	E
X	0.10	0.15	0.50	0.20	0.05
y	0.20	0.40	0.20	0.10	0.10

OR

(b) Define reliability and validity tests. (L – 2, CO – 5)

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A.G & S.G SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE

VUYYURU – 521165

Reaccredited at 'A' level by NAAC

Autonomous -ISO 9001 – 2015 Certified

Applied Statistics

Offered to: B.SC (MSCS) / STAP01
Course Type: Core (Practical)
Year of Introduction: 2022-23 **Percentage of Revision: 0%**
Semester: IV **Credits: 1**
Hours Taught: 30periods. per Semester **Max.Time: 2** Hours

Course Prerequisites: Students required knowledge in Mathematics and Statistical techniques

Course Description: This course provides the study of data related to population growth, construction index numbers. Also this course deals with industry problems and analyse and get solutions.

Course Objectives:

1) To enable the students to develop basic knowledge in Applied Statistics
2) To provide understanding in some advanced statistical techniques which are used for solving business problems.

Learning Outcomes: At the end of the course, the student will

1) have the hands on practice of working on the data and interpreting the results.
2) Acquire to apply the techniques related solve the real business problems.

S. No	Programme Outcomes
PO1.	**Effective Communication**: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology
PO2.	**Effective Citizenship**: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
PO3.	**Ethics:** Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.
PO4.	**Environment and Sustainability**: Understand the issues of environmental contexts and sustainable development

PO5.	**Critical Thinking**: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.
PO6:	**Specialized Skills / Transferable Skills:** Acquisition of communication and soft, analytical and technological skills that aid in enhancing
PO7.	**Self-directed and Life-long Learning:** Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

Course Outcomes:		
Course Outcome	Upon successful completion of this course, students should have the knowledge and skills to:	**Programme Outcomes Mapping**
CO 1	Measure the Mortality and Fertility rates and the construction of Life tables	PO - 5
CO 2	construct the Quality Control charts for Variables and attribute charts	PO - 6
CO 3	Construct the various types of index numbers	PO - 6

Practical No	**Theme**	**Key Topics**
Applied Statistics		
1	Control Charts	Construction of Mean & Range charts
2	Control Charts	Construction of p & c charts
3	Index Numbers	Construction of Weighted index numbers
4	Index Numbers	Testing of good index number
5	Index Numbers	Construction of Whole sale price index number
6	Vital Statistics	Determining of Mortality rates
7	Vital Statistics	Determining of Fertility & reproduction rates
8	Vital Statistics	Construction of life tables
9	Psychology & Education	Scaling of ratings using Normal distribution

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