ST JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS)

VISAKHAPATNAM

DEPARTMENT OF STATISTICS

The Department of Statistics, St. Joseph's College for Women (A) seeks to serve BSc Programme students interested in careers related to Statistics. The department offers MStCs of BSc. programme. In order to cater to the diverse interests of students and employers, a total of 10 theory and 10 practical courses are offered as part of Statistics domain in all the combination.

Programme Specific Outcomes of BSc Programme with Statistics

PSO 1: To inculcate the concepts and applications of Descriptive Statistics and probability, Mathematical Expectation, Statistical methods, Statistical interferences, Sampling Techniques and Design of Experiments, Quality and reliability, Applied Statistics, Optimization Techniques, Operations research, Project work

PSO 2: Be able to apply theoretical / analytical / statistical knowledge gained in various courses of BSc to solve numerical problems based on real life situations during practicals and draw meaningful solutions to day to day problems like data analysis. Statistics has significant value and is used in areas from Government to big Business

PSO 3: Be able to access, explore an area to obtain information and use the literature in Statistics and also able to work as a member of a team.

Assessment Methodology

PSO 1: To inculcate the concepts and applications of Descriptive Statistics and probability, Mathematical Expectation, Statistical methods, Statistical interferences, Sampling Techniques and Design of Experiments, Quality and reliability, Applied Statistics, Optimization Techniques, Operations research, Project work

Direct method of computing PSO 1 attainment is based on the student performance in all assessment instruments namely online and offline - subjective and objective tests for all the courses offered. These exams test students' learning at knowledge, understanding and application levels in the respective courses. Indirect method of computing PSOs is done through students' course exit survey wherein a structured questionnaire is administered to the students

and their response is solicited on a 5 point scale. Responses are consolidated and students' satisfaction level with reference to course transaction is computed.

Average percentage of level of attainments of all the courses in Statistics: 80%

PSO 2: Be able to apply theoretical / analytical / statistical knowledge gained in various courses of B.Sc to solve numerical problems based on real life situations during Practical's and draw meaningful solutions to day to day problems like data analysis. Statistics has significant value and is used in areas from Government to big Business.

PSO 2 attainment level is ascertained based on internal assessment (mid semester) and summative assessment (end semester) in every semester. This direct assessment involves application of knowledge in solving / analyzing /exploring a real life situation / difficult problems and also testing students' knowledge.

Average percentage of level of attainments of all the practical courses in Statistics: 91%

PSO 3: Be able to access, explore an area to obtain information and use the literature in Statistics and also able to work as a member of a team.

This project work provides an opportunity for the student to apply knowledge and skills obtained in Statistics theory and practical course work. From a list of relevant application level topics provided by the dept., Students choose one topic for study, based on their own interest. The study is followed by collective report submission and individual oral presentation as a Elective Cluster in VI Semester. The objective of this project is to provide an understanding for the graduate business student on statistical concepts to include measurements of location and dispersion, probability, probability distributions, sampling, estimation, hypothesis testing, regression, and correlation analysis, multiple regression and business/economic forecasting. Attainment of this learning outcome is ensured and assessed by the concerned faculty member at every stage through direct as well as indirect guidance and monitoring.

Evaluation Process

For the Field Work	: 60
For the Project Report	: 40

For Viva Voce : 20

For Seminar Presentation on Project Work : 30

Total : 150

Level of attainment in all the projects done by the students: 90% (Bench mark)

Level of attainment measurement

Level of attainment of course outcomes includes both direct and indirect assessments. Direct assessment is done by testing the knowledge and/or skills of the student in that course by conducting standardised examinations. In indirect assessment we use the student feedback on course which is measured on 5 point scale. The sum of these two assessments is shown as the level of attainment of that course.

Assessment of all the theory courses is done in two parts, namely by formative assessment (40%**)** which is internal and summative assessment (60%) which is external**.** The evaluation of 100% of the assessment in each semester is distributed as follows:

Mid Semester Examination 1 15% (which is offline)

Mid Semester Examination 2 15% (which is online)

Accessory Assessment 5% (written quiz, Assignment etc.)

Attendance 5% (above 75% attendance will be rewarded)

End semester examination 60% (which is descriptive)

Assessment of all the practical courses: Assessment is done in two parts, namely by continuous assessment (40%**)** and summative assessment (60%). In internal assessment, will be assessed for 40% by the practical application knowledge. Summative assessment (60%) of practical courses is through end semester practical exams designed to test student's knowledge as well as skills in the conduct of practicals. This direct assessment involves application of knowledge in solving / analyzing /exploring a real life situation / difficult problems and also testing students' knowledge. Average percentage of level of attainments of all the practical

courses in Statistics is given below. A written record of practical work carried out throughout the semester is also assessed.

Course outcomes of all the courses offered by Statistics department

Code	Title of the paper	Outcomes
ST1201(3) (Th.)	Descriptive Statistics and Probability	**Students will able to** **CO1:** Explain various measures of central tendency **CO2:** Define central and non-central moments. **CO3:** Derive the limits of the Bowley's Co-efficient of Skewness **CO4:**State and prove addition theorem of Probability. **CO5:** State and Prove Boole's inequality. **CO6:** Explain various definition of Probability. **CO7:** Define axiomative definition of Probability **CO8:** what are the Properties of joint distribution function. **CO9:** Define statistic independence of random variables **CO10:** Calculate mean, Median, Mode for the following data.
Level of attainment of CO1 to CO10: 80%		
ST1251(2) (Pr)	Descriptive Statistics and Probability	**Students be able to apply theoretical / analytical / statistical knowledge gained in various courses of B.Sc to solve numerical problems based on real life situations during Practicals and draw meaningful solutions to day to day problems** **CO1:** Explain various measures of central tendency **CO2:** Define central and non-central moments. **CO3:** Derive the limits of the Bowley's Co-efficient of Skewness **CO4:** State and prove addition theorem of Probability. **CO5:** State and Prove Boole's inequality. **CO6:** Explain various definition of Probability.

		CO7: Define axiomative definition of Probability **CO8:** what are the Properties of joint distribution function. **CO9:** Define statistic independence of random variables **CO10:** Calculate mean ,Median, Mode for the following data
Level of attainment of CO1 to CO10: 92%		
ST2201(3) (Tr.)	Mathematical Expectation	**Students will able to** **CO1:** Define Mathematical Expectation of a random variable. **CO2:** State and Prove Multiplication theorem of expectations. **CO3:** Given the properties of variance and co-variance. **CO4:** Define Moment generating function. **CO5:** Derive recurrence relation for Moments of Binomial distribution. **CO6:** Obtain Mean and variance through Mgf. **CO7:**Prove that normal distribution as a Limiting case of Binomial distribution **CO8:** Describe Poisson distribution n and S.T meanly variance of Poisson distribution are equal. **CO9:** State and Prove reproductive property of Poisson Distribution **CO10:** S.T normal distribution n as a limiting case of Poisson distribution
Level of attainment of CO1 to CO10: 84%		
ST2251(2) (Pr.)	Mathematical Expectation	**Students be able to apply theoretical / analytical / statistical knowledge gained in various courses of B.Sc to solve numerical problems based on real life situations during Practicals and draw meaningful solutions to day to day problems** **CO1:** Define Mathematical Expectation of a random

		variable. **CO2:** State and Prove Multiplication theorem of expectations. **CO3:** Given the properties of variance and co-variance. **CO4:** Define Moment generating function. **CO5:** Derive recurrence relation for Moments of Binomial distribution **CO6:** Obtain Mean and variance through Mgf. **CO7:**Prove that normal distribution as a Limiting case of Binomial distribution. **CO8:**DescribePoisson distribution n and S.T meanly variance of Poisson distribution are equal. **CO9:** State and Prove reproductive property of Poisson Distribution **CO10:** S.T normal distribution as a limiting case of Poisson distribution
Level of attainment of CO1 to CO10: 94%		
ST3201(3) (Th.)	Statistical Methods	**Students will able to** **CO1**: Define correlation and write the properties of correlation **CO2:** Fit a straight line of the form Y=a + bx by using Legendre's principle of least squares **CO3:** Fit an exponential curve of type i) Y = abx ,ii) Y= ae bx by using principle of least squares **CO4:**Explain the conditions for consistency of data **CO5:** Derive the relationships between t and f ,f & x2 **CO6:** Illustrate the applications of X2 , t and F distribution. **CO7:** Define Fisher t statistic and Drive pdt of Fisher t distribution **CO8:**Find the relation between association and colligation **CO9:** Illustrate the measures of correlation ratio

		CO10: Explain the concept of order of class
Level of attainment of CO1 to CO10: 75%		
ST3251(2) (Pr.)	Statistical Methods	**Students be able to apply theoretical / analytical / statistical knowledge gained in various courses of B.Sc to solve numerical problems based on real life situations during Practicals and draw meaningful solutions to day to day problems** **CO1**: Define correlation and write the properties of correlation **CO2:** Fit a straight line of the form Y=a + bx by using Legendre's principle of least squares **CO3:** Fit an exponential curve of type i) Y = abx ,ii) Y= ae bx by using principle of least squares **CO4:**Explain the conditions for consistency of data **CO5:** Derive the relationships between t and f ,f & x2 **CO6:** Illustrate the applications of X2 , t and F distribution. **CO7:** Define Fisher t statistic and Drive pdf of Fisher t distribution. **CO8:** Find the relation between association and colligation **CO9:** Illustrate the measures of correlation ratio **CO10:** Explain the concept of order of class.
Level of attainment of CO1 to CO10: 86%		
ST4201(3) (Th.)	Statistical Interference	**Students will able to** **CO1:** Write the characteristics of good estimator. **CO2:** Define Population, sample, parameter, Statistic, Standard error, Sampling Distribution. **CO3:** State and Prove invariance Properties of consistency. **CO4:** State and prove sample Mean is an unbiased estimator of population mean. **CO5:** State and Prove crammer Rao inequality. **CO6:** To find the X2 test for goodness of fit.

		CO7: Find the H.L.E of ƛ is Poisson distribution. **CO8:** obtain BCR for testing Ho: μ= μo against H1:μ=μ1 for the normal Population. **CO9:** obtain 95% confidence interval force when σ is known as normal Population. **CO10:** Explain t test for difference of means.
Level of attainment of CO1 to CO10: 82%		
ST4251(2) (Pr.)	Statistical Interference	**Students be able to apply theoretical / analytical / statistical knowledge gained in various courses of B.Sc to solve numerical problems based on real life situations during Practicals and draw meaningful solutions to day to day problems** **CO1:** Write the characteristics of good estimator. **CO2:** Define Population, sample, parameter, Statistic, Standard error, Sampling Distribution. **CO3:** State and Prove invariance Properties of consistency. **CO4:** State and prove sample Mean is an unbiased estimator of population mean. **CO5:** State and Prove crammer Rao inequality. **CO6:** To find the X2 test for goodness of fit. **CO7:** Find the H.L.E of ƛ is Poisson distribution. **CO8:** obtain BCR for testing Ho: μ= μo against H1: μ=μ1 for the normal Population. **CO9:** obtain 95% confidence interval force when σ is known as normal Population. **CO10:** Explain t test for difference of means.
Level of attainment of CO1 to CO10: 90%		
ST5201(3) (Th.)	Sampling Techniques	**Students will able to** **CO1:** In SRSWOR , State the sample mean is an unbiased estimator of the Population Mean **CO2:** Derive the Neyman allocation in stratified sample.

		CO3: What are Principle steps involved in conducting a sample Survey **CO4:** Give the merits and limitations of sample random sampling **CO5:** Explain Analysis of variance of one way Classification **CO6:** Illustrate the principle of experimental design **CO7:**Describe randomised Block design and Discuss its Merits and Demerits **CO8:** Explain the technique of Anova ,What are the assumption CO9: Discuss the efficiency of RBD over CRD and that of LSD over RBD and CRD CO10: Define experimental error and how to control it
Level of attainment of CO1 to CO10: 85% (Bench mark)		
ST5251(2) (Pr)	Sampling Techniques	**Students be able to apply theoretical / analytical / statistical knowledge gained in various courses of B.Sc to solve numerical problems based on real life situations during Practicals and draw meaningful solutions to day to day problems** **CO1:** In SRSWOR , State the sample mean is an unbiased estimator of the Population Mean **CO2:** Derive the Neyman allocation in stratified sample. **CO3:** What are Principle steps involved in conducting a sample Survey **CO4:** Give the merits and limitations of sample random sampling **CO5:** Explain Analysis of variance of one way Classification **CO6:** Illustrate the principle of experimental design **CO7:** Describe randomised Block design and Discuss its

		Merits and Demerits **CO8:** Explain the technique of Anova ,What are the assumption **CO9:** Discuss the efficiency of RBD over CRD and that of LSD over RBD and CRD **CO10:** Define experimental error and how to control it
Level of attainment of CO1 to CO10: 90% (Bench mark)		
ST5202(3) (Th.)	Quality and Reliability	**Students will able to** **CO1:** How do you construct fraction defective and number of defective charts. **CO2:** Define statistical quality control. **CO3:** Give the importance of Statistical Quality control in industry. **CO4:** Estimate the mean life of exponential distribution. **CO5:** Derive the reliability function and its estimation. **CO6:** Explain single and Double sampling plans for attributes give their OC and ASN function. **CO7:**Explain exponential distribution as life model and its memory less property. **CO8:** Find the control limit for number of defect charts. **CO9:** Construct X and S charts and check whether the process is under statistical control. **CO10:** Compute the failure density, failurerate, reliability and Probability of Failure.
Level of attainment of CO1 to CO10: 85% (Bench mark)		
ST5252(2) (Pr.)	Quality and Reliability	**Students be able to apply theoretical / analytical / statistical knowledge gained in various courses of B.Sc to solve numerical problems based on real life situations during Practicals and draw meaningful solutions to day to day problems** **CO1:** How do you construct fraction defective and number

		of defective charts. **CO2:** Define statistical quality control. **CO3:** Give the importance of Statistical Quality control in industry. **CO4:** Estimate the mean life of exponential distribution. **CO5:** Derive the reliability function and its estimation. **CO6:** Explain single and Double sampling plans for attributes give their OC and ASN function. **CO7:**Explain exponential distribution as life model and its memory less property. **CO8:** Find the control limit for number of defect charts. **CO9:** Construct X and S charts and check whether the process is under statistical control. **CO10:** Compute the failure density, failure rate, reliability and Probability of Failure.
Level of attainment of CO1 to CO10: 90% (Bench mark)		
ST-E1-6201(3) (TH)	APPLIED STATISTICS	**Students will able to** **CO1:** Predict the future values of the series **CO2:** Find the number of births, marriages and deaths. **CO3:** Explain the criteria of good index numbers. **CO4:** Compute the agricultural, area, yield of statistics, national income. **CO5:** Define vital statistics. **CO6:** Explain various death rates. **CO7:** Illustrate birth rates-CBR, ASFR, TFR. **CO8:** Explain the reproduction rates. **CO9:** Explain the uses of life tables and abridged life tables. **CO10:** Explain the deflation of index numbers.
Level of attainment of CO1 to CO10: 85% (Bench mark)		
ST-E1-6251(2)	APPLIED STATISTICS	**Students be able to apply theoretical / analytical / statistical knowledge gained in various courses of B.Sc to**

(Pr.)		**solve numerical problems based on real life situations during Practicals and draw meaningful solutions to day to day problems** **CO1:** Predict the future values of the series **CO2:** Find the number of births, marriages and deaths. **CO3:** Explain the criteria of good index numbers. **CO4:** Compute the agricultural, area, yield of statistics, national income. **CO5:** Define vital statistics. **CO6:** Explain various death rates. **CO7:** Illustrate birth rates-CBR,ASFR,TFR. **CO8:** Explain the reproduction rates. **CO9:** Explain the uses of life tables and abridged life tables. **CO10:** Explain the deflation of index numbers.
Level of attainment of CO1 to CO10: 90% (Bench mark)		
ST-A1-6201(3) (Th.)	Optimization Techniques Cluster(A1)	**Students will able to** **CO1:** Find the Optimal solution of an Optimization problem **CO2:** Solve the Graphical Solution of LPP. **CO3:** Explain the method to resolve Degeneracy. **CO4:** Find the linear programming problems by Big M method. **CO5:** Draw the network representation of CPM. **CO6:** Explain the Gromarey's cutting plane method. **CO7:** State the fundamental theorem of Duality. **CO8:** Illustrate the general rules of converting any primal to into its dual.
Level of attainment of CO1 to CO10: 85% (Bench mark)		
ST –A1-6251(2) (Pr.)	Optimization Techniques Cluster(A1)	**Students be able to apply theoretical / analytical / statistical knowledge gained in various courses of B.Sc to solve numerical problems based on real life situations**

		during Practicals and draw meaningful solutions to day to day problems **CO1:** Find the Optimal solution of an Optimization problem **CO2:** Solve the Graphical Solution of LPP. **CO3:** Explain the method to resolve Degeneracy. **CO4:** Find the linear programming problems by Big M method. **CO5:** Draw the network representation of CPM. **CO6:** Explain the Gromarey's cutting plane method. **CO7:** State the fundamental theorem of Duality. **CO8:** Illustrate the general rules of converting any primal to into its dual.
Level of attainment of CO1 to CO10: 90% (Bench mark)		
ST-A2-6201(3) (Th.)	Operation research Cluster(A2)	**Students will able to** **CO1:** Explain the scope of OR **CO2:** Explain role of computer in OR. **CO3:** Find an initial basic feasible solution (IBFS). **CO4:** Find the optimal solution by using MODI method. **CO5:** Compute the balanced and unbalanced assignment problem. **CO6:** Solve the unbalanced transportation Problem. **CO7:** Solve game theory by LLP. **CO8:** Compute the MXNJOBS. **CO9:** Define the GAME, ZEROSUMGAME, and SADDLE Point. **CO10:** Explain fundamental theorem of 2 x2 Games.
Level of attainment of CO1 to CO10: 85% (Bench mark)		
ST-A2-6252(2) (PR.)	Operation research Cluster(A2)	**Students be able to apply theoretical / analytical / statistical knowledge gained in various courses of B.Sc to solve numerical problems based on real life situations**

		during Practicals and draw meaningful solutions to day to day problems **CO1:** Explain the scope of OR **CO2:** Explain role of computer in OR. **CO3:** Find an initial basic feasible solution (IBFS). **CO4:** Find the optimal solution by using MODI method. **CO5:** Compute the balanced and unbalanced assignment problem. **CO6:** Solve the unbalanced transportation Problem. **CO7:** Solve game theory by LLP. **CO8:** Compute the MXNJOBS. **CO9:** Define the GAME, ZERO SUMGAME, and SADDLE Point. **CO10:** Explain fundamental theorem of 2 x2 Games.
Level of attainment of CO1 to CO10: 90% (Bench mark)		
ST –A3-6201(3)	PROJECT WORK (Theory & Practical)	**Students will able to** **CO1:** How to calculate and apply measures of location and measures of dispersion. **CO2:**how to apply discrete and continuous probability distribution to various business problems **CO3:** calculate confidence interval of a population parameter for single sample and sample cases **CO4:** Test the chi-square test for goodness of fit.
Level of attainment of CO1 to CO10: 90% (Bench mark)		