C. U. SHAH UNIVERSITY

WADHWAN CITY

FACULTY OF SCIENCES

B.Sc.

SEM-IV

Syllabi (CBCS) Statistics

C. U. SHAH UNIVERSITY

FACULTY OF SCIENCES

DEPARTMENT OF MATHEMATICS

COURSE: B.Sc.   **SEMESTER: IV**
SUBJECT NAME: Sample Surveys and Design of Experiments
SUBJECT CODE: 4SC04SSD1
Teaching & Evaluation Scheme:-

Teaching hours/week				Credit	Evaluation Scheme/semester							
					Theory				Practical			Total Marks
Th	**Tu**	**Pr**	**Total**		Sessional Exam		University Exam		Internal		University	
					Marks	**Hrs**	**Marks**	**Hrs**	**Pr**	**TW**		
3	**0**	**0**	**3**	**3**	30	1.5	70	3	--	--	--	100

Objectives: -The objectives of this course are
- To understand the different survey techniques of statistics.
- To analyze the problems of testing of statistical estimations.

Prerequisites: - Students must be familiar with the use of scientific calculator with statistical operations.

Course outline:-

Sr. No.	Course Contents	Hours
1	Sample Surveys: Concepts of population and sample. Complete enumeration vs. sample enumeration. Need for sampling. Principal and organizational aspects in the conduct of a sample survey. Properties of a good estimator.	09
2	Sampling and non-sampling errors. SRSWR & SRSWOR, determination of sample size. Stratified random sampling and different allocations. Systematic sampling, comparison of known sampling strategies under linear trend.	09
3	Ratio and Regression estimators and their comparison with SRSWOR estimator. Indian Official Statistics: Present Official Statistical System in India relating to census of population, agriculture, industrial production, and prices; methods of collection of official statistics, their reliability and limitation and the principal publications containing such statistics.	09

4	The various agencies responsible for the data collection- C.S.O., N.S.S.O., Office of Registrar General, their historical development, main functions and important publications. Analysis of variance and covariance: Analysis of variance and covariance (with one concomitant variable) in one-way and two-way classified data with equal number of observations per cell.	09
5	Design of experiments: Principles of experimentation, uniformity trails, completely randomized, Randomized block and Latin square designs. Missing plot technique, 2^2 and 2^3 Factorial experiments: construction and analysis. Regression Analysis: Two variable linear model – estimation, testing and problems of predication. Predication of the estimated regression equation, interval estimation, variance estimation	09

Learning Outcomes:-

After the successful completion of the course, students will be able to
- Understand the different survey techniques of statistics.
- Analyze the problems of testing of statistical estimations.

Books Recommended:-

1. 'Sampling Techniques', **W.G. Cochran**, John Wiley and Sons, *New York, 1997.*
2. 'Fundamentals of Statistics (Vol. II), 8th Ed.', **A.M. Goon, M.K. Gupta, and B. Dasgupta**, *World Press, Kolkata, 2005*.
3. 'An Outline of Statistical Theory (Vol. II), 3rd Ed.', **A.M. Goon, M.K. Gupta and B. Dasgupta**, *World Press, Kolkata, 2005*.
4. 'Fundamentals of Applied Statistics, 4th Ed.', S.C. **Gupta and V.K. Kapoor**, *Sultan Chand and Sons, 2008.*
5. 'A Course in Linear Models', **A.M. Kshirsagar**, *Marcel Dekker, Inc., N.Y., 1983*.
6. 'Designs and Analysis of Experiments', D.C. Montgomery, **John Wiley and Sons**, *New York, 2001.*
7. 'VD.C. Montgomery, 3rd Ed.', **E.A. Peak and G.G. Vinning**, *John Wiley and Sons, 2006*.
8. 'Theory and Methods of Surveys Sampling', **P. Mukhopadhyay**, *Prentice Hall of India, 1998.*

E-Resources:-

1. www.iasri.res.in/ebook/EB_SMAR/e-book.../13-Planning.pdf
2. home.iitk.ac.in/~shalab/anova/chapter12-anova-analysis-covariance.pdf
3. www.springer.com/cda/content/document/.../9780387460994-c2.pdf?...
4. https://books.google.co.in/books?isbn=0470317140

C. U. SHAH UNIVERSITY

FACULTY OF SCIENCES

DEPARTMENT OF MATHEMATICS

COURSE: B.Sc.   **SEMESTER: IV**

SUBJECT NAME: Advanced Statistical Methods   **SUBJECT CODE: 4SC04ASM1**

Teaching & Evaluation Scheme:-

Teaching hours/week				Credit	Evaluation Scheme/semester							
					Theory				Practical			
Th	Tu	Pr	Total		Sessional Exam		University Exam		Internal		University	Total Marks
					Marks	Hrs	Marks	Hrs	Pr	TW		
3	0	0	3	3	30	1.5	70	3	--	--	--	100

Objectives: -The objectives of this course are
- To understand the theory of attributes.
- To analysis the data via different statistical tests.

Prerequisites: - Students must be familiar with the use of scientific calculator with statistical operations

Course outline:-

Sr. No.	Course Contents	Hours
1	Theory of attributes: Consistency of data, conditions of Consistency, independence and association of attributes, measure of association and contingency Sampling Distributions.	09
2	Definition of random sample, parameter and statistic, Sampling distribution of a statistic, standard errors of sample mean, sample proportion and sample moments. Sampling distribution of sample mean and sample variance for normal distribution.	09
3	Sampling distributions of Chi-square, t and F statistics. distribution of sample correlation coefficient r when $\rho=0$ Tests of significance: Review of Null and alternative hypotheses, level of significance and probabilities of Type I and Type II errors.	09

4	Review of critical region and power of test. Large sample test, single proportion and difference of two proportions, single mean and difference of two means.	09
5	Small sample test: Chi-square, t and F Distributions. Order Statistics: Distribution of r-th order statistic, smallest and largest order statistics.	09

Learning Outcomes:-

After the successful completion of the course, students will be able to
- Understand the theory of attributes.
- Analysis the data via different statistical tests.

Books Recommended:-

1. 'An Outline of Statistical Theory (Vol. I)', 4th Ed., **A.M. Goon, M.K. Gupta and B. Dasgupta**, *World Press, Kolkata, 2003.*
2. 'Fundamentals of Mathematical Statistics, 11th Ed.', **S.C. Gupta and V.K. Kapoor**, *Sultan Chand and Sons, 2007*.
3. 'Introduction to Mathematical Statistics, 6th Ed.', **R.V. Hogg, A.T. Craig and J.W. Mckean**, *Pearson Education, 2005*.
4. 'Mathematical Statistics, 2nd Ed.', **P. Mukhopadhyay**, *Books and Allied (P) Ltd., 2000*.
5. 'An Introduction to Probability and Statistics, 2nd Ed.', **V.K. Rohtagi and A.K. Md. E. Saleh**, *John Wiley and Sons, 2009*.

E-Resources:-
1. www.assignmenthelp.net/assignment_help/theory-of-attributes
2. www.stata.com › Resources & support
3. www.graphpad.com/guides/prism/6/statistics/stat_semandsdnotsame.htm

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FACULTY OF SCIENCES

DEPARTMENT OF MATHEMATICS

COURSE: B.Sc.   **SEMESTER: IV**
SUBJECT NAME: Queueing and Reliability Theory   **SUBJECT CODE: 4SC04QRT1**

Teaching & Evaluation Scheme:-

Teaching hours/week				Credit	Evaluation Scheme/semester							
					Theory				Practical			Total Marks
Th	**Tu**	**Pr**	**Total**		Sessional Exam		University Exam		Internal		University	
					Marks	**Hrs**	**Marks**	**Hrs**	**Pr**	**TW**		
3	**0**	**0**	**3**	**3**	30	1.5	70	3	--	--	--	100

Objectives: -The objectives of this course are
- To understand the concept of queueing theory.
- To understand the concept of reliability.

Prerequisites: - Students must be familiar with the use of scientific calculator with statistical operations.

Course outline:-

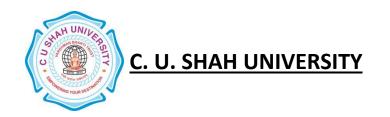| Sr. No.	Course Contents	Hours
1	General concepts of queueing system, Measures of performance, Arrival and Service Processes.	09
2	Single srver and multi-server models, Channels in parallel with limited and unlimited queues M/M/1/K, M/M/C. Queues with unlimited service.	09
3	Finite source queues, Application of simple queueing decision model's, Design and control models, Basics of reliability.	09
4	Classes of life distributions, Series, parallel, configurations. Reliability models, Reliability.	09
5	Mean Time before failure and Hazard rate of Exponential and Weibull distributions, Concepts and definitions of preventive maintenance, corrective maintenance and age replacement.	09

Learning Outcomes:-

After the successful completion of the course, students will be able to
- Understand the concept of queueing theory.
- Understand the concept of reliability.

Books Recommended:-

1. ' Introduction to Queueing Theory, 2nd Ed'., **R.B. Cooper**, *North Holland, 1981.*
2. 'An Introduction to Queueing Theory: Modelling and Analysis in Applications (Statistics for Industry and Technology)', **U.N. Bhat**, *Birkhauser Boston, 2008*.
3. 'Foundations of Queueing Theory', **U.N. Prabhu**, *International Series in Operations* Research & Management Science, Kluwer Academic Publishers, 2nd Ed., 2002.
4. 'Optimization and Probability in Systems Engineering',**John G. Rau**, *V.N. Reinhold Co., 1970.*
5. 'Maintenance for Industrial Systems,**Riccardo Manzini', Alberto Regattieri, Hoang Pham,** *Emilio Ferrai Springer-Verlag, London Limited, 2010*.
6. 'Contributions to Hardware and Software Reliability', **P.K. Kapur, R.B. Garg, S. Kumar**, *World Scientific, Singapore, 1999*.

E-Resources:-
1. https://en.wikipedia.org/wiki/Queueing_theory
2. https://www.scss.tcd.ie/~houldinb/Index/Simulation_files/sslides9.pdf
3. https://books.google.co.in/books?isbn=9814496529
4. https://en.wikipedia.org/wiki/Weibull_distribution

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DEPARTMENT OF MATHEMATICS

COURSE: B.Sc.   **SEMESTER: IV**
SUBJECT NAME: Applied Statistics   **SUBJECT CODE: 4SC04APS1**

Teaching & Evaluation Scheme:-

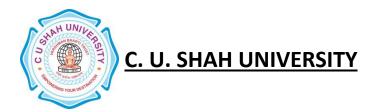| Teaching hours/week				Credit	Evaluation Scheme/semester							
					Theory				Practical			Total Marks
Th	Tu	Pr	Total		Sessional Exam		University Exam		Internal		University	
					Marks	Hrs	Marks	Hrs	Pr	TW		
3	0	0	3	3	30	1.5	70	3	--	--	--	100

Objectives: -The objectives of this course are
- To understand the economical statistics.
- To analysis age-specific and total fertility rates.

Prerequisites: - Students must be familiar with the use of scientific calculator with statistical operations.

Course outline:-

Sr. No.	Course Contents	Hours
1	Economics Statistics: Time Series Analysis-economic time series, different components, Illustrations, additive and multiplicative models, determination of trend, analysis of seasonal fluctuations.	09
2	Index numbers-criteria for a good index number. Different types of index numbers, Construction of index numbers of prices and qualities. Cost of living index number. Uses and limitations of index numbers. Statistical Quality Control: Importance of statistical methods in industrial research and practice, determination of tolerance limits, general theory of control charts.	09
3	Process and product control, causes of variation in quality, control limits, summary of out of control criteria, charts for attributes-p-chart, np-chart, c-chart; charts for variables- $\bar{X}$, R and s-charts, principles of acceptance sampling, problem of lot acceptance, producer's and consumer's risks, single sampling instruction plan and its OC and ASN functions.	09

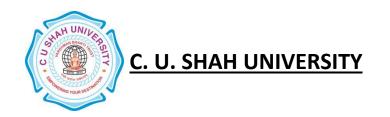| 4	Concepts of AQL, LTPD, AOQL, ATI functions; Dodge and Romig Tables. Demographic Methods: Sources of demographic data-census, register, ad hoc surveys, hospital records, demographic profiles of Indian census.	09
5	Questionnaire, errors in these data and their adjustment. Measurements of Mortality-CDR, SDR (w.r.t. age and sex), IMR, standardized death rate, complete life table, its main features and uses. Measurements of fertility and reproduction CBR, General, Age-specific and total fertility rates, GRR, NRR.	09

Learning Outcomes:-

After the successful completion of the course, students will be able to
- To understand the economical statistics.
- To analysis age-specific and total fertility rates.

Books Recommended:-

1. ' An Outline of Statistical Theory (Vol. I), 4th Ed'., **A.M. Goon, M.K. Gupta and B. Dasgupta**, *World Press, Kolkata, 2003*.
2. 'Fundamentals of Applied Statistics, 11th Ed ',**S.C. Gupta and V.K. Kapoor**, *Sultan Chand and Sons, 2007.*
3. 'Mathematical Statistics, 2nd Ed' , **P. Mukhopadhyay**, *Books and Allied (P) Ltd., 2000*.
4. 'Applied General Statistics'**, F.E. Croxton and D.J. Cowden**, *Prentice Hall of India, 1969*.
5. 'The Advanced Theory of Statistics (Vol. III)', **M.G. Kendall and A. Stuart**, *Macmillan Publishing Co. Inc., 1977.*
6. 'Introduction to Statistical Quality Control'**, D.C. Montgomery**, *John Wiley and Sons, New York, 1996.*

E-Resources:-
1. https://en.wikipedia.org/wiki/Time_series
2. www.encyclopedia.com/doc/1G2-3045000562.html
3. www.geo.hunter.cuny.edu/~imiyares/standard.htm

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DEPARTMENT OF MATHEMATICS

COURSE: B.Sc.   **SEMESTER: IV**
SUBJECT NAME: Statistics Practical-II   **SUBJECT CODE: 4SC04STP1**

Teaching & Evaluation Scheme:-

Teaching hours/week				Credit	Evaluation Scheme/semester						
					Theory				Practical		Total Marks
					Sessional Exam		University Exam		Internal		University	
Th	Tu	Pr	Total		Marks	Hrs	Marks	Hrs	Pr	TW	University	
0	0	6	3	3	-	-	--	-	20	10	70	100

Objectives: -The objectives of this course are
- To understand the economical statistics.
- To analysis age-specific and total fertility rates.
- To analyze co-relation and regression and different statistical tests.

Prerequisites: - Students must be familiar with the use of scientific calculator with statistical operations.

Course outline:-

Sr. No.	Course Contents	Hours
1	Problems based on Time Series Analysis-economic time series.	02
2	Problems based on Process and product control.	02
3	Problems based on AQL, LTPD, AOQL, ATI functions.	02
4	Problems based queueing system, Measures of performance, Arrival and Service Processes..	02
5	Problems based on Queues with unlimited service.	02
6	Problems based on Reliability models, Reliability.	02
7	Problems based on standard errors of sample mean and sample proportion.	02
8	Problems based on Hypothesis Testing.	02
9	Problems based on Tests of significance based on chi-square.	02
10	Problems based on Simple Linear Regression Model.	02

| 11 | Problems based on Two Variable Case Estimation of model by method of ordinary least squares | 02 |
| 12 | Problems based on functional forms of regression models; qualitative (dummy) independent variables. | 02 |

Learning Outcomes:-

After the successful completion of the course, students will be able to
- Understand the economical statistics.
- Analysis Age-specific and total fertility rates.
- Analyze co-relation and regression and different statistical tests.

Books Recommended:-

1. ' Probability and Statistics for Engineers', **Jay L. Devore**, *Cengage Learning, 2010*.
2. 'An Introduction to Mathematical Statistics and its Applications', **Richard J. Larsen and Morris L. Marx**, *Prentice Hall, 2011*.
3. ' Introduction to Queueing Theory, 2nd Ed'., **R.B. Cooper**, *North Holland, 1981*.
4. V D. Gross, **C. M. Harris**, *John Wiley and Sons Inc. P. Ltd., 2002*.
5. 'An Introduction to Queueing Theory: Modelling and Analysis in Applications (Statistics for Industry and Technology)',**U.N. Bhat**, *Birkhauser Boston, 2008*

E-Resources:-

1. https://en.wikipedia.org/wiki/Time_series
2. www.encyclopedia.com/doc/1G2-3045000562.html
3. www.geo.hunter.cuny.edu/~imiyares/standard.htm
4. www.staff.city.ac.uk/~sm340/MSCQTRP/Lecture1term2Violations.pdf
5. www.slideshare.net/marcelloagp/gujarati-15588240
6. www.cog.brown.edu/courses/9/lec10.htm
7. https://www.otexts.org/fpp/5/1