SHRI GURU RAM RAI UNIVERSITY

[Estd. by Govt. of Uttarakhand, vide Shri Guru Ram Rai University Act no. 03 of 2017
& recognized by UGC u/s (2f) of UGC Act 1956]

SYLLABUS

FOR

BACHELOR OF ARTS/ BACHELOR OF SCIENCE (STATISTICS)

SCHOOL OF HUMANITIES AND SOCIAL SCIENCES

BASED ON NEP 2020

(Effective from Academic Session 2023-2024)

Shri Guru Ram Rai University Patel Nagar, Dehradun, Uttarakhand-248001

Bachelor of Arts/ Bachelor of Science (Statistics)

Duration of Programme: 3 Years

Based on National Education Policy (NEP) 2020

Basic Structure of UG Multidisciplinary Programme (with Two Core disciplines)

Type of Course

Discipline Specific Core (DSC)
Discipline Specific Elective (DSE)
General Elective (GE)
Ability Enhancement Courses (AEC)
Skill Enhancement Course (SEC)
Internship/Apprenticeship / Project/ Community Outreach (IAPC)
Value Addition course (VAC)

em I	Core Discpline Specific Core (DSC)	Elective-Discipline Specific Elective (DSE)	Elective- Generic Elective (GE)	Ability Enhancement Course (AEC)	Skill Enhancement Course (SEC)	(Internship/Apprenticeship /Project/ Community Outreach) (IAPC)	Value Addition Course (VAC)	Total credit
	Course/ credit distribution (Credits 4) Theory (4) or Theory + Practicum/Tutorial (3T+1L) or (3T+1T)	Course/ credit distribution (Credits 4) Theory (4) or Theory + Practicum/ Tutorial (3T+1L) or (3T + 1T)	Course/ credit distribution (Credits 4) Theory (4) or Theory + Practicum/ Tutorial (3T+1L) or (3T+1T)	Course/ credit distribution (Credits 2)	Course/ credit distribution (Credits 2)	Course/ credit distribution (Credits 2)	Course/ credit distribution (Credits 2)	22

Bachelor of Arts /Bachelor of Science

I	1. DSC 1 (A or B) (DSC A (STATISTICS) or DSC B – (B) (4) 2. DSC A1 (STATISTICS)- (4) 3. DSC B1(B)- (4)		Choose one from a pool of GE language courses GE – *Lang. 1 (4)	AEC – 1 (2)	Choose one from a pool of SEC courses SEC – 1 (2)		Choose one from a pool of VAC courses VAC – 1 (2)	22
II	1. DSC 2 (A or B) (DSC A- (STATISTICS) or DSC B – (B) (4) 2. DSC A2 (STATISTICS)- (4) 3. DSC B2(B)- (4)		Choose one from a pool of GE language courses GE – *Lang.2 (4)	AEC – 2 (2)	Choose one from a pool of SEC courses SEC – 2 (2)		Choose one from a pool of VAC courses VAC – 2 (2)	22
	Students on exit shall be awarded Undergraduate Certificate (in the field of Multidisciplinary study) after securing requisite 44 credits in semester I & II							Total = 44
III	1. DSC 3 (A or B) (DSC A- (STATISTICS)- or DSC B – (B (4) 2. DSC A3(STATISTICS)- (4) 3. DSC B3 (B)- (4)		Choose one from a pool of GE langua ge courses GE – *Lang. 3 (4)	AEC – 3 (2)	Choose one from SEC 3 – (2) OR Internship/Appre nticeship /Project/ Community Outreach (IAPC) – (2)	Choose one from a pool of VAC courses VAC – 3 (2)		22
IV	1. DSC 4 (A or B) (DSC A- (STATISTICS) or DSC B – (B) (4) 2. DSC A4 (STATISTICS)- (4) 3. DSC B4(B)- (4)		Choose one from a pool of GE langua ge courses GE – *Lang. 4 (4)	AEC – 4 (2)	Choose one from SEC 4 – (2) OR Internship/Appre nticeship /Project/ Community Outreach (IAPC) – (2)	Choose one from a pool of VAC courses VAC – 4 (2)		22
	Students on exit shall be awarded Undergraduate Diploma (in the field of Multidisciplinary study/Discipline) after securing requisite 88 credits in semester III & IV							Total = 88
V	1. DSC 5 (A or	Cho	Choose one from		Choose one from			22

	B) (DSC A-(STATISTICS) or DSC B – (B) (4) 2. DSC A5 (STATISTICS) (4) 3. DSC B5(B)- (4)	ose one fro m a poo l of cou rses , DS E 1 (A/ B) (4)	a pool of courses GE – 5 (4)		SEC 5 – (2) OR Internship/Apprenticeship /Project/ Community Outreach (IAPC) – (2)		
VI	1. DSC 6 (A or B) (DSC A-(STATISTICS) or DSC B – (B) (4) 2. DSC A6 (STATISTICS) - (4) 3. DSC B6(B)- (4)	Cho ose one fro m a poo l of cou rses , DS E 2 (A/ B) (4)	Choose one from a pool of courses GE – 6 (4)		Choose one from SEC 6 – (2) OR Internship/Apprenticeship /Project/ Community Outreach (IAPC) – (2)		22
Students on exit shall be awarded Bachelor of Arts (in the field of Multidisciplinary study/Discipline) after securing requisite 132 credits on completion of semester V & VI							Total=132

Course Introduction:

The new curriculum of B.A./B.S.c with Statistics as core disciplines offers a one-year Undergraduate certificate, two-year Undergraduate diploma, three-year Undergraduate degree, and four-year Undergraduate degree (Hons. with Research) after securing the required credits as per the Curriculum and credit framework for Undergraduate program guidelines by UGC.

B.A./B.S.c (Statistics) has been redesigned with the objective to improve skill-based learning among students and make the entire programme more comprehensive. This will enable students to better understand the various aspects of behavioural and cognitive development of an individual in social, organizational, and across all facets of life span by learning about theories and concepts that have been developed in the field so far. Understanding of research methods and statistical testing has also been kept as integral components of the programme both at theoretical as well as at practical levels.

B.A/B.S.c (Statistics) aims to promote skill-based education and foster understanding of the expanding field of statistics. Facilitating self-discovery in the students is a key objective of this course. The goal of the course is to help students acquire the knowledge and abilities necessary for successfully addressing the demands and problems of the real world. The emphasis on theory and applied skills will provide the necessary foundation for the graduates of this programme, who can then choose flexible career paths in industry and clinical settings, and/or academic careers in research institutions. As a result, this syllabus is created keeping in mind the changing nature of society, educational institutions, and the workplace and inculcates the required skills in the students to understand and respond to the same efficiently and effectively.

Eligibility for admission:

Any candidate who has passed the Plus Two of the Higher Secondary Board of Examinations in any state recognized as equivalent to the Plus Two of the Higher Secondary Board in with not less than 40%-marks in aggregate is eligible for admission, However, SC/ST, OBC and other eligible communities shall be given relaxation as per University rules.

Program outcome (POs)

Students will be able to:

PO 1	Acquire knowledge of the discipline and conduct proper academic in various areas of discipline.
PO2	Recognize the social structures in our society.
PO3	Communicate effectively in context which one is operating and develop soft skills
PO4	Leader in teams in multidisciplinary courses and engage in initiatives that encourage growth for all.
PO5	Develop awareness of issues among students
PO6	Recognize and respect different value systems by following the norms of academic integrity.
PO7	Explain awareness of local, regional, national and global needs.
PO8	Work on career enhancement by adapting to professional and social needs engaged in lifelong learning.
PO9	Exhibit capability as lifelong learners adapting new technologies, modern concepts and skills for sustainable development.
PO10	Imbibe qualities of good citizenship, morality and ethics so as to work for the betterment of mankind
PO11	Cultivate a broad array of interdisciplinary knowledge and skills integrating concepts of humanities and social sciences.
PO12	Able to apply critical thinking, creativity, skills, cultural sensitivity, and humanity to to create awareness within society for problem –solving and interpretation..

Program Specific Outcome (PSOs)

PSO1	To familiarize students with basic to high-level statistical concepts.
PSO2	To Apply the concepts of statistics, Probability theory, Time Series, Designs of Experiment, survey sampling etc. in real life problems.
PSO3	To update students with various statistical tools that aid in statistical theory.
PSO4	Practical exercises done will enable students to analyze and interpret data and also to Draw valid conclusions. This will enable students to face real time applications

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Bachelor of Arts /Bachelor of Science

STUDY & EVALUATION SCHEME

SEM-I

S.N.	Subject Code	Subject Title	Periods per week				Evaluation Scheme		Total
			L	T	P	Credit	Internal Marks	External Marks	
		BA/ B.S.c I SEM							
1	STADC101	Descriptive Statistics & Probability Theory	3	0	0	3	30	70	100
2	STADL101	Lab course based on DC 101	0	0	2	1	30	70	100
3	STADC102	Univariate Descriptive Statistics	3	0	0	3	30	70	100
4	STADL102	Lab course based on DC 102	0	0	2	1	30	70	100
5	DSC101	Discipline Specific Core- B	4	0	0	4	30	70	100
6	STAGE101	Statistical Methods -I	4	0	0	4	30	70	100
7	AEC101	Ability Enhancement Course	2	0	0	2	30	70	100
8	STASC101	Sampling Theory	2	0	0	2	30	70	100
9	STAVA101	Choose one from pool of courses provided by the university	2	0	0	2	30	70	100
Total						**22**			**900**

SEM-II

S.N.	Subject Code	Subject Title	Periods per week				Evaluation Scheme		Total
			L	T	P	Credit	Internal Marks	External Marks	
		BA/B.S.c II SEM							
1	STADC201	Probability Distribution	3	0	0	3	30	70	100
2	STADL201	Lab course based on DC 201	0	0	2	1	30	70	100
3	STADC202	Distribution Theory	3	0	0	3	30	70	100
4	STADL202	Lab course based on DC 202	0	0	2	1	30	70	100
5	DSC201	Discipline Specific Core-B	4	0	0	4	30	70	100
6	STAGE201	Statistical Methods -II	4	0	0	4	30	70	100
7	AEC201	Ability Enhancement Course	2	0	0	2	30	70	100
8	STASC201	Data Analysis using SPSS	2	0	0	2	30	70	100
9	STAVA201	Choose one from pool of courses provided by the university	2	0	0	2	30	70	100
Total						**22**			**900**

SEM-III

S.N.	Subject Code	Subject Title	Periods per week			Credit	Evaluation Scheme		Total
			L	T	P		Internal Marks	External Marks	
		BA/B.Sc III SEM							
1	STADC301	Statistical Inference	3	0	0	3	30	70	100
2	STADL301	Lab course based on DC301	0	0	2	1	30	70	100
3	STADC302	Theory of Estimation and Testing of Hypothesis	3	0	0	3	30	70	100
4	STADL302	Lab course based on DC302	0	0	2	1	30	70	100
5	DSC301	Discipline Specific Core-B	4	0	0	4	30	70	100
6	STAGE301	Network Analysis & Theory of Sequencing	4	0	0	4	30	70	100
7	AEC301	Ability Enhancement Course	2	0	0	2	30	70	100
8	STASC301	Indian Official Statistics	2	0	0	2	30	70	100
9	STAVA301	Choose one from pool of courses provided by the university	2	0	0	2	30	70	100
Total						**22**			**900**

SEM-IV

S.N.	Subject Code	Subject Title	Periods per week			Credit	Evaluation Scheme		Total
			L	T	P		Internal Marks	External Marks	
		BA/B.S.c IV SEM							
1	STADC401	Survey Sampling	3	0	0	3	30	70	100
2	STADL401	Lab course based on DC401	0	0	2	1	30	70	100
3	STADC402	Sampling Distribution	3	0	0	3	30	70	100
4	STADL402	Lab course based on DC402	0	0	2	1	30	70	100
5	DSC401	Discipline Specific Core-B	4	0	0	4	30	70	100
6	STAGE401	Statistical Techniques for Research Methods	4	0	0	4	30	70	100
7	AEC401	Ability Enhancement Course	2	0	0	2	30	70	100
8	STASC401	Advanced Operational Research	2	0	0	2	30	70	100
9	STAVA401	Choose one from pool of courses provided by the university	2	0	0	2	30	70	100
Total						**22**			**900**

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SEM V

S.N.	Subject Code	Subject Title	Periods per week				Evaluation Scheme		Total
			L	T	P	Credit	Internal Marks	External Marks	
		BA/B.S.c V SEM							
1	STADC501	Analysis of Variance and Design of Experiment	3	0	0	3	30	70	100
2	STADL501	Lab course based on DC501	0	0	2	1	30	70	100
3	STADC502	Design & Analysis of Experiment	3	0	0	3	30	70	100
4	STADL502	Lab course based on DC502	0	0	2	1	30	70	100
5	DSC501	Discipline Specific Core-B	4	0	0	4	30	70	100
6	STADE 501a STADE 501b (Choose any one)	Applied Statistics Statistical Quality Control	4	0	0	4	30	70	100
7	STAGE501	Understanding Probability &Statistics Through Practical's	4	0	0	4	30	70	100
8	STASC501	Data Analysis using Spreadsheet	2	0	0	2	30	70	100
Total						22			800

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SEM VI

S.N.	Subject Code	Subject Title	Periods per week			Credit	Evaluation Scheme		Total
			L	T	P		Internal Marks	External Marks	
		BA/B.S.c VI SEM							
1	STADC601	Demography & Vital Statistics	3	0	0	3	30	70	100
2	STADL601	Lab course based on DC601	0	0	2	1	30	70	100
3	STADC602	Vital Statistics	3	0	0	3	30	70	100
4	STADL602	Lab course based on DC601	0	0	2	1	30	70	100
5	DSC601	Discipline Specific Core-B	4	0	0	4	30	70	100
6	STADE 601a STADE 601b (Choose any one)	Time Series Analysis Non Parametric Methods	4	0	0	4	30	70	100
7	STAGE601	Qperation Research	4	0	0	4	30	70	100
8	STASC601	Queuing Theory	2	0	0	2	30	70	100
Total						**22**			**800**

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Programme Name: B.A/B.Sc

Course code	:	STADC101
Course Name	:	Descriptive Statistics & Probability Theory
Semester/Year	:	I Sem /IstYear

	L	T	P	C
	3	0	0	3

L-Lecture T–Tutorial P –Practical C – Credit

Course Objectives:

The objectives of this course are:

1. To summarize the data and to obtain its salient features from the mass of original data
2. To understand the basic fundamental processes and core Statistics concepts and their applications in everyday life.
3. To understand the concepts of probability and its applications
4. To understand the concept of random variables and law of probability.

Course Contents

Unit 1 **(15 Hours)**

Introduction: Nature of Statistics, Uses of Statistics, Statistics in relation to other disciplines, Concepts of a statistical population and sample from a population, quantitative and qualitative data, discrete and continuous data, graphical representation of a frequency distribution by histogram and frequency polygon, cumulative frequency distributions (inclusive and exclusive methods)

Unit 2 **(10 Hours)**

Measures of Central tendency: Mean, Median, Mode, Geometric Mean and Harmonic Mean; their properties Measures of Dispersion: Range, Quartile Deviation, Mean Deviation, Standard Deviation and their properties, Coefficient of variation, Moments, Skewness and Kurtosis.

Unit 3 **(10 Hours)**

Bivariate data: Scatter diagram, principle of least-square and fitting of polynomials and exponential curves. Correlation and regression. Karl Pearson coefficient of correlation, Lines of regression.

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Unit-4 **(10 Hours)**

Probability: Random experiment, sample point and sample space, event, algebra of events, Definition of Probability- classical, relative frequency and axiomatic approaches to probability, merits and demerits of these approaches (only general ideas to be given). Theorem on probability, conditional probability Independent events Bayes' theorem and its applications.

Text Books:

1. Arun Kumar and Alka Chaudhary 2010. Descriptive Statistics, Krishna Prakash, 11, Shivaji Road, Meerut.
2. S.C.GuptaandV.K.Kapoor.2007. Fundamentals of Mathematical Statistics(11thEd.)Sultan Chand.

Reference Books:

1. R.V. Hogg, A.T.Craig and J.W. Mckean. 2005. Introduction to Mathematical Statistics(6thEd.).Pearson Education,
2. A.M. Mood, F.A. Graybill and D.C.Boes. 2007. Introduction to the Theory of Statistics(3rd Ed.). Tata
McGraw Hill Publication.

Course outcomes (COs):

Upon successful completion of the course a student will be able to:

CO1	Identify the fundamental of descriptive statistics and probability theory.
CO2	Explain the concept of descriptive statistics
CO3	Apply the knowledge of descriptive statistics in the analysis of data.
CO4	Analysis the result of descriptive statistics
CO5	Evaluate the result of descriptive statistics
CO6	Develop the skill and ability to correctly analysis the data.

CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	1	1	-	-	1	2	1	1	1	1	1	3	2	1	-
CO2	3	2	1	-	-	1	1	-	1	1	1	1	2	1	1	-
CO3	3	2	2	1	1	1	2	1	1	2	2	3	3	2	2	1
CO4	2	3	2	1	-	1	2		1	1	2	2	3	2	1	1
CO5	3	3	3	-	-	1	2	1	2	1	-	-	2	2	1	-
CO6	2	2	2	2	1	2	2	2	2	2	2	3	2	3	2	-

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Examination Scheme:

Components	Istinternal (Assignment)	IIndInternal (Written Exam)	External (ESE)
Weightage(%)	15	15	70

Programme Name: B.A/B.Sc.

Course code	: STADL101				
Course Name	: Lab course based on DC101				
Semester/Year	: Ist Sem/ IstYear				
		L	**T**	**P**	**C**
		0	0	2	1

L- Lecture T – Tutorial P – Practical C – Credit

Course Objectives:

The objectives of this course are:

1. To analyze the problem and its solution.
2. To study the average and measures for analysis it.
3. To enrich students' understanding of the influence of dispersion on average
4. To assess the effect of knowledge of the result on the performance of individual for analysis the data.

Course Contents

Unit 1 **(5 Hours)**

1. Problems based on graphical representation of data: Histograms (equal class intervals and unequal class intervals), Frequency polygon, Ogive curve.

Unit 2 **(15 Hours)**

1. Problems based on measures of central tendency and measures of dispersion.
2. Problems based on combined mean and variance and coefficient of variation.
3. Problems based on moments, relationships between moments about origin and central moments.
4. Problems based on Skewness and kurtosis.

Unit 3 **(10 Hours)**

1. Karl Pearson correlation coefficient.
2. Lines of regression and regression coefficients.
3. Spearman rank correlation with or without ties.

Text Books:

1. A.M.Goon,M.K.GuptaandB.DasGupta.2005.Fundamentals of Statistics, Vol.I,8thEd., World Press, Kolkatta.

2. S.C Gupta and V.K. Kapoor. 2007. Fundamentals of Mathematical Statistics,11thEd., Sultan Chand and Sons.

Reference Books:

1.V.Hogg,A.T.Craig and J.W.Mckean.2005 .Introduction to Mathematical Statistics(6thEd.).Pearson Education.

2 A.M. Mood F.A. Graybill and D.C.Boes. 2007. Introduction to the Theory of Statistics (3rdEd.).Tata McGraw Hill Publication.

Course outcomes (COs):

Upon successful completion of the course a student will be able to:

CO1	Remember he skill regarding analysis of data.
CO2	Apply the concepts of statistics through experiments.
CO3	Apply suitable technique for analysis data
CO4	Differentiate Quantitative and Qualitative data through practical's.
CO5	Evaluate the concepts of statistics through practical's
CO6	Develop basic tools and techniques for performing experiment

CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO1 2	PSO 1	PSO2	PSO3	PS O4
CO1	1	1	2	1	1	1	2	-	1	1	1	1	1	-	3	2
CO2	1	1	2	1	1	1	1	-	1	1	1	1	2	1	3	2
CO3	1	2	3	1	1	1	2	1	2	1	2	3	1	1	2	3
CO4	1	1	2	1	1	1	2	-	1	1	1	2	3	-	2	3
CO5	1	1	2	1	1	1	2	1	1	1	1	-	2	-	2	2
CO6	3	2	3	2	1	2	2	1	2	1	2	3	2	-	3	3

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

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Examination Scheme:

Evaluation Method	Internal Evaluation	External Evaluation	
Components	Written Exam/ File Record	Practical Conduction	Viva Voce
Weightage (%)	30	40	30

Programme Name: B.A/B.Sc.

Course code	:	STADC102			
Course Name	:	Univariate Descriptive Statistics			
Semester/Year	:	I Sem /IstYear			
		L	**T**	**P**	**C**
		3	0	0	3

L-Lecture T–Tutorial P –Practical C – Credit

Course Objectives:

The objectives of this course are:

1. To summarize the data and to obtain its salient features from the mass of original data
2. Tounderstandthebasicfundamentalprocessesandcore Statisticsconceptsandtheir Applications in everyday life.
3. To understand the concepts of probability and its applications
4. To understand the concept of random variables and law of probability.

Course Content

Unit 1 **(15 Hours)**

Introduction: Introduction to Statistics, Meaning of Statistics, Importance of Statistics, Scope of Statistics in Industry, Introduction and contribution of Indian Scholars in Statistics. Concept of Statistical population, Attributes and Variables (Discrete and Continuous)

Unit 2 **(10 Hours)**

Graphical representation of a frequency distribution: Histogram and frequency polygon, cumulative frequency distributions). Different types of scales – Nominal, Ordinal, Ratio and Interval, Primary data – designing a questionnaire and schedule, collection of primary data, checking their consistency, Secondary data.

Unit 3 **(10 Hours)**

Measures of Central tendency: Measures of Central tendency and Dispersion and their properties, Merits and Demerits of these Measures

Unit 4 **(10 Hours)**

Moments and Factorial moments, Sheppard's correction for moments, Measures of Skewness and Kurtosis and their significance, Measures based on quartiles, Correlation and Regression.

Text Books:

1.Arun Kumar and Alka Chaudhary 2010. Descriptive Statistics, Krishna Prakash, 11, Shivaji Road, Meerut.
2. S.C.Gupta andV.K.Kapoor.2007. Fundamentals of Mathematical Statistics(11thEd.) Sultan Chand and Sons.

Reference Books:

1. R.V.Hogg, A.T.Craig and J.W.Mckean. 2005. Introduction to Mathematical Statistics (6thEd.).Pearson Education,
2. A.M. Mood, F.A. Graybill and D.C. Boes. 2007. Introduction to the Theory of Statistics (3rd Ed.). Tata McGraw Hill Publication.

Course outcomes (COs):

Upon successful completion of the course a student will be able to:

CO1	Identify the fundamental of descriptive statistics and probability theory.
CO2	Explain the concept of descriptive statistics
CO3	Apply the knowledge of descriptive statistics in the analysis of data.
CO4	Analysis the result of descriptive statistics
CO5	Evaluate the result of descriptive statistics
CO6	Develop the skill and ability to correctly analysis the data.

CO-PO-PSO Mapping

Couse	PO 1	PO2	PO 3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3	PS O 4
CO1	3	1	1	-	-	1	2	1	1	1	1	1	3	2	1	-
CO2	3	2	1	-	-	1	1	-	1	1	1	1	2	1	1	-
CO3	3	2	2	1	1	1	2	1	1	2	2	3	3	2	2	1
CO4	2	3	2	1	-	1	2		1	1	2	2	3	2	1	1
CO5	3	3	3	-	-	1	2	1	2	1	-	-	2	2	1	-
CO6	2	2	2	2	1	2	2	2	2	2	2	3	2	3	2	-

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Examination Scheme:

Components	Istinternal (Assignment)	IInd Internal (Written Exam)	External (ESE)
Weightage(%)	15	15	70

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Programme Name: B.A/B.Sc.

Course code	:STADL102				
Course Name	:Lab course based on DC102				
Semester/Year	:Ist sem/ IstYear				
		L	**T**	**P**	**C**
		0	0	2	1

L- Lecture T – Tutorial P – Practical C – Credit

Course Objectives:

The objectives of this course are:

1. To analyse the problem and its solution.
2. To study the average and measures for analysis it.
3. To enrich students 'understanding of the influence of dispersion on average
4. To assess the effect of knowledge of the result on the performance of individual for analysis the data.

Course Contents

Unit 1 **(5 Hours)**

1. Problems based on graphical representation of data: Histograms (equal class intervals and unequal class intervals),Frequency polygon, Ogive curve.

Unit 2 **(15 Hours)**

1. Problems based on measures of central tendency and measures of dispersion.
2. Problems based on combined mean and variance and coefficient of variation.
3. Problems based on moments, relationships between moments about origin and central moments.
4. Problems based on Skewness and kurtosis.

Unit 3 **(10 Hours)**

4. Karl Pearson correlation coefficient.
5. Lines of regression and regression coefficients.
6. Spearman rank correlation with or without ties.

Text Books:

1. A.M.Goon,M.K.Gupta and B.Das Gupta .2005. Fundamentals of Statistics, Vol.I, 8thEd.,World Press, Kolkatta.
2. S.C Gupta and V.K.Kapoor. 2007. Fundamentals of Mathematical Statistics,11thEd., Sultan Chand and Sons.

Reference Books:

1.V.Hogg, A.T.Craig and J.W.Mckean.2005.Introduction to Mathematical Statistics (6thEd.). Pearson Education.

2 .A.M.Mood F.A.Graybill and D.C.Boes. 2007. Introduction to the Theory of Statistics (3rdEd.).Tata McGraw Hill Publication.

Course outcomes(COs):

Upon successful completion of the course a student will be able to:

CO1	Remember the skill regarding analysis of data.
CO2	Apply the concepts of statistics through experiments.
CO3	Apply suitable technique for analysis data
CO4	Differentiate Quantitative and Qualitative data through practical's.
CO5	Evaluate the concepts of statistics through practical's
CO6	Develop basic tools and techniques for performing experiment

CO-PO-PSO Mapping

Course	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO1 2	PSO 1	PSO2	PSO3	PS O4
CO1	1	1	2	1	1	1	2	-	1	1	1	1	1	-	3	2
CO2	1	1	2	1	1	1	1	-	1	1	1	1	2	1	3	2
CO3	1	2	3	1	1	1	2	1	2	1	2	3	1	1	2	3
CO4	1	1	2	1	1	1	2	-	1	1	1	2	3	-	2	3
CO5	1	1	2	1	1	1	2	1	1	1	1	-	2	-	2	2
CO6	3	2	3	2	1	2	2	1	2	1	2	3	2	-	3	3

3: Highest Correlated, 2: Medium Correlated, 1:Lowest Correlated

Examination Scheme:

Evaluation Method	Internal Evaluation	External Evaluation	
Components	Written Exam/ File Record	Practical Conduction	Viva Voce
Weightage (%)	30	40	30

Bachelor of Arts /Bachelor of Science

Programme Name: B.A/B.Sc.

Course code	: STAGE101				
Course Name	: Statistical Methods- I				
Semester/Year	:Ist sem/ IstYear				
		L	**T**	**P**	**C**
		0	0	2	1

L-Lecture T–Tutorial P –Practical C – Credit

Course Objectives:

The objectives of this course are:

1. To summarize the data and to obtain its salient features from them as of original data
2. To understand the basic fundamental processes and core Statistics concepts and their applications in everyday life.
3. To understand the concepts of probability and its applications
4. To understand the concept of random variables and law of probability.

Course Contents

Unit 1 **(15 Hours)**

Introduction: Nature of Statistics ,Uses of Statistics, Statistics in relation to other disciplines, Concepts of a statistical population and sample from a population, quantitative and qualitative data, discrete and continuous data

Unit 2 **(15 Hours)**

Graphical representation of a frequency distribution: Histogram and frequency polygon, cumulative frequency distributions (inclusive and exclusive methods)

Unit 3 **(15 Hours)**

Measures of Central tendency: Mean, Median, Mode, Geometric Mean and Harmonic Mean; their properties Measures of Dispersion: Range, Quartile Deviation, Mean Deviation, Standard Deviation, Coefficient of variation, Moments, Skewness and Kurtosis.

Unit-4 **(15 Hours)**

Correlation and regression. Karl Pearson coefficient of correlation, Lines of regression. Properties of correlation and regression.

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1 Arun Kumar and Alka Chaudhary 2010. Descriptive Statistics, Krishna Prakash, 11, Shivaji Road, Meerut.

2. Goon, A.M., Gupta, K.and Dasgupta,B.(1991):Fundamentals of Statistics, Vol I, World Press, Calcutta

Reference Books:

1. R.V.Hogg, A.T.Craig and J.W.Mckean. 2005. Introduction to Mathematical Statistics (6thEd.).Pearson Education,

2. A.M. Mood, F.A. Graybill and D.C.Boes. 2007. Introduction to the Theory of Statistics (3rd Ed.). Tata McGraw Hill Publication.

Course outcomes (COs):

Upon successful completion of the course a student will be able to:

CO1	Identify the fundamental of descriptive statistics and probability theory.
CO2	Explain the concept of descriptive statistics
CO3	Apply the knowledge of descriptive statistics in the analysis of data.
CO4	Analysis the result of descriptive statistics
CO5	Evaluate the result of descriptive statistics
CO6	Develop the skill and ability to correctly analysis the data.

CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	1	1	-	-	1	2	1	1	1	1	1	3	2	1	-
CO2	3	2	1	-	-	1	1	-	1	1	1	1	2	1	1	-
CO3	3	2	2	1	1	1	2	1	1	2	2	3	3	2	2	1
CO4	2	3	2	1	-	1	2		1	1	2	2	3	2	1	1
CO5	3	3	3	-	-	1	2	1	2	1	-	-	2	2	1	-
CO6	2	2	2	2	1	2	2	2	2	2	2	3	2	3	2	-

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Examination Scheme:

Components	Istinternal (Assignment)	IInd Internal (Written Exam)	External (ESE)
Weightage (%)	15	15	70

Programme Name: B.A./B.S.c

Course code	:STASC101				
Course Name	:Sampling Theory				
Semester/Year	:I sem /I Year				
		L	**T**	**P**	**C**
		2	0	0	2

L- Lecture T – Tutorial P – Practical C – Credit

Course Objectives:

The objectives of this course are:

1. To comprehend the tools and technique for selecting a sample of elements from a target population
2. To understand the basics of sampling methods.
3. To develop critical thinking in order to use the appropriate design and conduct experiment
4. To analysis and interpret data.

Course Contents

Unit 1 **(10 Hours)**

Concepts of census and sample survey: Basic concepts in sampling. Sampling and Non sampling errors. Principal steps involved in a sample survey, advantages of sampling over complete census, limitations of sampling, different methods of data collection.

Unit 2 **(10 Hours)**

Basic sampling methods: Simple random sampling (SRS) with and without replacement, use of random number tables, estimation of mean and variance in case of SRS. Simple random sampling of attributes, size of simple random sample.

Unit 3 **(5 Hours)**

Stratified random sampling: Estimation of population mean, variance of the estimate of Population mean in stratified random sampling, allocation of sample size, proportional allocation, and optimum allocation.

Unit 4 **(5 Hours)**

Comparison of Stratified random : sampling with SRS. Systematic random sampling Estimation of mean and variance. Comparison of Systematic random sampling with SRS and Stratified random sampling.

Texts Books:

1. A.M.Goon, M.K. Gupta and B. Dasgupta (2003) .An outline of Statistical Theory (Vol.I), 4thEd. World Press, Kolkata.

2. S.C.GuptaandV.K.Kapoor.(2007).FundamentalsofMathematicalStatistics11thEd.SultanChandandSons.

Reference Books:

1. D.C. Montgomery. (2001). Designs and Analysis of Experiments. John Wiley and Sons.

NewYork.
2. P. Mukhopadhyay. (1998). Theory and Methods of Surveys Sampling. Prentice Hall of India

Course outcomes (COs):

Upon successful completion of the course a student will be able to:

CO1	Identify basic concepts of survey sampling, basic principles in sampling, Simple random sampling, systematic sampling, stratified sampling.
CO2	Explain basic concepts of analysis of variance and appropriately interpret the results of analysis of variance test.
CO3	Apply the design of experiments and analyze the data they yield
CO4	Analysis Completely randomized design, Randomized block design, Latin square design. Factorial experiments with two levels
CO5	Evaluate different quantitative and qualitative statistical methods used in research.
CO6	Develop critical thinking in order to construct the statistical test and use the appropriate statistical analysis in statistics research.

CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO1 2	PSO 1	PSO2	PSO3	PS O4
CO1	3	1	1	-	-	1	2	1	1	1	1	1	3	2	1	-
CO2	3	2	1	-	-	1	1	-	1	1	1	1	2	1	1	-
CO3	3	2	2	1	1	1	2	1	1	2	2	3	3	2	2	1
CO4	2	3	2	1	-	1	2		1	1	2	2	3	2	1	1
CO5	3	3	3	-	-	1	2	1	2	1	-	-	2	2	1	-
CO6	2	2	2	2	1	2	2	2	2	2	2	3	2	3	2	-

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Examination Scheme:

Components	I[st]internal (Assignment)	II[nd]Internal (Written Exam)	External (ESE)
Weightage(%)	15	15	70

Programme Name: B.A. /B.Sc.

Course code	:	STADC201			
Course Name	:	Probability Distribution			
Semester/Year	:	II Sem/ Ist Year			
		L	**T**	**P**	**C**
		3	0	0	3

L-Lecture T –Tutorial P –Practical C– Credit

Course Objectives:

The objectives of this course are:

1. To understand the basic probability, concepts, theories, and will be able to apply this knowledge to day to day life.
2. To gain a reasonable knowledge of the concepts like expectation, probability distribution.
3. To learn about the fundamental principles and processes of random variables, its types and properties.
4. To differentiate between discrete probability distributions with their properties and Continuous probability distributions with their properties.

Course Contents

Unit 1

(15 Hours)

Random variables: Discrete and continuous random variables p.m.f, p.d.f.and c.d.f., illustrations and properties of random variables, univariate transformations with illustrations. Two dimensional random variables discrete and continuous type, joint, marginal and conditional p.m.f, p.d.f .and c.d.f., independence of variables, bivariate transformations with illustrations.

Unit 2

(10 Hours)

Mathematical Expectation: Generating Functions: Expectation of single and bivariate random variables and its properties.

Unit 3

(10 Hours)

Moments and Cumulants, Moment generating function: Cumulant generating function and characteristic function. Uniqueness and inversion theorems (without proof) along with applications, Conditional expectations.

Unit 4

(10 Hours)

Point(or degenerate): Binomial, Poisson, Geometric, negative binomial, Hypergeometric Normal, Uniform, Exponential, Beta and Gama distributions Statement and application of Chebychev's inequality, WLLN and SLLN, Central limit theorem (CLT)

Text Books:

1. Arun Kumar and Alka Chaudhary Probability Theory2008 , Krishna Prakashan Media Pvt Ltd.

2. A.M. Goon, M.K. Gupta and B. Dasgupta (2003):An outline of Statistical Theory (Vol. I), 4thEd.,World Press, Kolkata.

3. S.C. Gupta and V.K. Kapoor (2007): Fundamentals of Mathematical Statistics 11th Ed, Sultan Chand and Sons.

Reference Book:

1. R.V.Hogg, A.T.Craig, and J.W. McKean. (2005). Introduction to Mathematical Statistics, (6thEd) Pearson Education.

2. A.M. Mood, F.A. Graybill and D.C.Boes. (2007). Introduction to the Theory of Statistics (3rdEd.) Tata McGraw Hill Publication.

Course outcomes(COs):

Upon successful completion of the course a student will be able to:

CO1	Recognize the key probability concepts.
CO2	Explain the basic of probability and its distribution
CO3	Apply basic concepts of probability to self-analysis various probability distribution..
CO4	Analyse various techniques for fitting the distribution
CO5	Evaluate the probability concept and theories.
CO6	Develop critical analytical abilities.

CO-PO-PSO Mapping

Course	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO1 2	PSO 1	PSO2	PSO3	PS O4
CO1	3	1	1	-	-	1	2	1	1	1	1	1	3	2	1	-
CO2	3	2	1	-	-	1	1	-	1	1	1	1	2	1	1	-
CO3	3	2	2	1	1	1	2	1	1	2	2	3	3	2	2	1
CO4	2	3	2	1	-	1	2		1	1	2	2	3	2	1	1
CO5	3	3	3	-	-	1	2	1	2	1	-	-	2	2	1	-
CO6	2	2	2	2	1	2	2	2	2	2	2	3	2	3	2	-

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Examination Scheme:

Evaluation Method	Internal Evaluation	External Evaluation	
Components	Written Exam/ File Record	Practical Conduction	Viva Voce
Weightage (%)	30	40	30

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Programme Name: B.A./B.Sc.

Course code	:	STADL201
Course Name	:	Lab course based on C201
Semester/Year	:	II sem / Ist Year

L	T	P	C
0	0	2	1

L-Lecture T –Tutorial P – Practical C –Credit

Course objectives:

The objectives of this course are:

1. To analyse the distribution and its solution.
2. To study the various distribution and measures for analysis.
3. To enrich students' understanding of the influence of distribution in day to day life.
4. Toassesstheeffectofknowledgeoftheresultontheperformanceofindividualforanalysisthedata.

Course Contents

Unit 1 **(10 Hours)**

1. Fitting of binomial distributions computing mean and variance
2. Fitting of binomial distributions computing mean and variance
3. Fitting of Poisson distributions for given λ and after estimating mean.

Unit 2 **(10 Hours)**

1. Fitting of negative binomial
2. Fitting of Suitable distribution
3. Application Problems based on Binomial distribution

Unit 3 **(10 Hours)**

1. Application problems based on Poisson distribution
2. Application problems based on negative binomial distribution
3. Fitting of normal distribution when parameters are given /not given.

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Text Books:

1. A.M.Goon M.K.Gupta and B.Dasgupta (2003): An outline of Statistical Theory (Vol.I),4th Ed.,World Press, Kolkata.

2. S.C. Gupta and V.K. Kapoor (2007): Fundamentals of Mathematical Statistics 11thEd ,Sultan Chand and Sons.

ReferenceBooks:

1. R.V. Hogg, A.T. Craig, and J.W. McKean. (2005). Introduction to Mathematical Statistics,(6th Ed) Pearson Education.

2. A.M.Mood,F.A.Gray bill and D.C.Boes.(2007). Introduction to the Theory of Statistics (3rdEd.)Tata McGraw Hill Publication.

3. V.K. Rohtagi and A.K. Md. E. Saleh. (2009). An Introduction to Probability and Statistics, (2ndEd.) John Wiley and Sons.

4. S.A.Ross(2007).IntroductiontoProbabilityModels(9thEd.).AcademicPress.

Course outcomes (COs):

Upon successful completion of the course a student will be able to:

CO1	Remember the skill regarding analysis of data.
CO2	Apply the concepts of statistics through experiments.
CO3	Apply suitable technique for analysis data
CO4	Differentiate Quantitative and Qualitative data through practical's.
CO5	Evaluate the concepts of statistics through practical's
CO6	Develop basic tools and techniques for performing experiment

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CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	1	1	1	2	-	1	1	1	1	1	-	3	2
CO2	1	1	2	1	1	1	1	-	1	1	1	1	2	1	3	2
CO3	1	2	3	1	1	1	2	1	2	1	2	3	1	1	2	3
CO4	1	1	2	1	1	1	2	-	1	1	1	2	3	-	2	3
CO5	1	1	2	1	1	1	2	1	1	1	1	-	2	-	2	2
CO6	3	2	3	2	1	2	2	1	2	1	2	3	2	-	3	3

3:Highest Correlated, 2:Medium Correlated, 1:Lowest Correlated

Examination Scheme:

Evaluation Method	Internal Evaluation	External Evaluation	
Components	Practical Conduction	Practical Conduction	Viva Voce
Weightage (%)	30	40	30

Programme Name: B.A/B.Sc.

Course code	:	STADC202
Course Name	:	Distribution Theory
Semester/Year	:	II Sem/ Ist Year

L	T	P	C
3	0	0	3

L-Lecture T –Tutorial P –Practical C– Credit

Course Objectives:

The objectives of this course are:

1. To understand the basic probability, concepts, theories, and will be able to apply this knowledge to day to day life.
2. To gain a reasonable knowledge of the concepts like expectation, probability distribution.
3. To learn about the fundamental principles and processes of random variables, its types and properties.
4. To differentiate between discrete probability distributions with their properties and Continuous probability distributions with their properties.

Unit 1 : **(15 Hours)**

Discrete Probability Distributions: Binomial distribution, Poisson distribution (as limiting case of Binomial distribution), Hypergeometric, Geometric and Negative Binomial, Uniform and Multinomial distributions, fitting of Binomial, Poisson and Uniform distributions.

Unit 2 : **(10 Hours)**

Continuous Probability Distributions: Exponential, Gamma, Beta distributions. Cauchy, Laplace, Pareto, Weibull, Log normal distributions

Unit 3 : **(10 Hours)**

Normal distribution : indroduction, its properties, Standard Normal variate, Normal distribution as limiting case of Binomial distribution, fitting of Normal distribution

Unit 4 : **(10 Hours)**

Order Statistics: Distributions of minimum, r^{th} and maximum order statistic, Joint distribution of r^{th} and s^{th} order statistics (in continuous case), Distribution of sample range & sample median for uniform and exponential distributions

Text Books:

1. Arun Kumar and Alka Chaudhary Probability Theory2008 , Krishna Prakashan Media Pvt Ltd.

2. A.M.Goon, M.K. Gupta and B. Dasgupta (2003): An outline of Statistical Theory (Vol.I),4th Ed.,World Press, Kolkata.

3 .S.C.Gupta and V.K.Kapoor (2007): Fundamentals of Mathematical Statistics 11th Ed, Sultan Chand and Sons.

Reference Book:

1. R.V.Hogg, A.T.Craig, and J.W.McKean.(2005). Introduction to Mathematical Statistics, (6thEd) Pearson Education.
2. A.M.Mood,F.A.Graybilland D.C.Boes .(2007) .Introduction to the Theory of Statistics (3rdEd.)Tata McGraw Hill Publication.

Course outcomes (COs):

Upon successful completion of the course a student will be able to:

CO1	Recognize the key probability concepts.
CO2	Explain the basic of probability and its distribution
CO3	Apply basic concepts of probability to self-analysis various probability distribution.
CO4	Analyse various techniques for fitting the distribution
CO5	Evaluate the probability concept and theories.
CO6	Develop critical analytical abilities.

CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	1	1	-	-	1	2	1	1	1	1	1	3	2	1	-
CO2	3	2	1	-	-	1	1	-	1	1	1	1	2	1	1	-
CO3	3	2	2	1	1	1	2	1	1	2	2	3	3	2	2	1
CO4	2	3	2	1	-	1	2		1	1	2	2	3	2	1	1
CO5	3	3	3	-	-	1	2	1	2	1	-	-	2	2	1	-
CO6	2	2	2	2	1	2	2	2	2	2	2	3	2	3	2	-

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Examination Scheme:

Components	Ist internal (Assignment)	IInd Internal (Written Exam)	External (ESE)
Weightage (%)	15	15	70

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Programme Name: B.A./B.Sc.

Course code	:	**STADL202**
Course Name	:	**Lab course based on DC202**
Semester/Year	:	IIsem / IstYear

	L	T	P	C
	0	0	2	1

L-Lecture T –Tutorial P – Practical C –Credit

Course Objectives:

The objectives of this course are:

1. To analyse the distribution and its solution.
2. To study the various distribution and measures for analysis.
3. To enrich students' understanding of the influence of distribution in day to day life.
4. To assess the effect of knowledge of the result on the performance of individual for analysis the data.

Course Contents

Unit 1 **(10 Hours)**

1. Fitting of binomial distributions computing mean and variance
2. Fitting of binomial distributions computing mean and variance
3. Fitting of Poisson distributions for given λ and after estimating mean.

Unit 2 **(10 Hours)**

1. Fitting of negative binomial
2. Fitting of Suitable distribution
3. Application Problems based on Binomial distribution

Unit 3 **(10 Hours)**

1. Application problems based on Poisson distribution
2. Application problems based on negative binomial distribution
3. Fitting of normal distribution when parameters are given /not given.

Text Books:

1.A.M. Goon, M.K.Gupta and B.Dasgupta (2003): An outline of Statistical Theory (Vol.I),4th Ed., World Press, Kolkata.

2. S.C. Gupta and V.K. Kapoor (2007): Fundamentals of Mathematical Statistics 11thEd , Sultan Chand and Sons.

Reference Books:

1. R.V. Hogg, A.T. Craig, and J.W. McKean. (2005). Introduction to Mathematical Statistics,(6th Ed) Pearson Education.

2. A.M.Mood,F.A.Graybill and D.C.Boes.(2007). Introduction to the Theory of Statistics (3rdEd.) Tata McGraw Hill Publication.

3.V.K. Rohtagi and A.K. Md. E. Saleh. (2009). An Introduction to Probability and Statistics,(2ndEd.) John Wiley and Sons.

4.S.A.Ross (2007). Introduction to Probability Models(9thEd.). Academic Press.

Course outcomes (COs):

Upon successful completion of the course a student will be able to:

CO1	Remember the skill regarding analysis of data.
CO2	Apply the concepts of statistics through experiments.
CO3	Apply suitable technique for analysis data
CO4	Differentiate Quantitative and Qualitative data through practical's.
CO5	Evaluate the concepts of statistics through practical's
CO6	Develop basic tools and techniques for performing experiment

CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO1 2	PS O1	PS O2	PSO 3	PSO 4
CO1	1	1	2	1	1	1	2	-	1	1	1	1	1	-	3	2
CO2	1	1	2	1	1	1	1	-	1	1	1	1	2	1	3	2
CO3	1	2	3	1	1	1	2	1	2	1	2	3	1	1	2	3
CO4	1	1	2	1	1	1	2	-	1	1	1	2	3	-	2	3
CO5	1	1	2	1	1	1	2	1	1	1	1	-	2	-	2	2
CO6	3	2	3	2	1	2	2	1	2	1	2	3	2	-	3	3

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Examination Scheme:

Evaluation Method	Internal Evaluation	External Evaluation	
Components	Written Exam/ File Record	Practical Conduction	Viva Voce
Weightage (%)	30	40	30

Programme Name:B.A/B.Sc.

			L	T	P	C
Course code	:	STAGE201	4	0	0	4
Course Name	:	Statistical Methods –II				
Semester/Year	:	IISem /Ist Year				

L-Lecture T–Tutorial P –Practical C – Credit

Course Objectives:

The objectives of this course are:

1. To understand the basics concept of statistical inference
2. To drawing inference about the unknown population parameters based on random sample.
3. To gain understanding of estimation about the population using testing of hypothesis.
4. To understand the important tests which are using to draw valid conclusion

Course Contents

Unit 1 **(15 Hours)**

Random variables: Discrete and continuous random variables p.m.f, p.d.f. and c.d.f. and its properties.

Unit 2 **(15 Hours)**

Important Statistical Distribution: Binomial, Poisson, Geometric, negative binomial, Hyper geometric Normal, Uniform, Exponential, Fitting of various distributions

Unit 3 **(15 Hours)**

Estimation: Parameter space, sample space, point estimation, requirement of a good estimator,

Interval estimation.

Unit 4 **(15 Hours)**

Testing of Hypothesis: Statistical Hypothesis, simple and composite hypothesis null and alternative hypotheses. Critical region. Two kind of errors, Tests of significance based of Chi-square, t and F test.

Text Books:

1. Arun Kumar and Alka Chaudhary 2010. Statistical Inference, Krishna Prakash, 11, Shivaji Road, Meerut.
2. S.C.GuptaandV.K.Kapoor.2007. Fundamentals of Mathematical Statistics(11th Ed.)Sultan

Chand and Sons.

Reference Books:

1. R.V.Hogg, A.T. CraigandJ.W.Mckean. 2005. Introduction to Mathematical Statistics (6thEd.).Pearson Education,
2. A.M. Mood,F.A. Graybill and D.C.Boes. 2007. Introduction to the Theory of Statistics(3rd Ed.). Tata McGraw Hill Publication.

Course outcomes(COs):

Upon successful completion of the course a student will be able to:

CO1	Identify fundamental concepts of Point estimation. Properties of estimators and mean square error, Minimum variance unbiased estimators.
CO2	Recognize the Large sample test, Use of central limit theorem to obtain large sample tests for binomial proportions and means of populations, etc., Related Confidence intervals.
CO3	Apply the different methods of estimations. Estimating point estimators using Different methods. Construction of confidence interval for parameters of different distributions
CO4	Analysis practical utility of various test of significance based on t, F and Chi square test.
CO5	Evaluate the various tests based on hypothesis.
CO6	Develop an understanding of the hypothesis in relation to the social world

CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	1	1	-	-	1	2	1	1	1	1	1	3	2	1	-
CO2	3	2	1	-	-	1	1	-	1	1	1	1	2	1	1	-
CO3	3	2	2	1	1	1	2	1	1	2	2	3	3	2	2	1
CO4	2	3	2	1	-	1	2		1	1	2	2	3	2	1	1
CO5	3	3	3	-	-	1	2	1	2	1	-	-	2	2	1	-
CO6	2	2	2	2	1	2	2	2	2	2	2	3	2	3	2	-

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Examination Scheme:

Components	Istinternal (Assignment)	IIndInternal (Written Exam)	External (ESE)
Weightage (%)	15	15	70

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Programme Name: B.A/B.S.c

Course code	: STASC201				
Course Name	: Data Analysis Using SPSS				
Semester/Year	:II Sem/I Year				
		L	**T**	**P**	**C**
		2	0	0	2

L- Lecture T – Tutorial P – Practical C – Credit

Course Objectives:

Course Objectives:
The learning objectives include:

- To understand SPSS and its roles in problem solving.
- To understand data handling and its analysis.
- Learning the basic statistical software will help students to easily switch over to any other statistical software in future.

Course Contents:

Unit I **(10 Hours)**

SPSS Basics : plot a graph viz. histograms (equal class intervals and unequal class intervals), box plot, bar graphs, line graphs, stem-leaf, frequency polygon, pie chart, and gives with graphical summaries of data.

Unit II **(5 Hours)**

Generate automated reports giving detailed descriptive statistics, correlation and lines of regression. Random number generation using different probability distributions and sampling procedures

Unit III **(10 Hours)**

Fitting of polynomials: exponential curves. Problems based on fitting of suitable distribution. Normal probability plot.

Unit IV **(5 Hours)**

Simple analysis, create and manage statistical analysis projects, import data, Basics of statistical inference in order to understand hypothesis testing and compute p-values and confidence intervals. Comparison of several means..

Texts Books:

1. Knapp,H.(2014).*Introductory Statistics Using SPSS*, SAGE Publications India Private Ltd.

Reference Books

1. Cunningham, J.B.and Aldrich, J.O.(2014):*Using SPSS-An Interactive Hands-On Approach*, SAGE Publications India Private Ltd.

Course outcomes(COs):

Upon successful completion of the course a student will be able to:

CO1	Identify the basic concepts of statistics and probability through practical Does on a computer by using excel.
CO2	Explain the average; dispersion through practical's on a computer by using excelled.
CO3	Apply fitting of binomial, poison and normal distribution through Practicals on excel.
CO4	Analyse data by using suitable statistical test.
CO5	Evaluate the importance of data analysis.
CO6	Develop the ways to improve the data analysis by using proper test..

CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	1	1	1	1	1	2	1	1	1	1	1	3	2	-	-
CO2	3	2	1	-	1	1	1	-	1	1	1	1	2	1	-	-
CO3	3	2	2	1	1	1	2	1	1	2	2	3	3	2	1	-
CO4	2	3	2	1	1	1	2	-	1	1	2	2	3	2	-	-
CO5	3	3	2	1	1	1	2	1	2	1	-	-	2	2	-	-
CO6	2	2	2	2	1	1	2	2	2	2	2	3	2	3	1	-

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Examination Scheme:

Components	Istinternal(Assignment)	IIndInternal (Written Exam)	External (ESE)
Weightage(%)	15	15	70

Programme Name: B.A/B.S.c

Course code	: STADC301				
Course Name	:Statistical Inference				
Semester/Year	:III sem/ IInd Year				
		L	**T**	**P**	**C**
		3	0	0	3

L- Lecture T – Tutorial P – Practical C – Credit

Course Objectives:

The objectives of this course are:

1. To understand the basics concept of statistical inference
2. To drawing inference about the unknown population parameters based on random sample.
3. To gain understanding of estimation about the population using testing of hypothesis.
4. To understand the important tests which are using to draw valid conclusion

Course Contents

Unit1 **(15 Hours)**

Estimation: Parameter space, sample space, point estimation, requirement of a good estimator, consistency, unbiasedness, efficiency, sufficiency, Minimum variance unbiased estimators. Cramer-Rao inequality (Statement only).

Unit 2 **(10 Hours)**

Methods of estimation: Maximum likelihood, least squares and minimum variance, statement of Rao-Blackwell theorem and lehmann- Scheffe theorem. Properties of maximum likelihood estimators (illustration).Interval Estimation: confidence intervals for the parameters of normal distribution confidence intervals for difference of mean and for ratio of variances.

Unit 3 **(10 Hours)**

Testing of Hypothesis: Statistical Hypothesis, simple and composite hypothesis null and alternative hypotheses. Critical region. Two kind of errors, Level of significance and power of atest.MP test and region. Neyman-Pearson lemma (statement only).Likelihood ratio test.

Unit 4 **(10 Hours)**

Test of significance: Null and alternative hypotheses, level of significance and probabilities of Type I and Type II errors, critical region and power of test. Large sample test, use of CLT for testing single proportion and difference of two proportions, Tests of significance based of Chi-square, t and F distributions.

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Text Books:

1. A.M. Goon, M.K. Gupta and B.Dasgupta (2003).An outline of Statistical Thcory (Vol.I),4thEd.World Press, Kolkata.

2. S.C. Gupta andV.K.Kapoor (2007).Fundamentals of Mathematical Statistics 11thEd, Sultan Chand and Sons.

Reference Books:

1. G.Casel and R.L.Berger (2002).Statistical Inference(2nd Ed.).Thomson Duxbury.

2. E.J.Dudewicz and S.N.Mishra (1988).Modern Mathematical Statistics, John Wiley and Sons.

3. R.V.Hogg, A.T.Craig and J.W.Mckean.(2005).Introduction to Mathematical Statistics (6thEd.).Pearson Education.

Course outcomes(COs):

Upon successful completion of the course a student will be able to:

CO1	Identify fundamental concepts of Point estimation. Properties of estimators and mean square error, Minimum variance unbiased estimators.
CO2	Recognize the Large sample test, Use of central limit theorem to obtain large sample tests for binomial proportions and means of populations, etc, Related Confidence intervals.
CO3	Apply the different methods of estimations. Estimating point estimators using Different methods .Construction of confidence interval for parameter s of different distributions
CO4	Analysis practical utility of various test of significance based on t, F and Chi square test.
CO5	Evaluate the various tests based on hypothesis.
CO6	Develop an understanding of the hypothesis in relation to the social world

CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO1 2	PSO 1	PSO2	PSO3	PS O4
CO1	3	1	1	-	-	1	2	1	1	1	1	1	3	2	1	-
CO2	3	2	1	-	-	1	1	-	1	1	1	1	2	1	1	-
CO3	3	2	2	1	1	1	2	1	1	2	2	3	3	2	2	1
CO4	2	3	2	1	-	1	2		1	1	2	2	3	2	1	1
CO5	3	3	3	-	-	1	2	1	2	1	-	-	2	2	1	-
CO6	2	2	2	2	1	2	2	2	2	2	2	3	2	3	2	-

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Examination Scheme:

Components	Istinternal (Assignment)	IIndInternal (Written Exam)	External (ESE)
Weightage(%)	15	15	70

Programme Name: B.A./B.S.c Bachelor of Arts /Bachelor of Science

Course code	:STADL301			
Course Name	:Lab course based on DC301			
Semester/Year	:IIIrd/ IIndYear			
	L	**T**	**P**	**C**
	0	0	2	1

L-Lecture T –Tutorial P – Practical C –Credit

Course Objectives:

The objectives of this course are:

1. To draw inference about the unknown population parameters based on random sample.
2. To Acquire knowledge of estimation about the population using testing of hypothesis.
3. To study the important tests which are using to draw valid conclusion.

Course Contents

Unit 1 **(10 Hours)**

1. Large Sample Tests (Based on normal distribution)

2. Testing of goodness of fit

3. Testing of independence of attributes based on 2X2 contingency table

Unit 2 **(10 Hours)**

1. Testing of equality of two populations variances

2. Applying the paired–test for difference of means

3. Maximum Likelihood Estimation

Unit 3 **(10 Hours)**

1. Confidence interval for Binomial proportion

2. Confidence interval for the difference of proportions

3. Confidence interval for difference of population means

4. Confidence interval for ratio of variances

Text Books:

1. A.M. Goon, M.K.Gupta and B.Dasgupta (2003) .An outline of Statistical Theory (Vol.I), 4thEd.World Press, Kolkata.

2. S.C. Gupta and V.K. Kapoor (2007).Fundamentals of Mathematical Statistics 11thEd, Sultan Chand and Sons.

Reference Books:

1. G.Casel and R.L.Berger(2002).Statistical Inference(2ndEd.).Thomson Duxbury.

2. E.J. Dudewicz and S.N.Mishra (1988).ModernMathematicalStatistics.JohnWileyandSons.

3. R.V.Hogg, A.T.Craig and J.W.Mckean (2005). Introduction to Mathematical Statistics (6thEd.).Pearson Education.

4.V.K.Rohtagi and A.K.Md.E.Saleh (2009).An Introduction to Probablity and Statistics, (2ndEd.).John Wiley and Sons.

Course outcomes (COs):

Upon successful completion of the course a student will b ableto:

CO1	Remember the skill regarding analysis of data.
CO2	Apply the concepts of statistics through experiments.
CO3	Apply suitable technique for analysis data
CO4	Differentiate Quantitative and Qualitative data through practical's.
CO5	Evaluate the concepts of statistics through practical's
CO6	Develop basic tools and techniques for performing experiment

CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	1	1	1	2	-	1	1	1	1	1	-	3	2
CO2	1	1	2	1	1	1	1	-	1	1	1	1	2	1	3	2
CO3	1	2	3	1	1	1	2	1	2	1	2	3	1	1	2	3
CO4	1	1	2	1	1	1	2	-	1	1	1	2	3	-	2	3
CO5	1	1	2	1	1	1	2	1	1	1	1	-	2	-	2	2
CO6	3	2	3	2	1	2	2	1	2	1	2	3	2	-	3	3

3: Highest Correlated, 2:Medium Correlated, 1:Lowest Correlated

Examination Scheme:

Evaluation Method	Internal Evaluation	External Evaluation	
Components	Written Exam/ File Record	Practical Conduction	Viva Voce
Weightage (%)	30	40	30

Programme Name: B.A/B.S.c

Course code	: STADC302				
Course Name	: Theory of Estimation & Testing of Hypothesis				
Semester/Year	:IIIsem /IIndYear				
		L	**T**	**P**	**C**
		3	0	0	3

L- Lecture T – Tutorial P – Practical C – Credit

Course Objectives:

The objectives of this course are:

1.To understand the basics concept of statistical inference

2. To drawing inference about the unknown population parameters based on random sample.

3. To gain understanding of estimation about the population using testing of hypothesis.

4. To understand the important tests which are using to draw valid conclusion

Course Contents

Unit1 **(10 Hours)**

Estimation: Point estimation: Characteristics of a good estimator: Unbiasedness, consistency, sufficiency and efficiency. Problems and examples, Interval estimation

Unit 2 **(10 Hours)**

Methods of estimation: Method of Maximum Likelihood and properties of maximum likelihood estimators (without proof), Method of minimum Chi-square. Method of least squares and methods of moments for estimation of parameters.

Unit3 **(10 Hours)**

Testing of Hypothesis: Statistical Hypothesis (Simple and Composite), Testing of hypothesis. Type–I and Type–II errors, Significance level, p-values, Power of a test, Definitions of Most Powerful (MP),Uniformly Most Powerful (UMP) and Uniformly Most Powerful Unbiased (UMPU)tests.

Unit4 **(15 Hours)**

Test of significance: Test of significance: large sample tests for (Attributes and Variables) proportions and means (i)for one sample(ii)for two sample, Small sample test based on t, f and chi-square distributions.

Text Books:

1.A.M.Goon, M.K. Gupta and B.Dasgupta (2003). An outline of Statistical Theory (Vol.I), 4th Ed.World Press, Kolkata.

2. S.C. Gupta and V.K. Kapoor (2007).Fundamentals of Mathematical Statistics 11thEd, Sultan Chand and Sons.

Reference Books:

1.G.Casel and R.L.Berger (2002).Statistical Inference(2nd Ed.).Thomson Duxbury.

2. E.J.DudewiczandS.N.Mishra (1988).ModernMathematicalStatistics,JohnWileyand Sons.

3. R.V.Hogg,A.T.Craig and J.W.Mckean.(2005).Introduction to Mathematical Statistics (6thEd.).Pearson Education.

Course outcomes (COs):

Upon successful completion of the course a student will be able to:

CO1	Identify fundamental concepts of Point estimation. Properties of estimators and mean square error, Minimum variance unbiased estimators.
CO2	Recognize the Large sample test, Use of central limit theorem to obtain large sample tests for binomial proportions and means of populations,etc., Related Confidence intervals.
CO3	Apply the different methods of estimations. Estimating point estimators using Different methods. Construction of confidence interval for parameters of different distributions
CO4	Analysis practical utility of various test of significance based on t, F and Chi square test.
CO5	Evaluate the various tests based on hypothesis.
CO6	Develop an understanding of the hypothesis in relation to the social world

CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	1	1	-	-	1	2	1	1	1	1	1	3	2	1	-
CO2	3	2	1	-	-	1	1	-	1	1	1	1	2	1	1	-
CO3	3	2	2	1	1	1	2	1	1	2	2	3	3	2	2	1
CO4	2	3	2	1	-	1	2		1	1	2	2	3	2	1	1
CO5	3	3	3	-	-	1	2	1	2	1	-	-	2	2	1	-
CO6	2	2	2	2	1	2	2	2	2	2	2	3	2	3	2	-

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Examination Scheme:

Components	Istinternal (Assignment)	IIndInternal (Written Exam)	External (ESE)
Weightage (%)	15	15	70

Programme Name:B.A./B.S.c

Course code	:STADL302				
Course Name	: Lab course based on DC302				
Semester/Year	: IIIrd/ II nd Year				
		L	**T**	**P**	**C**
		0	0	2	1

L-Lecture T –Tutorial P – Practical C –Credit

Course Objectives:

The objectives of this course are:

1. To draw inference about the unknown population parameters based on random sample.
2. To Acquire knowledge of estimation about the population using testing of hypothesis.
3. To study the important tests which are using to draw valid conclusion.

Course Contents

Unit 1 **(10 Hours)**

1. Large Sample Tests (Based on normal distribution)

2. Testing of goodness of fit

3. Testing of independence of attributes based on 2X2 contingency table

Unit 2 **(10 Hours)**

1. Testing of equality of two populations variances

2. Applying the paired–test for difference of means

3. Maximum Likelihood Estimation

Unit 3 **(10 Hours)**

1. Confidence interval for Binomial proportion

2. Confidence interval for the difference of proportions

3. Confidence interval for difference of population means

Text Books:

1. A.M.Goon, M.K.Gupta and B.Dasgupta (2003).An outline of Statistical Theory (Vol.I),4th Ed.World Press, Kolkata.

2. S.C. Gupta and V.K. Kapoor (2007).Fundamentals of Mathematical Statistics 11thEd ,Sultan Chand and Sons.

Reference Books:

1.G.Casel and R.L.Berger (2002).Statistical Inference(2ndEd.).Thomson Duxbury.

2.E.J.Dudewicz andS.N.Mishra(1988).ModernMathematicalStatistics.JohnWileyandSons.

3.R.V.Hogg,A.T.CraigandJ.W.Mckean(2005).IntroductiontoMathematicalStatistics(6thEd.).Pearson Education.

Course outcomes (COs):

Upon successful completion of the course a student will be able to:

CO1	Remember the skill regarding analysis of data.
CO2	Apply the concepts of statistics through experiments.
CO3	Apply suitable technique for analysis data
CO4	Differentiate Quantitative and Qualitative data through practical's.
CO5	Evaluate the concepts of statistics through practical's
CO6	Develop basic tools and techniques for performing experiment

CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	1	1	1	2	-	1	1	1	1	1	-	3	2
CO2	1	1	2	1	1	1	1	-	1	1	1	1	2	1	3	2
CO3	1	2	3	1	1	1	2	1	2	1	2	3	1	1	2	3
CO4	1	1	2	1	1	1	2	-	1	1	1	2	3	-	2	3
CO5	1	1	2	1	1	1	2	1	1	1	1	-	2	-	2	2
CO6	3	2	3	2	1	2	2	1	2	1	2	3	2	-	3	3

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

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Examination Scheme:

Evaluation Method	Internal Evaluation	External Evaluation	
Components	Written Exam/ File Record	Practical Conduction	Viva Voce
Weightage (%)	30	40	30

Programme Name: B.A./B.S.c

Course code : STAGE301				
Course Name : Network Analysis &Theory of Sequencing				
Semester/Year : III sem/ IIndYear				
	L	**T**	**P**	**C**
	4	0	0	4

L-Lecture T –Tutorial P – Practical C –Credit

Course Objectives:

The objectives of this course are:

1. To understand the concepts and importance of theory of sequencing
2. To comprehend the process and steps of job sequencing.
3. To learn various strategies to enhance effective decision making in travelling salesman problem.

Course Contents

Unit 1 **(15 Hours)**

Flows in networks: Maximal flow, Shortest path and travelling sales man problem, Construction of minimal spanning tree and its applications.

Unit 2 **(15 Hours)**

Project management: Project management through PERT/CPM, Updating of PERT charts .Project crashing,

Unit 3 **(15 Hours)**

Sequencing Problems: Processing n jobs through two/three machines. General n/m jobs problem.

Unit 4 **(15 Hours)**

Introduction Salesman problem: Problems based on travelling, salesman problem.

Texts Book

1. Sharma, S.D.Operation Research, Pragati Prakashan Meerut.
2. R.K.AhujaT.L.Magnanti,B.Orlin.1993.Network Flows-Theory, Algorithm and Applications, Prentice Hall, NJ.

3. J.D.Wist, F.K.Levy. (2007).A Management Guide to PERT/CPM (2ndEd.).PH

Reference Books

1. G.Hadley.1964.Non linear and Dynamic Programming, Addison-Wesley.

2.A.Ravindran,D.T. Phillips and James J.Solberg.2005.Operations Research-Principles and Practice. John Wiley and Sons.

Course outcomes(COs):

Upon successful completion of the course a student will be able to:

CO1	Identify the fundamentals of network Analysis.
CO2	Explain the concepts of theory of sequencing.
CO3	Apply the various strategies for solving travelling salesman problem.
CO4	Analyse major issues of network analysis.
CO5	Evaluate the importance of network analysis & theory of sequencing.
CO6	Develop the ability and skill of effective network analysis .

CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO1 2	PSO 1	PSO2	PSO3	PSO4
CO1	3	1	1	1	1	1	2	1	1	1	1	1	3	2	-	-
CO2	3	2	1	-	1	1	1	-	1	1	1	1	2	1	-	-
CO3	3	2	2	1	1	1	2	1	1	2	2	3	3	2	1	-
CO4	2	3	2	1	1	1	2	-	1	1	2	2	3	2	-	-
CO5	3	3	2	1	1	1	2	1	2	1	-	-	2	2	-	-
CO6	2	2	2	2	1	1	2	2	2	2	2	3	2	3	1	-

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Examination Scheme:

Components	I[st]internal (Assignment)	II[nd]Internal (Written Exam)	External (ESE)
Weightage (%)	15	15	70

Programme Name: B.A./B.S.c

Course code :STASC301				
Course Name : Indian Official Statistics				
Semester /Year : IIIsem / IInd Year				
	L	**T**	**P**	**C**
	2	0	0	2

L - Lecture T – Tutorial P – Practical C – Credit

The objectives of this course are:

1. To understand the concepts of Indian Statistical System
2. To Differentiate between International & state statistical system
3. To understand the function of various Statistical offices.

Course Contents

Unit 1 **(10 Hours)**

Introduction to Indian and International Statistical systems. Present Official Statistical System in India, role, functions and activities of central and state organization. Organization of large scales sample survey methods of collection of official statistics, Role of National Sample Survey Organization.

Unit 2 **(10 Hours)**

General and special data dissemination systems, population growth in developed and developing countries. Evaluation of performance of family welfare programs projection of labor force and man power. Scope and content of population of census of India.

Unit 3 **(5 Hours)**

System of collection of agriculture Statistics, Crop forecasting and estimation. Support prices buffer stock, impact of irrigation projects.

Unit 4 **(5 Hours)**

Statistics related to industries, balance of payment, cost of living, educational and other Social Statistics.

Text Books:

1. Basic Statistics relating to Indian Economy (CSO) 1990.

2. Statistical system in India (CSO) 1975.

Reference Books:

1. Guide to Official Statistics (CSO) 1999.

2. Principles and accommodation of National Populations Census. UNESCO.

Course outcomes (COs):

Upon successful completion of the course a student will be able to:

CO1	Identify the concepts of statistical system in India
CO2	Explain the function of various statistical office in India
CO3	Apply the concept of population census.
CO4	Analysis the work of various offices like CSO, NSSO etc.
CO5	Evaluate the different theoretical approaches of indian official statistics.
CO6	Develop the critical thinking of official statistics.

CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	1	1	-	-	2	2	-	2	1	1	1	3	2	1	1
CO2	3	2	1	-	-	2	1	-	2	1	1	1	3	2	1	1
CO3	2	2	1	1	1	2	2	-	2	2	2	3	3	1	2	1
CO4	2	2	1	-	-	2	2	-	2	1	2	2	3	2	2	2
CO5	3	2	2	-	-	2	2	-	2	1	-	-	2	2	1	1
CO6	2	2	1	1	1	2	2	-	2	2	2	3	2	3	2	2

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Examination Scheme:

Components	I[st] internal Assignment	II[nd] Internal Written Exam	External (ESE)
Weightage(%)	15	15	70

Programme Name: B.A./B.S.c

Course code	:STADC401				
Course Name	:Survey Sampling				
Semester/Year	:IV sem/IIndYear				
		L	**T**	**P**	**C**
		3	0	0	3

L- Lecture T – Tutorial P – Practical C – Credit

Course Objectives:

The objectives of this course are:

1. To comprehend the tools and technique for selecting a sample of elements from a target population
2. To understand the basics of sampling methods.
3. To develop criticalthinkinginordertousetheappropriatedesignandconductexperiment
4. To analysis and interpret data.

Course Contents

Unit 1 **(15 Hours)**

Concepts of census and sample survey: Basic concepts in sampling. Sampling and Non sampling errors. Principal steps involved in a sample survey; bias, precision and accuracy, advantages of sampling over complete census, limitations of sampling, different methods of datacollection.Basicsamplingmethods:Simplerrandomsampling(SRS)withandwithoutreplacement, use of random number tables, estimation of mean and variance in case of SRS.

Unit 2 **(10 Hours)**

Stratified random sampling: Estimation of population mean, variance of the estimate of population mean in stratified Random sampling, allocation of sample size, proportional allocation, and optimum allocation.

Unit 3 **(10 Hours)**

Comparison of Stratified random sampling with SRS. sampling, estimation of mean and variance. Comparison of Systematic random sampling with SRS and Stratified random sampling.

Unit 4 **(10 Hours)**

Ratio and Regression Introduction to Ratio and regression methods of estimation, first approximation to the population mean and total (for SRS of large size),variance of these estimates and estimates of these variances, variances in terms of correlation coefficient for regression method of estimation and their comparison with SRS.

Texts Books:

1. A.M.Goon, M.K.Guptaand B.Dasgupta (2003).An outline of Statistical Theory (Vol.I),4th Ed.World Press, Kolkata.

2. S.C.GuptaandV.K.Kapoor.(2007).FundamentalsofMathematicalStatistics11thEd.Sultan Chand and Sons.

Reference Books:

1. D.C. Montgomery. (2001). Designs and Analysis of Experiments. John Wiley and Sons. NewYork.

2. P.Mukhopadhyay. (1998). Theory and Methods of Surveys Sampling. Prentice Hall of India.

Course outcomes (COs):

Upon successful completion of the course a student will be able to:

CO1	Identify basic concepts of survey sampling,
CO2	Explain basic principles in sampling,.
CO3	Apply Simple random sampling
CO4	Analysis systematic sampling
CO5	Evaluate stratified sampling
CO6	Develop critical thinking in order to construct the techniques of sampling.

CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	1	1	-	-	1	2	1	1	1	1	1	3	2	1	-
CO2	3	2	1	-	-	1	1	-	1	1	1	1	2	1	1	-
CO3	3	2	2	1	1	1	2	1	1	2	2	3	3	2	2	1
CO4	2	3	2	1	-	1	2		1	1	2	2	3	2	1	1
CO5	3	3	3	-	-	1	2	1	2	1	-	-	2	2	1	-
CO6	2	2	2	2	1	2	2	2	2	2	2	3	2	3	2	-

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Examination Scheme:

Components	Istinternal (Assignment)	IInd Internal (Written Exam)	External (ESE)
Weightage (%)	15	15	70

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Programme Name:B.A./B.Sc.

Course code	:	STADL401
Course Name	:	Lab course based on DC401
Semester/Year	:	IV sem/ IInd Year

	L	T	P	C
	0	0	2	1

L-Lecture T –Tutorial P – Practical C –Credit

Course Objectives:

The objectives of this course are:

1. To provide tools and technique for selecting a sample of elements from a target population
2. To understand the basics of sampling methods and different sampling techniques.
3. To develop critical thinking in order to use the appropriate design and conduct experiment for Analysis.

Course Contents

Unit 1 **(10 Hours)**

1. To select a SRS with and without replacement.

2. For a population of size 5, estimate population mean, population mean square and population variance. Enumerate all possible sample size 2 by wr and wor.

Unit 2 **(10 Hours)**

1.For srswor, estimate mean, standard error, the sample size

2. Stratified Sampling: allocation of sample to strata by proportional and Neyman'sMethodscomparetheefficienciesofabovetwomethodsrelativetosrs

Unit 3 **(10 Hours)**

1. Estimation of gain in precision in stratified sampling

2.Comparison of systematic sampling with stratified sampling.

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Texts Books:

1. A.M. Goon, M.K. Gupta and B.Dasgupta (2005): *Fundamentals of Statistics* (Vol.II), 8th Ed., World Press, Kolkata.

2. A.M. Goon, M.K.Gupta and B. Dasgupta(2005): *An Outline of Statistical Theory* (Vol.II), 3Ed., World Press, Kolkata.

3.S.C.Gupta and V.K. Kapoor, *Fundamentals of Applied Statistics*, 4th Ed. Sultan Chand and Sons, 2008.

Referance Books:

1 D.C. Montgomery (2001):*Designs and Analysis of Experiments*, John Wiley and Sons, NewYork.

2. P. Mukhopadhyay (1998): *Theory and Methods of Surveys Sampling*, Prentice

Course outcomes (COs):

Upon successful completion of the course a student will be able to:

CO1	Remember the skill regarding analysis of data.
CO2	Apply the concepts of statistics through experiments.
CO3	Apply suitable technique for analysis data
CO4	Differentiate Quantitative and Qualitative data through practical's.
CO5	Evaluate the concepts of statistics through practical's
CO6	Develop basic tools and techniques for performing experiment

CO-PO-PSO Mapping

Course	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2	PSO 3	PSO 4
CO1	1	1	2	1	1	1	2	-	1	1	1	1	1	-	3	2
CO2	1	1	2	1	1	1	1	-	1	1	1	1	2	1	3	2
CO3	1	2	3	1	1	1	2	1	2	1	2	3	1	1	2	3
CO4	1	1	2	1	1	1	2	-	1	1	1	2	3	-	2	3
CO5	1	1	2	1	1	1	2	1	1	1	1	-	2	-	2	2
CO6	3	2	3	2	1	2	2	1	2	1	2	3	2	-	3	3

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Examination Scheme:

Evaluation Method	Internal Evaluation	External Evaluation	
Components	Written Exam/ File Record	Practical Conduction	Viva Voce
Weightage (%)	30	40	30

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Programme Name: B.A./B.S.c

Course code	: STADC402
Course Name	: Sampling Distribution
Semester/Year	: IVsem/IIndYear

	L	T	P	C
	3	-	0	3

L- Lecture T – Tutorial P – Practical C –Credit

Course Objectives:

The objectives of this course are:

1. To comprehend the tools and technique for selecting a sample of elements from a target population
2. To understand the basics of sampling methods.
3. To develop critical thinking in order to use the appropriate design and conduct experiment
4. To analysis and interpret data.

Course Contents

Unit1 **(15 Hours)**

Sampling Distributions: The concept of sampling distribution, Parameter, Statistic and Standard error. The sampling distribution for the sum of independent random variables of Binomial, Poisson and Normal distribution

Unit 2 **(10 Hours)**

Definitions of random sample, parameter and statistic, sampling distribution of a statistic, sampling distribution of sample mean, standard errors of sample mean, sample variance and sample proportion. Null and alternative hypotheses, level of significance Type I and Type II errors, their probabilities and critical region.

Unit 3 **(10 Hours)**

Normal Population. Exact sampling distribution: definition and derivation of *p.d.f.* of χ^2 with n degrees of freedom (d.f) using m.g.f., nature of χ^2curve for different degrees of freedom, mean, variance ,m.g.f., cumulative generating function, mode, additive property and limiting form of χ^2distribution.

Unit 4 **(10 Hours)**

Exact sampling distributions-Student's t and Fisher t-distribution, Derivation of its p.d.f., nature of probability curve with different degrees of freedom, mean, variance, moments and limiting form of t distribution. Snedecore's F-distribution

Texts Books:

1.A.M.Goon,M.K.Gupta and B.Dasgupta (2003).An outline of Statistical Theory (Vol.I),4th Ed.World Press, Kolkata.

2.S.C.Gupta and V.K. Kapoor .(2007).Fundamentals of Mathematical Statistics 11th Ed Sultan Chand and Sons.

Reference Books:

1. D.C. Montgomery. (2001). Designs and Analysis of Experiments. John Wiley and Sons. NewYork.

2. P.Mukhopadhyay. (1998). Theory and Methods of Surveys Sampling. Prentice Hall of India.

Course outcomes (COs):

Upon successful completion of the course a student will be able to:

CO1	Identify basic concepts of survey sampling,
CO2	Explain basic principles in sampling,.
CO3	Apply Simple random sampling
CO4	Analysis systematic sampling
CO5	Evaluate stratified sampling
CO6	Develop critical thinking in order to construct the techniques of sampling .

CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	1	1	-	-	1	2	1	1	1	1	1	3	2	1	-
CO2	3	2	1	-	-	1	1	-	1	1	1	1	2	1	1	-
CO3	3	2	2	1	1	1	2	1	1	2	2	3	3	2	2	1
CO4	2	3	2	1	-	1	2		1	1	2	2	3	2	1	1
CO5	3	3	3	-	-	1	2	1	2	1	-	-	2	2	1	-
CO6	2	2	2	2	1	2	2	2	2	2	2	3	2	3	2	-

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Examination Scheme:

Components	I[st]internal (Assignment)	II[nd]Internal (Written Exam)	External (ESE)
Weightage (%)	15	15	70

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Programme Name: B.A./B.Sc.

Course code	:	STADL402			
Course Name	:	Lab course based on DC402			
Semester/Year	:	IV sem/ IInd Year			
		L	**T**	**P**	**C**
		0	0	2	1

L-Lecture T –Tutorial P – Practical C –Credit

Course Objectives:

The objectives of this course are:

1. To provide tools and technique for selecting a sample of elements from a target population
2. To understand the basics of sampling methods and different sampling techniques.
3. To develop critical thinking in order to use the appropriate design and conduct experiment for Analysis.

Course Contents

Unit 1 **(10 Hours)**

1. Problems based on t –test., difference t test

Unit 2 **(10 Hours)**

1. Problems based on F-test. And its applications

Unit 3 **(10 Hours)**

1. Problems based on Chi-square test, Problems based on large sample tests

Texts Books:

1.A.M. Goon, M.K.Gupta, and B.Dasgupta (2005):*Fundamentals of Statistics* (Vol.II),8th Ed., World Press, Kolkata.

2.A.M.Goon,M.K.Gupta and B.Dasgupta (2005):*An Outline of Statistical Theory* (Vol.II) ,3rd Ed.,World Press, Kolkata.

2. S.C.Gupta and V.K.Kapoor, *Fundamentals of Applied Statistics*, 4th Ed Sultan Chand and Sons, 2008.

Reference Books:

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1D.C. Montgomery (2001): *Designs and Analysis of Experiments*, John Wiley and Sons, New York.

2. P. Mukhopadhyay (1998): *Theory and Methods of Surveys Sampling*, Prentice

Course outcomes (COs):

Upon successful completion of the course a student will be able to:

CO1	Remember the skill regarding analysis of data.
CO2	Apply the concepts of statistics through experiments.
CO3	Apply suitable technique for analysis data
CO4	Differentiate Quantitative and Qualitative data through practical's.
CO5	Evaluate the concepts of statistics through practical's
CO6	Develop basic tools and techniques for performing experiment

CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	1	1	1	2	-	1	1	1	1	1	-	3	2
CO2	1	1	2	1	1	1	1	-	1	1	1	1	2	1	3	2
CO3	1	2	3	1	1	1	2	1	2	1	2	3	1	1	2	3
CO4	1	1	2	1	1	1	2	-	1	1	1	2	3	-	2	3
CO5	1	1	2	1	1	1	2	1	1	1	1	-	2	-	2	2
CO6	3	2	3	2	1	2	2	1	2	1	2	3	2	-	3	3

3: Highest Correlated, 2: Medium Correlated, 1:LowestCorrelated

Examination Scheme:

Evaluation Method	Internal Evaluation	External Evaluation	
Components	Written Exam/ File Record	Practical Conduction	Viva Voce
Weightage (%)	30	40	30

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Programme Name: B.A./B.Sc.

Course code	:STAGE401			
Course Name	:Statistics Technique for Research Methods			
Semester/Year	: IVth sem/ IIndYear			
	L	**T**	**P**	**C**
	4	0	0	4

L-Lecture T –Tutorial P – Practical C –Credit

Course Objectives:

The objectives of this course are:

1. To understand how the principles of research methodology can be applied to the area of research
2. To understand the concepts and theories of research problem, research design.
3. To understand the comparative study of different methods of data collection
4. To learn student show to construct of questionnaires

Course Contents

Unit 1 **15 Hours)**

Introduction: Meaning, objective and motivation in research, types of research, research Approach, significance of research. Research problems: definition, selection and necessity of research problems.

Unit 2 **(15 Hours)**

Survey Methodology: Data Collection, inference and error in surveys ,the target populations, sampling frames and coverage error, methods of data collection, non-response, questions and answers in surveys.

Unit 3 **(15 Hours)**

Processing: Data Analysis and Interpretation: Review of various techniques for data analysis covered in core statistics papers, techniques of interpretation, precaution in interpretation.

Unit 4 **(15 Hours)**

Develop a questionnaire: collect survey data pertaining to a research problem (such as gender discriminations in private/government sector, unemployment rates, removal of subsidy, and impact on service class v/s unorganized sectors), interpret the results and draw inferences.

Text Books:

1. Kothari, C.R.(2009): Research Methodology: Methods and Techniques, Edition reprint New Age International Publishers.

2. Kumar, R(2011):Research Methodology: A Step-by- Step Guide for Beginners, SAGE publications.

.Reference Books:

1. Kumar, R(2011):Research Methodology: A Step by-Step Guide for Beginners, SAGE publications

Course outcomes (COs):

Upon successful completion of the course a student will be able to:

CO1	Identify the basic concepts meaning of research and types of research
CO2	Decribetounderstandresearchproblemsselectionandnecessityofresearchproblems.
CO3	Applytheconceptsofsurveymethodologyandhowtocollectdatacollection,processing data analysis and interpretations..
CO4	Examine the questionnairecollectsurveydataandtheiranalysisbyusingsuitablestatistical tools.
CO5	Evaluate the research methods for analysis data.
CO6	Develop the ability to use the research concepts.

CO-PO-PSO Mapping

Course	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	1	1	1	1	1	2	1	1	1	1	1	3	2	-	-
CO2	3	2	1	-	1	1	1	-	1	1	1	1	2	1	-	-
CO3	3	2	2	1	1	1	2	1	1	2	2	3	3	2	1	-
CO4	2	3	2	1	1	1	2	-	1	1	2	2	3	2	-	-
CO5	3	3	2	1	1	1	2	1	2	1	-	-	2	2	-	-
CO6	2	2	2	2	1	1	2	2	2	2	2	3	2	3	1	-

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Examination Scheme:

Components	Istinternal Assignment	IIndInternal Written Exam	External (ESE)
Weightage(%)	15	15	70

Programme Name: B.A./B.S.c

Course code	:STASC401			
Course Name	:Advanced Operation Research			
Semester /Year	: IVsem / IInd Year			
	L	**T**	**P**	**C**
	2	0	0	2

L - Lecture T – Tutorial P – Practical C – Credit

Course Objectives:

The objectives of this course are:

1. To understand the fundamental concepts of operation research.
2. To Acquire the fundamental concepts of linear programming
3. To learn and analysis the transportation problem and assignment problem and to solve it

Course Contents

Unit 1: **(5 Hours)**

Basics of O.R: Definition and scope of Operational research, phases in Operations Research, models and their solutions. Review of linear programming problems (LPP);

Unit 2: **10 Hours)**

Games Theory: Two-person game's, pure and mixed strategies, existence of solution and uniqueness of value in zero sum games, finding solution in 2x2,2x m and mxn games, reduction of game problem to a linear programming problem. Allocation Problems, transportation problem (TP),

Unit 3: **(10 Hours)**

Queuing Theory: Queuing Models, Stead y-state solutions of (M/M/1) and (M/M/C) models with associated distribution of queue length and waiting time, M/G/1 queue.

Unit 4: **(5 Hours)**

NLP: Non-Linear Programming, Kuhn-Tucker conditions,. Inventory Control-Economic lot size, Formulae of Harris for known demand and its extension allowing shortage, Random demand; discrete and continuous cases.

Books Recommended:

1. Sharma, S.D.: Operation Research, PragatiPrakashan, Meerut.

2. Taha,H.A.(1982):Operations Research: An Introduction; Mac Millan Publishing Company, NewYork.

Reference Books:

1. Kanti Swaroop, Gupta, P.K. and Singh, M.M.(1985): Operations Research; Sultan Chand and Sons.

2. Hadle y, G and Whitin,T.M.(1963):Analysis of Inventory System; Prentice Hall

Course outcomes (COs):

Upon successful completion of the course a student will be able to:

CO1	Identify the concepts of operation research
CO2	Describe the concept of linear programming and their procedure for obtaining the best results..
CO3	Apply the concept of basic feasible solution and their different to find initial feasible solution
CO4	Analysis between transportation and assignment problems as LPP.
CO5	Evaluate the different theoretical approaches of operation research.
CO6	Develop the thinking and skills of analysis .

CO-PO-PSO Mapping

Course	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	3	1	1	-	-	2	2	-	2	1	1	1	3	2	1	1
CO2	3	2	1	-	-	2	1	-	2	1	1	1	3	2	1	1
CO3	2	2	1	1	1	2	2	-	2	2	2	3	3	1	2	1
CO4	2	2	1	-	-	2	2	-	2	1	2	2	3	2	2	2
CO5	3	2	2	-	-	2	2	-	2	1	-	-	2	2	1	1
CO6	2	2	1	1	1	2	2	-	2	2	2	3	2	3	2	2

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Examination Scheme:

Components	I[st] internal (Assignment)	II[nd] Internal (Written Exam)	External (ESE)
Weightage(%)	15	15	70

Programme Name: B.A./B.S.c

Course code	:STADC501			
Course Name	:Analysis of Variance and Design of Experiment			
Semester /Year	: Vsem / IIIrd Year			
	L	**T**	**P**	**C**
	3	0	0	3

L - Lecture T – Tutorial P – Practical C – Credit

Course Objectives:

The objectives of this course are:

1. To comprehend the tools and technique for selecting a sample of elements from a target population
2. To understand the basics of sampling methods.
3. To develop critical thinking in order to use the appropriate design and conduct experiment
4. To analysis and interpret data.

Unit1 **(10 Hours)**

Analysis of variance (ANOVA): Definition and assumptions for ANOVA. Causes of variations Analysis of variance for one-way classification and two-way classifications for fixed effect models with one observation per cell.

Unit 2 **(10 Hours)**

Mathematical model: Sum of squares for various causes of variation, Expected value of Sum of Squares, Degrees of freedom for Sum of Squares, ANOVA Table and related tests of Significance

Unit 3 **(10 Hours)**

Introduction to design of experiments: Terminology experiment, treatment, experimental unit, blocks, replication, precision, efficiency of a design, need for design of experiments, size and shape of plots and blocks. Fundamental principles of design randomization, replication and local control

Unit 4 **(10 Hours)**

Different designs : Completely randomized design (CRD), Randomized Block Design (RBD), their layout ,Latin square design (LSD) Layout, Missing observations, statistical analysis, applications, merits and demerits of LSD. Factorial designs and Confounding.

Texts Books:

1.A.M. Goon, M.K. Gupta and B. Dasgupta (2003). An outline of Statistical Theory (Vol.I),4th Ed .World Press, Kolkata.

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2. S.C.Gupta and V.K.Kapoor. (2007). Fundamentals of Mathematical Statistics 11thEd. Sultan Chand and Sons.

Reference Books:

1. D.C. Montgomery. (2001). Designs and Analysis of Experiments. John Wiley and Sons. New York.

2. P.Mukhopadhyay. (1998). Theory and Methods of Surveys Sampling. Prentice Hall of India.

Course outcomes (COs):

Upon successful completion of the course a student will be able to:

CO1	Identify basic concepts of Anova and its utility .
CO2	Explain basic concepts of analysis of variance and appropriately interpret the results of analysis of variance test.
CO3	Apply the design of experiments and analyze the data they yield
CO4	Analysis Completely randomized design, Randomized block design, Latin square design. Factorial experiments with two levels
CO5	Evaluate different quantitative and qualitative statistical methods used in research.
CO6	Develop critical thinking in order to construct the statistical test and use the appropriate statistical analysis in statistics research.

CO-PO-PSO Mapping

Course	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2	PSO 3	PSO 4
CO1	3	1	1	-	-	1	2	1	1	1	1	1	3	2	1	-
CO2	3	2	1	-	-	1	1	-	1	1	1	1	2	1	1	-
CO3	3	2	2	1	1	1	2	1	1	2	2	3	3	2	2	1
CO4	2	3	2	1	-	1	2		1	1	2	2	3	2	1	1
CO5	3	3	3	-	-	1	2	1	2	1	-	-	2	2	1	-
CO6	2	2	2	2	1	2	2	2	2	2	2	3	2	3	2	-

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Examination Scheme:

Components	I[st]internal (Assignment)	II[nd]Internal (Written Exam)	External (ESE)
Weightage(%)	15	15	70

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Programme Name:B.A./B.Sc.

Course code	:	STADL501
Course Name	:	Lab course based on DC501
Semester /Year	:	V sem/ IIIrd Year

	L	T	P	C
	0	0	2	1

L-Lecture T –Tutorial P – Practical C –Credit

Course Objectives:

The objectives of this course are:

1. To provide tools and technique for selecting a sample of elements from a target population
2. To understand the basics of sampling methods and different sampling techniques.
3. To develop critical thinking in order to use the appropriate design and conduct experiment for Analysis.

Course Contents

Unit 1 **(10 Hours)**

1. Anova in way classification

2. Anova in two way classification

Unit 2 **(10 Hours)**

1. Analysis of an CRD

2. Analysis of an RBD

3. Comparison between CRD,RBD and LSD.

Unit 3 **(10 Hours)**

1. Analysis of an RBD and LSD with one missing observation

2. Missing plot technique.

Texts Books:

1. A.M.Goon, M.K.Gupta, and B.Dasgupta (2005): *Fundamentals of Statistics*

(Vol.II),8th Ed., World Press, Kolkata.

2. A.M. Goon, M.K.Gupta and B.Dasgupta (2005):*An Outline of Statistical Theory* (Vol.II), 3rd Ed., World Press, Kolkata.

3. S.C.Gupta and V.K.Kapoor, *Fundamentals of Applied Statistics*, 4th Ed. Sultan Chand and Sons, 2008.

Reference Books:

1D.C. Montgomery (2001): *Designs and Analysis of Experiments*, John Wiley and Sons, New York.

2.P. Mukhopadhyay (1998): *Theory and Methods of Surveys Sampling*, Prentice Hall of India

Course outcomes (COs):

Upon successful completion of the course a student will be able to:

CO1	Remember the skill regarding analysis of data.
CO2	Apply the concepts of statistics through experiments.
CO3	Apply suitable technique for analysis data
CO4	Differentiate Quantitative and Qualitative data through practical's.
CO5	Evaluate the concepts of statistics through practical's
CO6	Develop basic tools and techniques for performing experiment

CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO1 2	PSO 1	PSO2	PSO3	PSO 4
CO1	1	1	2	1	1	1	2	-	1	1	1	1	1	-	3	2
CO2	1	1	2	1	1	1	1	-	1	1	1	1	2	1	3	2
CO3	1	2	3	1	1	1	2	1	2	1	2	3	1	1	2	3
CO4	1	1	2	1	1	1	2	-	1	1	1	2	3	-	2	3
CO5	1	1	2	1	1	1	2	1	1	1	1	-	2	-	2	2
CO6	3	2	3	2	1	2	2	1	2	1	2	3	2	-	3	3

3: Highest Correlated, 2: Medium Correlated, 1:Lowest Correlated

Examination Scheme:

Evaluation Method	Internal Evaluation	External Evaluation	
Components	Written Exam/ File Record	Practical Conduction	Viva Voce
Weightage (%)	30	40	30

Programme Name:B.A./B.S.c

Course code	:STADC502				
Course Name	: Design & Analysis of Experiment				
Semester/Year	:V sem /IIIrdYear				
		L	**T**	**P**	**C**
		3	0	0	3

L- Lecture T – Tutorial P – Practical C – Credit

Course Objectives:

The objectives of this course are:

1. To design and conduct experiments.
2. To analyze and interpret data.
3. To develop critical thinking in order to use the appropriate design and conduct experiment
4. To analysis and interpret data.

Course Contents

Unit 1 **(10 Hours)**

ANOVA in Way and two way classifications: Terminology experiment, treatment, experimental unit, blocks, replication, precision, efficiency of a design, need for design of experiments, size and shape of plots and blocks. Fundamental principles of design randomization, replication and local control

Unit 2 **(15 Hours)**

Basic designs: Completely Randomized Design (CRD), Randomized Block Design (RBD), Latin Square Design (LSD)-layout, model and statistical analysis, relative efficiency, analysis with missing observations,

Unit3 **(10 Hours)**

statistical analysis: applications, merits and demerits of LSD. Factorial designs and Confounding. Incomplete Block Designs, Balanced Incomplete Block Design (BIBD)-parameters,

Unit 4 **(10 Hours)**

Factorial experiments: Concepts, notations and advantages, 2^2, $2^3 \ldots 2^n$ factorial experiments, design and analysis, Total and Partial confounding .Factorial experiments in a single replicate

.

Texts Books:

1. A.M. Goon,M.K.Gupta and B.Dasgupta (2003). An outline of Statistical Theory (Vol.I),4th Ed. World Press, Kolkata.

2. S.C.Gupta and V.K.Kapoor. (2007). Fundamentals of Mathematical Statistics 11th Ed.Sultan

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Chand and Sons.

Reference Books:

1. D.C. Montgomery. (2001). Designs and Analysis of Experiments. John Wiley and Sons. NewYork.

2. P.Mukhopadhyay. (1998). Theory and Methods of Surveys Sampling. Prentice Hall of India.

Course outcomes(COs):

Upon successful completion of the course a student will be able to:

CO1	Identify basic concepts of survey sampling, basic principles in sampling, Simple random sampling, systematic sampling, stratified sampling.
CO2	Explain basic concepts of analysis of variance and appropriately interpret the results of analysis of variance test.
CO3	Apply the design of experiments and analyze the data they yield
CO4	Analysis Completely randomized design, Randomized block design, Latin square design. Factorial experiments with two levels
CO5	Evaluate different quantitative and qualitative statistical methods used in research.
CO6	Develop critical thinking in order to construct the statistical test and use the appropriate statistical analysis in statistics research.

CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO1 2	PSO 1	PSO2	PSO3	PSO4
CO1	3	1	1	-	-	1	2	1	1	1	1	1	3	2	1	-
CO2	3	2	1	-	-	1	1	-	1	1	1	1	2	1	1	-
CO3	3	2	2	1	1	1	2	1	1	2	2	3	3	2	2	1
CO4	2	3	2	1	-	1	2		1	1	2	2	3	2	1	1
CO5	3	3	3	-	-	1	2	1	2	1	-	-	2	2	1	-
CO6	2	2	2	2	1	2	2	2	2	2	2	3	2	3	2	-

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Examination Scheme:

Components	I[st]internal (Assignment)	II[nd]Internal (Written Exam)	External (ESE)
Weightage(%)	15	15	70

Programme Name:B.A./B.Sc.

Course code	:	STADL502			
Course Name	:	Lab course based on DC502			
Semester/Year	:	V sem/ IIIrd Year			
		L	**T**	**P**	**C**
		0	0	2	1

L-Lecture T –Tutorial P – Practical C –Credit

Course Objectives:

The objectives of this course are:

1.To provide tools and technique for selecting a sample of elements from a target popuation
2.To understand the basics of sampling methods and different sampling techniques.
3.To develop critical thinking in order to use the appropriate design and conduct experiment for Analysis.

Course Contents

Course Contents

Unit 1 **(10 Hours)**

1. Analysis of RBD with one missing observation.
2. Analysis of LSD with one missing observation.
3. Analysis of Intra block analysis of BIBD

Unit 2 **(10 Hours)**

1. Analysis of 2^2and2^3factorialinCRD,RBD and LSD.
2. Analysis2^3factorial in CRD, RBD and LSD
3. Analysis of a CRD with equal replicates.

Unit 3 **(10 Hours)**

1. Analysis of an one way/two way ANOVA
2. Analysis of a CRD, RBD, and LSD
3. Analysis of an RBD and LSD with one missing observation.

Texts Books:

1.A.M. Goon, M.K. Gupta, and B.Dasgupta (2005): *Fundamentals Statistics* (Vol.II),8th Ed., World Press, Kolkata.

2.A.M. Goon, M.K.Gupta and B. Dasgupta(2005):*An Outline of Statistical Theory* (Vol.II),3rd Ed., World Press, Kolkata.

3. S.C.Gupta and V.K.Kapoor, *Fundamentals of Applied Statistics*, 4th Ed. Sultan Chand and Sons, 2008.

Reference Books:

1 D.C. Montgomery (2001):*Designs and Analysis of Experiments*, John Wiley and Sons, NewYork.

2.P. Mukhopadhyay (1998): *Theory and Methods of Surveys Sampling*, Prentice Hall of India

Course outcomes (COs):

Upon successful completion of the course a student will be able to:

CO1	Remember the skill regarding analysis of data.
CO2	Apply the concepts of statistics through experiments.
CO3	Apply suitable technique for analysis data
CO4	Differentiate Quantitative and Qualitative data through practical's.
CO5	Evaluate the concepts of statistics through practical's
CO6	Develop basic tools and techniques for performing experiment

CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	1	1	1	2	-	1	1	1	1	1	-	3	2
CO2	1	1	2	1	1	1	1	-	1	1	1	1	2	1	3	2
CO3	1	2	3	1	1	1	2	1	2	1	2	3	1	1	2	3
CO4	1	1	2	1	1	1	2	-	1	1	1	2	3	-	2	3
CO5	1	1	2	1	1	1	2	1	1	1	1	-	2	-	2	2
CO6	3	2	3	2	1	2	2	1	2	1	2	3	2	-	3	3

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Examination Scheme:

Evaluation Method	Internal Evaluation	External Evaluation	
Components	Written Exam/ File Record	Practical Conduction	Viva Voce
Weightage (%)	30	40	30

Programme Name: B.A/B.Sc.

Course code	:STADE501a			
Course Name	:Applied Statistics			
Semester/Year	: Vth sem/ IIIrdYear			
	L	**T**	**P**	**C**
	4	0	0	4

L-Lecture T –Tutorial P –Practical C– Credit

Course Objectives:

The objectives of this course are:

1. To understand the concepts of applied statistics
2. To give suitable exposure to applied filed of statistics
3. To gain knowledge of fundamental concepts about index numbers and time series

Course Contents

Unit 1 **(15 Hours)**

Economic Time Series: Components of time series, Decomposition of time series-Additive and multiplicative model with their merits and demerits, Illustrations of time series. Measurement of trend by method of free-hand curve, method of semi-averages and method of least squares (linear, quadratic and modified exponential). Measurement of seasonal variations by method of ratio to trend.

Unit 2 **(15 Hours)**

Index numbers: Definition, Criteria for a good index number, different types of index numbers. Construction of index numbers of prices and quantities, consumer price index number Uses and limitations of index numbers.

Unit 3 **(15 Hours)**

Statistical Quality Control: Importance of statistical methods in industrial research and practice.Determinationoftolerancelimits.Causesofvariationsinquality:chanceandassignable.GeneralTheory of control charts, process & product control, Control charts for variables: X-bar and R-charts. Control charts for attributes: p and c-charts

Unit 4 **(15 Hours)**

Demographic Methods: Introduction, measurement of population, rates and ratios of vital events. Measurement of mortality CDR, SDR (w.r.t .Age and sex), IMR, Standardized death rates. Life (mortality) tables definition of its main functions and uses. Measurement of fertility and reproduction: CBR,GFR ,and TFR. Measurement of population growth :GRR,NRR.

Texts Books

1. Gun,A.M.,Gupta,M.K.andDasgupta,B.(2008):FundamentalsofStatistics,Vol.II,9 Edition World Press ,Kolkata.
2. Gupta, S.C.and Kapoor, V.K.(2008): Fundamentals of Applied Statistics,4th Edition (Reprint),Sultan Chand & Sons

Reference Books:

1.Arun Kumar and Alka Chaudhary (2009), Krishna Prakashan Media(P)Ltd. Meerut.

Course outcomes(COs):

Upon successful completion of the course a student will be able to:

CO1	Identify the basic concepts of vital statistics. Mortality rates, fertility rates and their measurements. Have a basic idea about migration and population Projection
CO2	Explain the concepts of quality control different types of control charts For variables and attributes and their construction
CO3	Apply the concept Index numbers and their applications. Have a clear Understanding about the different indices
CO4	Analysis the concepts of time series, different models and measurement of trend and seasonal variations..
CO5	Evaluate the important theoretical perspectives and methodological techniques in applied statistics.
CO6	Develop an ability to identify the various analysis tools for data analysis.

CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO1 2	PSO 1	PSO2	PSO3	PS O4
CO1	3	1	1	-	-	1	2	1	1	1	1	1	3	2	1	-
CO2	3	2	1	-	-	1	1	-	1	1	1	1	2	1	1	-
CO3	3	2	2	1	1	1	2	1	1	2	2	3	3	2	2	1
CO4	2	3	2	1	-	1	2		1	1	2	2	3	2	1	1
CO5	3	3	3	-	-	1	2	1	2	1	-	-	2	2	1	-
CO6	2	2	2	2	1	2	2	2	2	2	2	3	2	3	2	-

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Examination Scheme:

Components	Istinternal (Assignment)	IInd Internal (Written Exam)	External (ESE)
Weightage(%)	15	15	70

Programme Name: B.A./B.S.c.

Course code	:	STADE501b			
Course Name	:	Statistical Quality Control			
Semester/Year	:	Vth sem/ IIIrd Year			
		L	**T**	**P**	**C**
		4	0	0	4

L- Lecture T – Tutorial P – Practical C – Credit

Course Objectives:

The objectives of this course are:

1. .To introduce the basic concepts of statistical quality control
2. To Learn techniques and approach of SQC being used in various filed especially industry
3. Describe the concepts of various methods to control quality
4. Describe the concept of sigma and index numbers.

Course Contents

Unit 1 **(15 Hours)**

Quality Control: Definition, dimensions of quality, its concept, application and importance. Introduction to Process and Product Controls. Statistical Process Control - Seven tools of SPC, chance and assignable Causes of quality variation. Introduction to Six-Sigma.

Unit 2 **(15 Hours)**

Statistical Control Charts- Construction and Statistical basis of 3-σ Control charts. Controlchartsforvariables:&R-chart,&s-chart.Controlchartsforattributes:np-chart,p-chart,c-chartandu-chart.

Unit 3 **(15 Hours)**

Comparison between control charts for variables and control charts for attributes. Analysis of patterns on control chart, estimation of process capability Rational Sub grouping. Comparison between control charts for variables and control charts for attributes .Analysis of patterns on control chart, estimation of process capability.

Unit 4 **(15 Hours)**

Acceptance sampling plan: Principle of acceptance sampling plans. Single and Double sampling plan their OC, AQL, LTPD, AOQ, AOQL, ASN, ATI functions with graphical interpretation, use and interpretation of Dodge and Romig's sampling inspection plan.

Text Books:

1. Suddhendu Biswas (2003) Statistics of Quality Control, New Central Book Agency Kolkata

2. Arun Kumar and Alka Chaudhary (2009),Applied Statistics, Krishna House, 11, Shivaji RoadMeerut..

ReferenceBooks:

1. David,H.(1995).ISO Quality Systems Handbook, 2ndEd., Butterworth Heinemann Publication. Montogomery, D.C.(2009). Introduction to Statistical Quality Control, 6thEd.,Wiley India Pvt. Ltd

Course outcomes (COs):

Upon successful completion of the course a student will be able to:

CO1	Identify the basic concepts of statistical process control tools
CO2	Describe the various tools which are using to control quality
CO3	Apply the statistical product control tools and sampling inspection plan
CO4	Analyse and check whether the process in control or out of control by applying various control charts.
CO5	Evaluate the work attitudes and their impact on quality control.
CO6	Develop the ability & skill to perform statistical quality control.

CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO1 2	PSO 1	PSO2	PSO3	PS O4
CO1	3	1	1	-	-	1	2	1	1	1	1	1	3	2	1	-
CO2	3	2	1	-	-	1	1	-	1	1	1	1	2	1	1	-
CO3	3	2	2	1	1	1	2	1	1	2	2	3	3	2	2	1
CO4	2	3	2	1	-	1	2		1	1	2	2	3	2	1	1
CO5	3	3	3	-	-	1	2	1	2	1	-	-	2	2	1	-
CO6	2	2	2	2	1	2	2	2	2	2	2	3	2	3	2	-

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Examination Scheme:

Components	I[st]internal (Assignment)	II[nd]Internal (Written Exam)	External (ESE)
Weightage (%)	15	15	70

Programme Name:B.A./B.S.c.

Course code	:STAGE501				
Course Name	:Understanding Probability and Statistics Through Practical's				
Semester/Year	: Vsem /IIIrdYear				
		L	**T**	**P**	**C**
		4	0	0	4

L-Lecture T –Tutorial P – Practical C –Credit

Course Objectives:

The objectives of this course are:

1. To Learn the concepts and analysis of data in excel sheet
2. To analysis various fitting of data by using excel sheet.
3. To analysis correlation, tests based on t, F and Chi square test on excel sheet.

Course Contents

Unit 1 **(15 Hours)**

Fitting of Binomial, Poisson, Negative Binomial, Normal Distributions

Unit 2: **(15 Hours)**

Applications of Chi-square, t and F Distributions.

Unit 3: **(15 Hours)**

Calculation of correlation coefficient, Rank Correlation etc

Unit 4 **(15 Hours)**

Fitting of polynomials and regression curves. Selecting a simple random sample using random number tables.

Text Books :

1. Robert V.Hogg, Joseph W.McKean and Allen T.Craig. 2007. Introduction to Mathematical Statistics, Pearson Education, Asia.

2. Irwin Miller and Marylees Miller, John E. Freunds. 2006. Mathematical Statistics withApplications(7thEd.)Pearson Education, Asia.

Reference Book:

1. Sheldon Ross. 2007. Introduction to Probability Models, 9th Ed., Academic Press, Indian Reprint

Course outcomes(COs):

Upon successful completion of the course a student will be able to:

CO1	Identify the basic concepts of statistics and probability through practicals on a computer by using excel
CO2	Explain the concept of Fitting of Binomial, Poisson, Negative Binomial And normal distribution through practicals on a computer by using excel.
CO3	Apply Chi-Square t and F distribution through practicals on excel
CO4	Analyse correlation coefficient through practicals on compute rby using excel.
CO5	Evaluate the different methods and theories of probability
CO6	Formulate the different strategies to deal with data analysis.

CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO1 2	PSO 1	PSO2	PSO3	PS O4
CO1	3	1	1	1	1	1	2	1	1	1	1	1	3	2	-	-
CO2	3	2	1	-	1	1	1	-	1	1	1	1	2	1	-	-
CO3	3	2	2	1	1	1	2	1	1	2	2	3	3	2	1	-
CO4	2	3	2	1	1	1	2	-	1	1	2	2	3	2	-	-
CO5	3	3	2	1	1	1	2	1	2	1	-	-	2	2	-	-
CO6	2	2	2	2	1	1	2	2	2	2	2	3	2	3	1	-

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Examination Scheme:

Components	I[st]internal (Assignment)	II[nd]Internal (Written Exam)	External (ESE)
Weightage(%)	15	15	70

Programme Name:B.A./B.Sc.

Course code	:	STASC501			
Course Name	:	Data Analysis using Spreadsheet			
Semester/Year	:	Vth sem /IIIrd Year			
		L	**T**	**P**	**C**
		2	0	0	2

L-Lecture T –Tutorial P – Practical C –Credit

Course Objectives:

The objectives of this course are:

1. To insert and conduct calculations.

2. To analyze and interpret data.

Course Contents:

Unit1 **(10 Hours)**

Graphical Representations-Role,historicalperspective,terminology,typesofclassinterval-inclusive,exclusive,Formulatogenerateclassintervals,typesofgraphs-Histogram, frequency curve, frequency polygon, pie chart, Ogive-more than and less than.

Unit 2: **(10 Hours)**

Measures of Central tendency-Arithmetic Mean, Harmonic Mean, Geometric Mean, Median and Mode explanation with example, Measures of Dispersion-Range, Semi Interquartile Range, Standard Deviation, Mean Deviation and explanation with example.

Unit 3: **(5 Hours)**

Curve Fitting-Principle of least squares Method, fitting of various curves like Straight line, Second degree Polynomial,

Unit4:

Introduction to Correlation Analysis, role, uses, its properties and formula, Introduction to Regression Analysis, role, uses, properties of its coefficient and formula to calculate regression coefficient, Regression Line, explain with example

Texts Book:

1. Artymiak, J.(2011).Beginning Open Office Calc: From Setting Up Simple Spreadsheets to Business Forecasting. A press Publisher.

2.Billo,E.J.(2007).Excel for Scientists and Engineers Numerical Methods. John Wiley & Sons.

3.Carlberg, C.(2011).Statistical Analysis. Pearsons Education.

Reference books:

1. Held,B.(2007).Microsoft Excel Functions and Formulas. Wordware Publishing, Inc.

2. Kanji,G.K.(2006).100StatisticalTests(3rded.).Sage Publication.

Course outcomes(COs):

Upon successful completion of the course a student will be able to:

CO1	Identify the basic concepts of statistics and probability through practical Does on a computer by using excel.
CO2	Explain the average; dispersion through practical's on a computer by using excelled.
CO3	Apply fitting of binomial, poison and normal distribution through Practicals on excel.
CO4	Analyse data by using suitable statistical test.
CO5	Evaluate the importance of data analysis.
CO6	Develop the ways to improve the data analysis by using proper test..

CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO1 2	PSO 1	PSO2	PSO3	PS O4
CO1	3	1	1	1	1	1	2	1	1	1	1	1	3	2	-	-
CO2	3	2	1	-	1	1	1	-	1	1	1	1	2	1	-	-
CO3	3	2	2	1	1	1	2	1	1	2	2	3	3	2	1	-
CO4	2	3	2	1	1	1	2	-	1	1	2	2	3	2	-	-
CO5	3	3	2	1	1	1	2	1	2	1	-	-	2	2	-	-
CO6	2	2	2	2	1	1	2	2	2	2	2	3	2	3	1	-

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Examination Scheme:

Components	Istinternal (Assignment)	IInd Internal (WrittenExam)	External (ESE)
Weightage(%)	15	15	70

Programme Name:B.A./B.S.c

Course code	:STADC601			
Course Name	: Demography and vital statistics			
Semester /Year	:VI th Sem/ IIIrd Year			
	L	**T**	**P**	**C**
	3	0	0	3

L-Lecture T –Tutorial P – Practical C –Credit

Course Objectives:

The objectives of this course are:

1. To introduce the concepts of demography and its types
2. To help students in defining and to collect valid demography data using different methods
3. To gain specific knowledge about basic measures of Mortality, Fertlity and lifetable.
4. To understand how to construct life Tables.

Course Contents

Unit 1: **(10 Hours)**

Biological theories: Hypothesis of Fertility, Malthusian theory of population, pearl and reed hypothesis, Herbert Spencer's theory, Jouse Decastro's hypothesis, Robert Ardrey's hypothesis, Analysis of food fertility link.

Unit 2: **(10 Hours)**

Marxian theory of surplus population: Dumont's hypothesis. The model of fertility, Easterly's hypothesis, Development of transition theory, leading stage of population profile of demographic explosion.

Unit 3: **(15 Hours)**

Introduction: sources of collecting data on vital statistics, errors in census and registration data. Measurement of population, rate and ratio of vital events. Measurements of Mortality Crude Death Rate(CDR), Specific Death Rate(SDR), Infant Mortality, Rate(IMR)and Standardized DeathRates.StationaryandStablepopulation,.Life(Mortality)TablesAssumption,description ,construction of Life Tables and Uses of Life Tables.

Unit 4: **(10 Hours)**

Measurements of Fertility: Crude Birth Rate (CBR), General Fertility Rate (GFR), Specific Fertility Rate (SFR) and Total Fertility Rate (TFR). Measurement of Population Growth Crude rates of natural increase, Pearl's Vital Index, Gross Reproduction Rate (GRR) and Net Reproduction Rate (NRR).

Texts Books:

1. P. Mukhopadhyay (1999): Applied Statistics, Books and Allied(P)Ltd.

2. A.M. Goon, M.K. Gupta and B. Dasgupta (2008): Fundamentals of Statistics, Vol.II,9th Edition, World Press.

3. S. Biswas (1988): Stochastic Processes in Demography & Application, Wiley Eastern Ltd.

Reference Books:

1.FredrickE .Croxton, Dudley J. Cowden, and SKlein (1973):Applied General Statistics,3rd Edition.Prentice Hall of India Pvt.Ltd.

Course outcomes (COs):

Upon successful completion of the course a student will be able to:

CO1	Identify the basic concepts of vital statistics. Mortality rates, fertility rates and their measurements. Have a basic idea about migration and population projection.
CO2	Describe the various measures of mortality and fertility and their practical Utility in different fields.
CO3	Apply the concepts of life table, their constructions, uses of time table and their utility for the society.
CO4	Analysis between gross reproduction and net reproduction rate.
CO5	Summarize the fertility and mortality with its measures.
CO6	Develop the abilities and skills to identify data realted to life table.

CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO1 2	PSO 1	PSO2	PSO3	PS O4
CO1	3	1	1	-	-	1	2	1	1	1	1	1	3	2	1	-
CO2	3	2	1	-	-	1	1	-	1	1	1	1	2	1	1	-
CO3	3	2	2	1	1	1	2	1	1	2	2	3	3	2	2	1
CO4	2	3	2	1	-	1	2		1	1	2	2	3	2	1	1
CO5	3	3	3	-	-	1	2	1	2	1	-	-	2	2	1	-
CO6	2	2	2	2	1	2	2	2	2	2	2	3	2	3	2	-

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Examination Scheme:

Components	I[st]internal (Assignment)	II[nd]Internal (Written Exam)	External (ESE)
Weightage(%)	15	15	70

Programme Name: B.A./B.Sc.

Course code	:	STADL601			
Course Name	:	Lab course based on DC601			
Semester/Year	:	VI th sem/IIIrd Year			
		L	**T**	**P**	**C**
		0	0	2	1

L-Lecture T –Tutorial P –Practical C– Credit

Course Objectives:

The objectives of this course are:

1. To analysis the various measures of mortality
2. To analysis the various measures of Fertility.
3. To construct Lifetables by calculating all components which are using life tables
4. To analysis the various measures for calculation net reproduction rate.

Course Contents

Unit 1 **(10 Hours)**

1. To calculate CDR and Age Specific death rate for a given set of data

2. To find Standardized death rate by:-(i) Direct method(ii) Indirect method

3. To construct a complete life table

Unit 2 **(10 Hours)**

1. To fill in the missing entries in a life table

2. To calculate CBR,GFR,

3. To calculate SFR, TFR for a given set of data

Unit 3 **(10 Hours)**

1. To calculate Crude rate of Natural Increase and Pearle`s Vital Index for a given set of data.

2. Calculate GRR and NRR for a given set of data and compare

Texts Books:

1. P. Mukhopadhyay (1999): Applied Statistics, Books and Allied (P)Ltd.
2. A.M.Goon,M.K.GuptaandB.Dasgupta(2008):FundamentalsofStatistics,Vol.II,9thEdition,

Reference Books:

1.Fredrick E. Croxton, Dudley J.Cowden, and S Klein (1973): Applied General Statistics, 3rd Edition. Prentice Hall of India Pvt. Ltd.

2. N.Keyfitz and John A.Beckman: Demography through Problems, S-Verlag Newyork.

Course outcomes (COs):

Upon successful completion of the course a student will be able to:

CO1	Remember the skill regarding analysis of data.
CO2	Apply the concepts of statistics through experiments.
CO3	Apply suitable technique for analysis data
CO4	Differentiate Quantitative and Qualitative data through practical`s.
CO5	Evaluate the concepts of statistics through practical`s
CO6	Develop basic tools and techniques for performing experiment

CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	1	1	1	2	-	1	1	1	1	1	-	3	2
CO2	1	1	2	1	1	1	1	-	1	1	1	1	2	1	3	2
CO3	1	2	3	1	1	1	2	1	2	1	2	3	1	1	2	3
CO4	1	1	2	1	1	1	2	-	1	1	1	2	3	-	2	3
CO5	1	1	2	1	1	1	2	1	1	1	1	-	2	-	2	2
CO6	3	2	3	2	1	2	2	1	2	1	2	3	2	-	3	3

3:Highest Correlated, 2:Medium Correlated, 1:Lowest Correlated

Examination Scheme:

Evaluation Method	Internal Evaluation	External Evaluation	
Components	Written Exam/ File Record	Practical Conduction	Viva Voce
Weightage (%)	30	40	30

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Programme Name: B.A./B.S.c

Course code	:STADC602				
Course Name	: vital statistics				
Semester/Year	:VI Sem/ IIIrdYear				
		L	T	P	C
		3	0	0	3

L-Lecture T –Tutorial P – Practical C –Credit

Course Objectives:

The objectives of this course are:

1. To introduce the concepts of demography and its types
2. To help students in defining and to collect valid demography data using different methods
3. To gain specific knowledge about basic measures of Mortality, Fertlity and lifetable.
4. To understand how to construct life Tables.

Course Contents

Unit 1:

(10 Hours)

Population Theories: Coverage and content errors in demographic data, use of balancing equations and Chandrase karan-Deming formula to check completeness of registration data. Marxian theory of surplus population: Dumont's hypothesis. The Becker model of fertility. Easterly's hypothesis, Development of transition theory,

Unit 2.

(15 Hours)

Introduction and sources of collecting data on vital statistics, errors in census and registration data. Measuremen of population, rate and ratio of vital events. Measurements of Mortality: Crude Death Rate (CDR), Specific Death Rate (SDR), Infant Mortality, Rate (IMR) and Standardized Death Rates. Stationary and Stable population, Central Mortality Rates and Force of Mortality.

Unit 3

(10 Hours)

Measurements of Fertility: Crude Birth Rate (CBR), General Fertility Rate(GFR), Specific Fertility Rate(SFR) and Total Fertility Rate(TFR). Measurement of Population Growth Crude rates of natural increase, Pearl's Vital Index, Gross Reproduction Rate (GRR) and Net Reproduction Rate(NRR).

Unit 4

(10 Hours)

Life (Mortality) Tables: Assumption, description, construction of Life Tables and Uses of Life

Tables .Abridged Life Tables; Concept and construction of abridged life tables by Reed-Merrell method, Greville's method and King's Method.

Texts Books:

1.P. Mukhopadhyay (1999): Applied Statistics, Books and Allied(P)Ltd.
2.A.M .Goon, M.K.Gupta and B.Dasgupta (2008): Fundamentals of Statistics,Vol.II,9th Edition,WorldPress.
3. S.Biswas 1988):StochasticProcessesinDemography&Application,WileyEasternLtd.

Reference Books:

1.Fredrick E .Croxton, Dudley J.Cowden, and S Klein (1973) :Applied General Statistics,3rd Edition. Prentice Hall of India Pvt .Ltd.

Course outcomes (COs):

Upon successful completion of the course a student will be able to:

CO1	Identify the basic concepts of vital statistics. Mortality rates, fertility rates and Their measurements.Haveabasicideaaboutmigrationandpopulationprojection.
CO2	Describe the various measures of mortality and fertility and their practical Utility in different fields.
CO3	Apply the concepts of life table, their constructions, uses of time table and their utility for the society.
CO4	Analysis between gross reproduction and net reproduction rate.
CO5	Summarize the fertility and mortality with its measures.
CO6	Develop the abilities and skills to identify data realted to life table.

CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO1 2	PSO 1	PSO2	PSO3	PSO4
CO1	3	1	1	-	-	1	2	1	1	1	1	1	3	2	1	-
CO2	3	2	1	-	-	1	1	-	1	1	1	1	2	1	1	-
CO3	3	2	2	1	1	1	2	1	1	2	2	3	3	2	2	1
CO4	2	3	2	1	-	1	2		1	1	2	2	3	2	1	1
CO5	3	3	3	-	-	1	2	1	2	1	-	-	2	2	1	-
CO6	2	2	2	2	1	2	2	2	2	2	2	3	2	3	2	-

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Examination Scheme:

Components	Istinternal (Assignment)	IInd Internal (Written Exam)	External (ESE)
Weightage (%)	15	15	70

Programme Name: B.A./B.Sc.

Course code	:	STADL602			
Course Name	:	Lab course based on DC602			
Semester/Year	:	VIth sem/ IIIrd Year			
		L	**T**	**P**	**C**
		0	0	2	1

L-Lecture T –Tutorial P –Practical C– Credit

Course Objectives:

The objectives of this course are:

1. To analysis the various measures of mortality
2. To analysis the various measures of Fertility.
3. To construct Life tables by calculating all components which are using life tables
4. To analysis the various measures for calculation net reproduction rate.

Course Contents

Unit 1 **(10 Hours)**

1. To calculate CDR and Age Specific death rate for a given set of data

2.To find Standardized death rate by:-(i)Direct method(ii) Indirect method

Unit 2 **(10 Hours)**

1.To construct a complete life table

2.To fill in the missing entries in a life table

Unit 3 **(10 Hours)**

1.To calculate CBR, GFR, SFR, TFR for a given set of data

2.To calculateCruderateofNaturalIncreaseandPearle'sVitalIndexforagivensetofdata.

3.Calculate GRR and NRR for a given set of data and compare

Texts Books:

1.P. Mukhopadhyay (1999):Applied Statistics, Books and Allied (P)Ltd.

2.A.M.Goon,M.K.GuptaandB.Dasgupta(2008):FundamentalsofStatistics,Vol.II,9thEdition, World Press

Reference Books:

1. Fredrick E. Croxton, Dudley J. Cowden, and S Klein(1973):Applied General Statistics,3rd Edition. Prentice Hall of India Pvt. Ltd.

2. N. Keyfitz and John A. Beckman: Demography through Problems, S-Verlag Newyork.

Course outcomes (COs):

Upon successful completion of the course a student will be able to:

CO1	Remember the skill regarding analys is of data.
CO2	Apply the concepts of statistics through experiments.
CO3	Apply suitable technique for analysis data
CO4	Differentiate Quantitative and Qualitative data through practical's.
CO5	Evaluate the concepts of statistics through practical's
CO6	Develop basic tools and techniques for performing experiment

CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	1	1	1	2	-	1	1	1	1	1	-	3	2
CO2	1	1	2	1	1	1	1	-	1	1	1	1	2	1	3	2
CO3	1	2	3	1	1	1	2	1	2	1	2	3	1	1	2	3
CO4	1	1	2	1	1	1	2	-	1	1	1	2	3	-	2	3
CO5	1	1	2	1	1	1	2	1	1	1	1	-	2	-	2	2
CO6	3	2	3	2	1	2	2	1	2	1	2	3	2	-	3	3

3:Highest Correlated, 2:Medium Correlated, 1:Lowest Correlated

Examination Scheme:

Evaluation Method	Internal Evaluation	External Evaluation	
Components	Written Exam/ File Record	Practical Conduction	Viva Voce
Weightage (%)	30	40	30

Programme Name:B.A./B.S.c

Coursecode	:	STADE601a
CourseName	:	Time Series Analysis
Semester/Year	:	VIth sem /IIIrdYear

L	T	P	C
4	0	0	4

L-Lecture T –Tutorial P – Practical C –Credit

Course Objectives:

The objectives of this course are:

1. Enabled to design and conduct the components of time series.
2. To understanding of the process generating a time series
3. To learn forecasting future values of the observed series

Course Content:

Unit1 **(15 Hours)**

Introduction to times series data : application of time series from various fields, Components of a times series, Decomposition of time series. Trend: Estimation of trend by free hand curve method, method of semi averages, fitting a various mathematical curve, and growth curves.

Unit 2 **(15 Hours)**

Trend: Method of moving averages. Detrending. Effect of elimination of trend on other components of the time series. Seasonal Component: Estimation of seasonal component by Method of simple averages, Ratio to Trend,

Unit 3 **(15 Hours)**

Seasonal Component: Ratio to Moving Averages and Link Relative method, Deseasonalization. Cyclic Component: Harmonic Analysis. Some Special Processes:

Unit 4 **(15 Hours)**

Moving: (MA) process and Auto regressive (AR) process of orders , Estimation of the parameters of AR(1) and AR (2)–Yule-Walker equations.

TextBooks:

1. Arun Kumar and Alka Chaudhary (2009), Applied Statistics, Krishna House,11,Shivaji Road Meerut..

2. ChatfieldC.(1980):TheAnalysisofTimeSeries–AnIntroduction,Chapman&Hall.

Reference Book:

1. Mukhopadhyay P.(2011): AppliedStatistics,2nd ed. Revised reprint, Books and Allied.

Course outcomes (COs):

Upon successful completion of the course a student will be able to:

CO1	Identify the concepts of time series, the different models, measurement of Trend and seasonal variations.
CO2	Describe the fitting a various mathematical curve and growth curve.
CO3	Apply method of moving average and estimation of seasonal component By method of simple averages..
CO4	Analysis the process of moving average and autoregressive process of order one and two..
CO5	Evaluate the approaches and various techniques used in time series analysis.
CO6	Develop the different components of times series.

CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO1 2	PSO 1	PSO2	PSO3	PSO 4
CO1	3	1	1	-	-	1	2	1	1	1	1	1	3	2	1	-
CO2	3	2	1	-	-	1	1	-	1	1	1	1	2	1	1	-
CO3	3	2	2	1	1	1	2	1	1	2	2	3	3	2	2	1
CO4	2	3	2	1	-	1	2		1	1	2	2	3	2	1	1
CO5	3	3	3	-	-	1	2	1	2	1	-	-	2	2	1	-
CO6	2	2	2	2	1	2	2	2	2	2	2	3	2	3	2	-

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Examination Scheme:

Components	Ist internal (Assignment)	IInd Internal (Written Exam)	External (ESE)
Weightage (%)	15	15	70

100

Programme Name:B.A./B.Sc.

Course code : STADE601b				
Course Name : Non Parametric Methods				
Semester/Year : VIth sem /IIIrdYear				
	L	**T**	**P**	**C**
	4	0	0	4

L–LectureT–Tutorial P –Practical C–Credit

Course Objectives:

The objectives of this course are:

1.To describe the basic concepts of non parametric test.

2. To understand various tests which are using in non-parametric methods.

3. To learn various ways of analysis the data by using different test.

4. To apply nonparametric methods of testing of hypothesis.

Course Contents

Unit 1 **(15 Hours)**

Non parametric Tests: Introduction and Concept, Test for randomness based on total number of runs, Empirical distribution function.

Unit 2: **(15 Hours)**

Kolmogorov Smirnov Tests: one sample Inference Review of order statistics, Distribution-free statistics over a class, Counting statistics, ranking statistics, Statistics utilizing counting and ranking, Asymptotic distribution of U-statistics.

Unit 3 **(15 Hours)**

Measures of Association: bivariate samples: Kendall's Tau coefficient, Spearman's coefficient of Rank correlation, Measures of association in multiple classifications

Unit 4: **(15 Hours)**

Rank tests: Locally most powerful rank tests, Linear rank statistics and their distributional properties under null hypothesis, Pitman's asymptotic relative efficiency.

Text Books

1. Arun Kumar and Alka Chaudhary (2009), Statistical Inference, Krishna House, 11, Shivaji Road Meerut..

2. Gibbons,J.D. and Chakraborti,S. (1992).Non parametric Statistical Inference, Third Edition, Marcel Dekker.

3. Hettman sperger,T.P.(1984).Statistical inference Based on Ranks, John Wiley&Sons.

Reference Book:

1.Randles, R.H.andWolfe,D.A.(1979). Introduction to the Theory of Non parametric Statistics, John Wiley &Sons.

Course outcomes(COs):

Upon successful completion of the course a student will be able to:

CO1	Identify the basic concept and importance of nonparametric methods
CO2	Describe the concept of empirical distribution function and Kolmogorov Goodness of fit test
CO3	Apply parametric and non-parametric test.
CO4	Examine testing of hypothesis using non- parametric test like sign test,mann- Whitney test etc and ability to use them carefully for the testing of Given data.
CO5	Evaluate the various methods in non-parametric.
CO6	Write a difference between parametric & non parametric methods.

CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO1 2	PSO 1	PSO2	PSO3	PS O4
CO1	3	1	1	-	-	1	2	1	1	1	1	1	3	2	1	-
CO2	3	2	1	-	-	1	1	-	1	1	1	1	2	1	1	-
CO3	3	2	2	1	1	1	2	1	1	2	2	3	3	2	2	1
CO4	2	3	2	1	-	1	2		1	1	2	2	3	2	1	1
CO5	3	3	3	-	-	1	2	1	2	1	-	-	2	2	1	-
CO6	2	2	2	2	1	2	2	2	2	2	2	3	2	3	2	-

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Examination Scheme:

Components	I[st]internal (Assignment)	II[nd]Internal (Written Exam)	External (ESE)
Weightage(%)	15	15	70

Programme Name: B.A./B.S.c

Course code	: STAGE601				
Course Name	: Operation Research				
Semester/Year	:VI th sem /IIIrd Year				
		L	**T**	**P**	**C**
		4	0	0	4

L-Lecture T –Tutorial P – Practical C –Credit

Course Objectives:

The objectives of this course are:

1. To understand the fundamental concepts of operation research.
2. To Acquire the fundamental concepts of linear programming
3. Tolearnandanalysisthetransportationproblemandassignmentproblemandtosolveit

Course Contents

Unit1 **(15 Hours)**

Objective of O.R.: Nature and definitions of O.R. Scope of O.R Meaning and necessity of O.R.models, classification of O.R. models, Advantages & disadvantages of O.R. models. Steps in model formulation, principles of modeling. Characteristics of a good model, Allocation problems.

Unit 2 **(15 Hours)**

Linear programming problem (LPP): Definition, objective function, constraints, graphical solution of L.P.P. limitations of graphical method, Simplex method to solve L.P.P. concept of initial basic feasible solution, computation procedure for Simplex method.

Unit 3 **(15 Hours)**

Artificial variable techniques: Big-M method, Two-phase method. Duality in Linear Programming; Concept of duality, Fundamental properties of duality

Unit 4 **(15 Hours)**

Transportation Problem (T.P.): Formulation, Basic feasible solution. Different methods to find initial feasible solution: North-West corner rule, Row minima method, column minima method, Matrix minima method (Least cost entry method),

Text Books:

1.Sharma, S.D(2020).: Operation Research, Kedar Nath and Ram Nath Meerut

2. Taha, H.A.(2007):Operations Research:AnIntroduction,8th Hall of India.Edition, Prentice

Reference Book:

1.Ravindran, A, Phillips, D.T., Solberg, J.J.(2005): Operations Research- Principles and Practice, John Wiley & Sons.

Course outcomes (COs):

Upon successful completion of the course a student will be able to:

CO1	Identify the basic concepts of Operation research, Formulation of a linear Programming problem, Obtain graphical solutions to a linear programming problem.
CO2	Describe the concept of linear programming and their procedure for obtaining the best results..
CO3	Apply the concept of basic feasible solution and their different to find Initial feasible solution
CO4	Examine transportation and assignment problems as LPP.
CO5	Evaluate the approaches and various techniques used in operation research.
CO6	Develop the qualities and attributes required in research.

CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO1 2	PSO 1	PSO2	PSO3	PS O4
CO1	3	1	1	-	-	1	2	1	1	1	1	1	3	2	1	-
CO2	3	2	1	-	-	1	1	-	1	1	1	1	2	1	1	-
CO3	3	2	2	1	1	1	2	1	1	2	2	3	3	2	2	1
CO4	2	3	2	1	-	1	2		1	1	2	2	3	2	1	1
CO5	3	3	3	-	-	1	2	1	2	1	-	-	2	2	1	-
CO6	2	2	2	2	1	2	2	2	2	2	2	3	2	3	2	-

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Examination Scheme:

Components	Istinternal (Assignment)	IInd Internal (Written Exam)	External (ESE)
Weightage(%)	15	15	70

Programme Name: B.A./B.S.c

Course code	:STASC601			
Course Name	:Queuing Theory			
Semester /Year	: Vith sem / IIIrd Year			
	L	**T**	**P**	**C**
	2	0	0	2

L - Lecture T – Tutorial P – Practical C – Credit

Course Objectives:

The objectives of this course are:

1.To understand the concept of integer programming.
2. To Learn the sequencing and scheduling problem
3. To learn various ways of analysis CPM and PERT

Course Contents

Unit 1 **(10 Hours)**

Queuing Theory: Introduction of queue, Types of Queue, Transient solution of M/M/1 queue; bulk queues (bulk arrival and bulk service), finite queues, GI/G/1 queue and its solutions, simulation of queues.
Queuing System: General concept, steady Staten distribution, queuing model,capacity,waiting time distribution

Unit 2: **(10 Hours)**

Sequencing and Scheduling Problem: Sequencing and scheduling problems, 2 machines n –job and 3-machinesn-job problems with identical machine sequence for all jobs, 2-jobn-machine problem with different routing, branch and bound method for solving travelling-salesman problems.

Unit 3 **(5 Hours)**

Project Management: Project management, CPM and PERT, probability of project completion, PERT-crashing.

Unit 4: **(5 Hours)**

Replacement Problem: Replacement problems: block and age replacement policies; dynamic programming approach for maintenance problems, replacement of items with long life.

Text Book:

1. Taha, H.A. (1982) : Operations Research: An Introduction; Mac Millan Publishing Company, New York.

2. Shamblin, J.E. and Stevens,G.T.(1974) : Operations Research: A Fundamental Approach; McGraw Hill.

3. KantiSwaroop, Gupta, P.K. and Singh, M.M. (1985): Operations Research Sultan Chand and Sons.

4. Kleinrock,L. (1975) : Queuing Systems, Vol.I; John Wiley.

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5. Starr, M.K.and Miller, D.W. (1962): Inventory Control-Theor y and Practice; Prentice Hall.

Reference Books:

1. Weiten, W., Dunn, D. S., & Hammer, E. Y. (2012). Psychology applied to modern life: Adjustment in 21st century (10th Ed.). Belmond, CA: Wadsworth, Cengage Learning.

Course outcomes (COs):

Upon successful completion of the course a student will be able to:

CO1	Identify the basic concepts of Operation research, Formulation of a linear programming problem, Obtain graphical solutions to a linear programming problem.
CO2	Explain the concept of linear programming and their procedure for obtaining the best results..
CO3	Apply the concept of basic feasible solution and their different to find initial feasible solution
CO4	Analysis between transportation and assignment problems as LPP, solve transportation and assignment problems using different methods.
CO5	Evaluate the different theoretical approaches of operation research.
CO6	Develop the critical thinking and skills for solving probes based on operation research..

CO-PO-PSO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	1	1	-	-	2	2	-	2	1	1	1	3	2	1	1
CO2	3	2	1	-	-	2	1	-	2	1	1	1	3	2	1	1
CO3	2	2	1	1	1	2	2	-	2	2	2	3	3	1	2	1
CO4	2	2	1	-	-	2	2	-	2	1	2	2	3	2	2	2
CO5	3	2	2	-	-	2	2	-	2	1	-	-	2	2	1	1
CO6	2	2	1	1	1	2	2	-	2	2	2	3	2	3	2	2

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Examination Scheme:

Components	I[st] internal Assignment	II[nd] Internal Written Exam	External (ESE)
Weightage (%)	20	20	60