



# GULBARGA UNIVERSITY

Jnana Ganga", GULBARGA - 585 106, Karnataka  
India.



08472-263202

Fax:

08472-263206

E-Mail:

registrar@gug.ac.in

Website:

www.gug.ac.in.



ಕ್ರಂ.ಸಂ.ಗುವಿಕ/ವಿಮವಿ/ಬಿ.ಓಎಸ್/2018-19 948

ದಿನಾಂಕ 13-8-2018.

## ಅಧಿಸೂಚನೆ

ವಿಷಯ: ಬಿ.ಎ/ಬಿ.ಎಸ್ಸಿ ಕೋರ್ಸಿಗಾಗಿ ಸಿಬಿಸಿಎಸ್ ಪದ್ಧತಿಯನ್ನು ಅಳವಡಿಸಿಕೊಂಡು ಸಂಖ್ಯಾಶಾಸ್ತ್ರ ಪಠ್ಯಕ್ರಮವನ್ನು ಜಾರಿಗೊಳಿಸಿದ ಬಗ್ಗೆ.

- ಉಲ್ಲೇಖ: 1) ಸ್ನಾತಕ ಅಧ್ಯಯನ ಮಂಡಳಿಯ ಸಭೆಯ ದಿನಾಂಕ: 13.06.2018.  
2) ವಿಜ್ಞಾನ ಮತ್ತು ತಂತ್ರಜ್ಞಾನ ನಿಕಾಯದ ಸಭೆ ದಿನಾಂಕ: 14.06.2018.  
3) ಮಾನ್ಯ ಕುಲಪತಿಗಳು ಅನುಮೋದನೆ ದಿನಾಂಕ.23.07.2018.

\*\*\*\*

ಉಲ್ಲೇಖ (3) ರಲ್ಲಿನ ಮಾನ್ಯ ಕುಲಪತಿಗಳು ಅನುಮೋದನೆ ನೀಡಿರುವ ಹಿನ್ನೆಲೆಯಲ್ಲಿ ಬಿ.ಎ/ಬಿ.ಎಸ್ಸಿ ಸಂಖ್ಯಾಶಾಸ್ತ್ರ I ರಿಂದ VIನೇ ಸೆಮೆಸ್ಟರ ಪಠ್ಯಕ್ರಮವನ್ನು ಅಧ್ಯಯನ ಮಂಡಳಿಯು 'ಪರಿಷ್ಕರಿಸಿ ಅನುಮೋದಿಸಿರುತ್ತದೆ. ದಿನಾಂಕ 14.06.2018. ರಂದು ಜರುಗಿದ ವಿಜ್ಞಾನ ಮತ್ತು ತಂತ್ರಜ್ಞಾನ ನಿಕಾಯದ ಸಭೆಯಲ್ಲಿ ಸದರಿ ಪಠ್ಯಕ್ರಮವನ್ನು 2018-19ನೇ ಸಾಲಿನಿಂದ ಅನ್ವಯವಾಗುವಂತೆ ಜಾರಿಗೊಳಿಸಲು ಶಿಫಾರಸ್ಸು ಮಾಡಲಾಗಿದೆ.

ಅದರಂತೆ, 2018-19ನೇ ಸಾಲಿನಿಂದ ಅನ್ವಯವಾಗುವಂತೆ ಬಿ.ಎ/ಬಿ.ಎಸ್ಸಿ ಸಂಖ್ಯಾಶಾಸ್ತ್ರ ಸ್ನಾತಕ ಕೋರ್ಸಿನ I ರಿಂದ VIನೇ ಸೆಮೆಸ್ಟರ ಪಠ್ಯಕ್ರಮವನ್ನು ಪರಿಷ್ಕರಿಸಿ ಜಾರಿಗೊಳಿಸಲಾಗಿದೆ.

ಈ ಮಾಹಿತಿಯನ್ನು ಸಂಬಂಧಪಟ್ಟ ಶಿಕ್ಷಕರ ಹಾಗೂ ವಿದ್ಯಾರ್ಥಿಗಳ ಗಮನಕ್ಕೆ ತರಲು ಸೂಚಿಸಲಾಗಿದೆ. ಪಠ್ಯಕ್ರಮದ ವಿವರವನ್ನು ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯದ ವೆಬ್‌ಸೈಟ್ [www.gug.ac.in](http://www.gug.ac.in) ದಿಂದ ಪಡೆಯಬಹುದು.

ಕುಲಸಚಿವರು

ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಕಲಬುರಗಿ

ಗೆ,

1. ಮುಖ್ಯಸ್ಥರು, ಸಂಖ್ಯಾಶಾಸ್ತ್ರ ಅಧ್ಯಯನ ವಿಭಾಗ, ಗು.ವಿ.ಕಲಬುರಗಿ.
2. ಎಲ್ಲಾ ಪದವಿ ಮಹಾವಿದ್ಯಾಲಯಗಳ ಪ್ರಾಂಶುಪಾಲರಿಗೆ.

### ಪ್ರತಿಗಳು:

1. ಡೀನ್‌ರು, ವಿಜ್ಞಾನ ಮತ್ತು ತಂತ್ರಜ್ಞಾನ/ಸಮಾಜ ವಿಜ್ಞಾನ ನಿಕಾಯ, ಗು.ವಿ.ಕಲಬುರಗಿ ರವರ ಮಾಹಿತಿಗಾಗಿ.
2. ಕುಲಸಚಿವರು (ಮೌಲ್ಯಮಾಪನ), ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಕಲಬುರಗಿ ರವರ ಮಾಹಿತಿಗಾಗಿ.
3. ನಿರ್ದೇಶಕರು, ಯೋಜನೆ, ಮೇಲ್ವಿಚಾರಣೆ ಹಾಗೂ ಮೌಲ್ಯಮಾಪನ ಮಂಡಳಿ, ಗು.ವಿ.ಕಲಬುರಗಿ.
4. ಗ್ರಂಥಪಾಲಕರು, ಗು.ವಿ.ಕಲಬುರಗಿ ರವರ ಮಾಹಿತಿಗಾಗಿ
5. ವಿಜ್ಞಾನ ಮತ್ತು ತಂತ್ರಜ್ಞಾನ/ಸಮಾಜ ವಿಜ್ಞಾನ ನಿಕಾಯದ ಎಲ್ಲಾ ವಿಭಾಗಗಳ ಮುಖ್ಯಸ್ಥರಿಗೆ
6. ಮುಖ್ಯಸ್ಥರು, ಗಣಕಕೇಂದ್ರ, ಗು.ವಿ.ಕಲಬುರಗಿ ಇವರಿಗೆ ಸದರಿ ಪಠ್ಯಕ್ರಮವನ್ನು ವಿಶ್ವವಿದ್ಯಾಲಯದ ವೆಬ್‌ ಸೈಟ್ ನಲ್ಲಿ ಪ್ರಕಟಿಸಲು ತಿಳಿಸಲಾಗಿದೆ.
7. ಕುಲಪತಿಗಳ ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿ / ಕುಲಸಚಿವರ ಆಪ್ತ ಸಹಾಯಕರ ಮಾಹಿತಿಗಾಗಿ.

*Proposed Syllabus*

*For*

***B.A. Course (Statistics)***

*Submitted*

*To*

***Gulbarga University***

***Kalaburagi***

*By*

***Department of Statistics***

***Gulbarga University, Kalaburagi***

*Under*

***Choice Based Credit System***


*June 2018*



# GULBARGA UNIVERSITY, KALABURGI

## Distribution of Courses / Papers in Undergraduate program I to VI Semesters as per Choice Based Credit System (CBCS) proposed for B.A. Courses.

Se mes ter	Course Coded	Course Type	Course Title	Credit s	Teaching per Week L:T:P	Total Credits
I	16	DSC-3A DSCP-3A	Basic Statistics of probability Practical	6	4:0:2	6
II	26	DSC-3B DSCP-3B	Statistical Methodology Practical	6	4:0:2	6
III	33	GE-1	STAT-GE-1 Statistical Methods	2	1:1	2
	36	GEP-1	Practical	6	4:0:2	6
		DSC-3C DSCP-3C	Theory of Statistical Inference Practical			
IV	43	GE-2	STAT-GE-4 Introduction to Operations Research	2	1:1	2
	46	GEP-2	Practical	6	4:0:2	6
		DSC-3D	Survey Samplings and Design of Experiments			
		DSCP-3D	Practical			
V	51	SEC-1	Data Analysis of Spread Sheets	2	1:1	2
	54	SECP-1	Practical	6	4:0:2	6
		DSE-3	Demography & Applied Statistics - I,LPP			
		DSEP-3	Practical			
VI	61	SEC-2	Research Methodology	2	1:1	2
	64	SECP-2	Practical	6	4:02	6
		DSE-6	Applied Statistics -II & Demand Analysis and Linear Regression			
		DSEP-6	Practical			

  
**CHAIRMAN**  
 Dept. of Studies in Statistics  
 Gulbarga University,  
 GULBARGA-585106  
 (Karnataka State)

2

**Structures of Core Courses, Skill Enhancement Courses,  
Discipline Specific Elective Courses and Generic Elective  
Courses in**

**B.A.Program with Statistics.**

**CORE COURSES STRUCTURE**

<b>Semester</b>	<b>Papers</b>	<b>Page No.</b>
1	Core 1: Basic Statistics and Probability	2-4
2	Core 2: Statistical Methodology	4-5
3	Core 3: Theory of Statistical Inference	8-9
4	Core 4: Survey Sampling and Design of Experience	12-14


**SKILL ENHANCEMENT COURSES STRUCTURE**

<b>Semester</b>	<b>Papers</b>	<b>Page No.</b>
3	SE 1: Data Analysis using Spread Sheets	6-7
6	SE 4: Research Methods	10-11

**DISCIPLINE SPECIFIC ELECTIVE COURSES STRUCTURE**

<b>Semester</b>	<b>Papers</b>	<b>Page No.</b>
5	DSE-1(i) : Demography	17-18
	DSE-1(ii) : Applied Statistics – I	19-20
6	DSE-2 (i) : Applied Statistics – II	22-23
	DSE-2(ii) :Demand Analysis and Linear Regression	24-25

CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)

  
**CHAIRMAN**  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)



### **Core Courses (DSC)**

- Core 1 : Basic Statistics and Probability
- Core 2 : Statistical Methodology
- Core 3 : Theory of Statistical Inference
- Core 4 : Survey Sampling and Design of Experience

### **Skill Enhancement Courses (SEC)**


- SE 1 : Data Analysis using Spread Sheets
- SE 2 : Statistical Computations using Software (SPSS/R)
- SE 3 : Simulation Techniques Statistics
- SE 4 : Research Methods

### **Discipline Specific Electives (DSE)**

- DSE 1 : (Choose one)
- DSE-1(i) : Demography
- DSE-1(ii) : Applied Statistics – I
- DSE 2 : (Choose one)
- DSE-2 (i) : Applied Statistics – II
- DSE-2(ii) : Demand Analysis and Linear Regression

### **Generic Elective**

- STAT GE 1 : Statistical Methods
- STAT GE 2 : Introduction to Operation Research

  
CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)

CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)

## SEMESTER-I

### 16: DSCT3A: Basic Statistics and Probability

Concepts of a Statistical population and Sample from a population, quantitative and qualitative data, nominal, ordinal and time series data, discrete and continuous data.


Presentation of data by tables and by diagrams, frequency distributions for discrete and continuous data, graphical representation of a frequency distribution by histogram and frequency polygon, cumulative frequency distributions (inclusive and exclusive methods)

Measures of location (or central tendency) and dispersion, moments, measures of skewness and kurtosis, cumulants, Bivariate data : Scatter diagram, principle of least –square and fitting of polynomials and exponential curves. Correlation and regression. Karl pearson coefficient of correlation, lines regression, spearman's rank correlation, coefficient, multiple and partial correlations (for 3 variates only)

Random experiments, sample point and sample space, event, algebra of events, definition of probability – classical, relative frequency and axiomatic approaches to probability, merits and demerits of those approaches (only general ideas to be given). Theorem of probability, conditional probability, independent events. Law and compound probability and its applications.

### REFERENCES

1. J.E. Freund (2009): Mathematical Statistics with Applications, 7<sup>th</sup> Ed., Pearson Education.
2. A.M.Goon, M.K. Gupta and B. Dasgupta (2005): Fundamentals of Statistics, Vol. I, 8<sup>th</sup> Ed., World Press, Kolkatta.
3. S.C.Gupta and V.K. Kapoor (2007): Fundamentals of Mathematical Statistics, 11<sup>th</sup> Ed., Sultan Chand and Sons.
4. R.V.Hogg, A.T.Craig and S.W.Mekean (2005) : Introduction to Mathematical Statistics, 6<sup>th</sup> Ed., Pearson Education.
5. A.M. Mood, F.A. Graybill and D.C. Boes(2007): Introduction to the theory of statistics, 3<sup>rd</sup> Ed., Tata McGraw Hill Publication.

  
 CHAIRMAN  
 Dept. of Studies in Statistics  
 Gulbarga University,  
 GULBARGA-585106  
 (Karnataka State)



## 16: DSCP-3A: LIST OF PRACTICALS

1. Problems based on graphical representation of data: Histograms (equal class intervals and unequal class intervals), Frequency polygon, Ogive curves,.
2. Problems based on measures of Central Tendency using raw data, grouped data and for change of origin and scale.
3. Problems based on measures of dispersion using raw data, grouped data and for change of origin and scale.
4. Problems based on combined mean and variance and coefficient of variation.
5. Problems based on moments using raw data, grouped data and for change of origin and scale.
6. Relationships between moments about origin and central moments.
7. Problems based on skewness and Kurtosis
8. Karl Person Correlation Coefficient (with / without change of scale and origin)
9. Lines of regression, angle between lines and estimated values variables.
10. Lines of regression and regression coefficients.
11. Spearman rank correlation with / without ties
12. Fitting of polynomials and exponential curves.



CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)

CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)

## SEMESTER-II

### 26: DSCT-3B: Statistical Methodology

Random variables : Discrete and Continuous random variables, p.m.f., p.d.f. and c.d.f. illustrations of random variables and its properties , moments and cumulants, moment generating function, cumulants generating function and characteristics functions, Bivariate probability distributions , marginals and conditional distributions; independence of variate.

(only general idea to be given).


Transformation in univariate and bivariate distributions.

Points (or degenerate), Binomial, Piosson, Geometric, Negative Binomial, Hypergeometric, Normal, Uniform, Exponential, Beta and Gamma distributions.

Fitting of curves: Fitting of linear, quadratic and exponential distribution by using method of lease squares.

### REFERENCES

1. A.M.Goon, M.K. Gupta and B.Dasgupta (2003): An Outline of Statistical Theory (Vol I) 4<sup>th</sup> Ed., World Press, Kolkatta.
2. S.C.Gupta and V.K. Kapoor (2007): Fundamentals of Mathematical Statistics, 11<sup>th</sup> Ed., Sultan Chand and Sons.
3. R.V.Hogg, A.T.Craig and S.W.Mekean (2005): Introduction to Mathematical Statistics, 6<sup>th</sup> Ed., Pearson Education.
4. A.M. Mood, F.A.Graybill and D.C. Boes, (2007): Introduction to the theory of Statistics, 3<sup>rd</sup> Ed., Tata Mc.Graw Hill Publication.
5. V.K.Rohtagi and A.K. Md.,E. Saleh (2009) : An Introduction to Probability and Statistics., 2<sup>nd</sup> Ed., John Wiley and Sons.
6. S.A.Ross (2007): Introduction to probability Models, 9<sup>th</sup> Ed., Academic Press.

  
CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)



## 26: DSCP-3B: LIST OF PRACTICALS

1. Fitting of binomial distributions for  $n$  and  $p-q = \frac{1}{2}$  and for  $n$  and  $p$  given.
2. Fitting of binomial distributions computing mean and variance.
3. Fitting of poisson distributions for given  $\lambda$  and after estimating mean.
4. Fitting of negative binomial.
5. Fitting of suitable distribution.
6. Application problems based on Binomial distribution.
7. Application problems based on poisson distribution.
8. Application problems based on negative binomial distribution.
9. Problems based on Area property of normal distribution.
10. To find the ordinate for a given area for normal distribution.
11. Application problems based on normal distribution.
12. Fitting of normal distribution when parameters are given / not given.



CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)

CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)

### SEMESTER-III

#### 33: GET-1: Statistical Methods

##### Credit 2

##### UNIT I

Introduction: Definition and scope of Statistics, concepts of statistical population and sample.

Data: quantitative and qualitative, attributes, variables, scales of measurement - nominal, ordinal, interval and ratio. Presentation: tabular and graphic, including histogram and ogives.

##### UNIT II

Measures of Central Tendency: mathematical and positional. Measures of Dispersion: range, quartile deviation, mean deviation, standard deviation, coefficient of variation, moments, skewness and kurtosis.

##### UNIT III

Bivariate data: Definition, scatter diagram, simple, partial and multiple correlation (3 variables only), rank correlation. Simple linear regression, principle of least squares and fitting of polynomials and exponential curves.

##### REFERENCES

1. Goon A.M., Gupta M.K. and Dasgupta B. (2002): Fundamentals of Statistics, Vol. I & II, 8th Edn. The World Press, Kolkata.
2. Miller, Irwin and Miller, Marylees (2006): John E. Freund's Mathematical Statistics with Applications, (7th Edn.), Pearson Education, Asia.
3. Mood, A.M. Graybill, F.A. and Boes, D.C. (2007): Introduction to the Theory of Statistics, 3rd Edn., (Reprint), Tata McGraw-Hill Pub. Co. Ltd.



CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)

### 33: GEP-1: LIST OF PRACTICAL

1. Graphical representation of data
2. Problems based on measures of central tendency
3. Problems based on measures of dispersion
4. Problems based on combined mean and variance and coefficient of variation
5. Problems based on moments, skewness and kurtosis
6. Fitting of polynomials, exponential curves
7. Karl Pearson correlation coefficient
8. Partial and multiple correlations
9. Spearman rank correlation with and without ties.
10. Correlation coefficient for a bivariate frequency distribution
11. Lines of regression, angle between lines and estimated values of variables.
12. Checking consistency of data and finding association among attributes.



CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)

CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)



### 36: DSCT-3C: Theory of Statistical Inference

Definitions of random sample, parameter and statistics null alternative hypothesis, simple and composite hypothesis, level of significance and probabilities of TYPE I and TYPE II errors, power of a test and critical region. Sampling distribution of a statistics, sampling distribution of sample mean, standard error of sample means.

Large samples tests for single mean, difference of means, standard deviation and difference of standard deviations. Sampling distributions of Chi-Square, t and F: definitions, properties and relationships between them. Tests of significance based on Chi-Square (goodness of fit and independence of attributes), t distribution and F-distributions using classical and P-value approach.

Estimation ; Parameter space, sample space , point estimation , requirement of a good estimator, consistency, unbiasedness efficiency, sufficiency, minimum variance unbiased estimators, Cramer Rao inequality: Statement and application, Methods of estimation : maximum likelihood, least squares and minimum variance, statement of Ra-Blackwell Theorem and Lehmann-Scheffe theorem, properties of maximum likelihood estimators (illustration). Interval Estimation: Confidence intervals of the parameters of normal distribution, confidence intervals for difference of mean and for ratio of variances.

Neyman-Person Lemma and MP test: Statements and application.

### REFERENCES

1. G. Casella 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. A.M. Goon, M.K.Gupta and B.Dasgupta (2003) : An Outline of Statistical Theory (Vol I) 4<sup>th</sup> Ed., World Press, Kolkatta.
4. S.C.Gupta and V.K.Kapoor (2007): Fundamentals of Mathematical Statistics, 11<sup>th</sup> Ed., Sultan Chand and Sons.
5. R.V.Hogg, A.T.Craig and S.W.Mekean (2005) : Introduction to Mathematical Statistics, 6<sup>th</sup> Ed., Pearson Education.

  
 CHAIRMAN  
 Dept. of Studies in Statistics  
 Gulbarga University,  
 GULBARGA-585106  
 (Karnataka State)

6. V.K.Rohtagi and A.K. Md.,E. Saleh (2009) : An Introduction to Probability and Statistics.,  
2<sup>nd</sup> Ed., John Wiley and Sons.

### 36: DSCP-3C: LIST OF PRACTICALS

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.
4. Testing of equality of two populations variances.
5. Applying the paired t-test for difference of means.
6. Maximum Likelihood Estimation.
7. Confidence Interval for Binomial proportion.
8. Confidence interval for the difference of proportions.
9. Confidence interval for difference of population means.
10. Confidence interval for ratio of variances.
11. Type I and Type II errors.
12. Most powerful critical region (NP Lemma).



CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)

CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)

## SEMESTER-IV

### 43: GET-2: STAT-GE-2 Introduction to Operations Research

Credit 2

#### UNIT I:

Introduction to Operations Research, phases of O.R., model building, various types of O.R. problems. Linear Programming Problem, Mathematical formulation of the L.P.P, graphical solutions of a L.P.P.

#### UNIT II


Optimum solution to a L.P.P: Simplex method, concept of artificial variables and Charne's big M-technique. Graphically identifying special cases of L.P.P. Concept of duality in L.P.P.

#### UNIT III

Transportation Problem: Initial solution by North West corner rule, Least cost method and Vogel's approximation method (VAM), MODI's method to find the optimal solution. Assignment problem: Hungarian method to find optimal assignment.

#### REFERENCES

1. Taha, H. A. (2007): Operations Research: An Introduction, 8th Edition, Prentice Hall of India.
2. SwarupKanti, Gupta, P.K. and Manmohan (2007): Operations Research, 13th Edition, Sultan Chand and Sons.
3. Ravindran, A, Phillips, D.T., Solberg,J.J.(2005): Operations Research- Principles and Practice, John Wiley & Sons.

  
CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)



### 43: GEP-2: LIST OF PRACTICAL

1. Mathematical formulation of L.P.P and solving the problem using graphical method
2. Simplex technique to solve L.P.P and reading dual solution from the optimal table
4. Charne's Big M method involving artificial variables.
5. Identifying Special cases: Degenerate solution, Unbounded solution, Alternate solution and Infeasible solution by Graphical method and interpretation
6. Allocation problem using Transportation model
7. Allocation problem using Assignment model
8. Networking : Shortest route problem
9. Problems based on game matrix:  $m \times 2$  /  $2 \times n$  rectangular and Mixed strategy



CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)

CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)

### 46: DSCT-3D: Survey Sampling and Design of Experiments

Sample Survey : Basic concepts of sample survey : Concept of sampling, need for sampling, complete enumeration v/s., sampling, principles of sampling theory, principal steps in a sample surveys, planning and organization of a sample survey, sampling and non-sampling errors. Simple random sampling (srswr and srswor) : definition and procedures of selecting a sample , properties of simple random sample, estimation of mean and sampling variance of sample mean.

Stratified random sampling: introduction, estimation of population mean and its variance, choice of sample sizes in different strata, comparison of stratified sampling under proportional and Neyman allocation with SRSWOR in terms of precision. Systematic sampling : introduction to linear systematic sampling, estimation of sample mean and its sampling ; introduction to linear systematic sampling, estimation of sample mean and its variance ( $N=nk$ ), comparison of systematic sampling with srswor in terms of mean squares.

Analaysis of variance: one- way and two way classified data with one observation per cell only.

Design of experiments: Principles of Design of experiments, uniformity trails., completely randomized, Randomized block and Latin square designs, Missing plot technique,  $2^2$  and  $2^3$  Factorial experiments : construction and analysis.

Indian Official Statistics: Present Official Statistical System in India relating to census of population, agriculture, industrial production and prices; methods of collection of official statistics, major publications, their reliability and limitations. Agencies responsible for the data collection – C.S.O., N.S.S.O, Office of Registrar Genera: historical development, main functions and important publications.

  
CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)

CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)




## REFERENCES

1. A.M. Goon, M.K.Gupta and B.Dasgupta (2005): Fundamental of Statistics (Vol II) 8<sup>th</sup> Ed., World Press, Kolkatta.
2. A.M. Goon, M.K.Gupta and B.Dasgupta (2003) : An Outline of Statistical Theory (Vol II) 3<sup>rd</sup> Ed., World Press, Kolkatta.
3. S.C.Gupta and V.K.Kapoor (2007): Fundamentals of Applied Statistics, 4<sup>th</sup> Ed., Sultan Chand and Sons.
4. D.C. Montogemery (2001) : Designs and Analysis of Experiments, John Wiley and Sons, New York.
5. P. Mukhopadhyaya (1998): Theory and Methods of Surveys Samplings, Prentice Hall of India.
6. D.Singh and F.S. Chaudhary (1995): Theory and Analysis of Sample Survey Designs, New Age International (P) Ltd.
7. P.V.Sukhatme, B.V.Sukhatme, S. Sukhatme and C. Ashok (1984) : Sampling Theory of Surveys with Applications, Iowa State University Press, Iowa, USA.
8. Guide to current Indian Official Statistics, Central Statistical Office, GOI, New Delhi.
9. <http://mospi.nic.in/>


## 46: DSCP-3D LIST OF PRACTICALS

1. To select SRS with and without replacement
2. For a population of size 5, estimate population mean, population mean square and population variance. Enumerate all possible samples of size 2 by wr and wor and establish all properties relative to SRS.
3. For srswor, estimate means, standards error, the sample size.
4. Stratified Sampling: allocation of sample to strata by proportional and Neyman's methods compare the efficiencies of above two methods relative to SRS.
5. Estimation of gain in precision in stratified sampling.

  
CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)



6. Comparison of systematic sampling with stratified sampling and SRS in the presence of a linear trend.
7. Analysis of an one way/ two way ANOVA
8. Analysis of a CRD, RBD
9. Analysis of a LSD.
10. Analysis of an RBD with one missing observation.
11. Analysis of an LSD with one missing observation.
12. Analysis of  $2^2$  and  $2^3$  factorial CRD and RBD.

  
CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)

CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)

## SEMESTER-V

### 51: SECT 1: Data Analysis using Spread Sheet

This course will review topics in probability and statistics studies in core for data analysis.

Introduction to statistical computing, analysis and graphical interpretation using spread sheet. The following problems can be done on spread sheet to enhance data analysis skills.

Graphical representation of data by histograms, frequency polygon, Pie Chart, Ogives, Boxplot and Stem-leaf. Measures of central tendency , dispersion.

Fitting of polynomials, exponential curves and plotting of probability distributions. Correlation and regression. Testing of hypothesis.

### REFERENCES

1. Conard Carlberg (2011) : Statistical Analysis, Pearson Education, Inc.
2. Gopal K.Kanji (2006): 100 Statistical Tests , 3<sup>rd</sup> Ed., Sage Publication.
3. Brend Held (2007): Microsoft Excel Functions and Formulas, Wordware Publishing Inc.
4. E.J.Billo (2007) Excel for Scientists and Engineers Numerical Methods, John Wiley and Sons.
5. D.Remenyi, G. Onofrei, J.English ( 2011) : An Introduction Statistics using Microsoft Excel, Academic Publishing Limited.
6. J.Artymiak (2011) Beginning OpenOffice Calc : From Setting Up Simple Spreadsheets to Business Forecasting, Apress Publisher.



CHAIRMAN  
Dept. of Studies In Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)

### 54: DSET-3: Demography and Applied Statistics -1

#### Demography:

Population Theories : Coverage and content errors in demographic data, use of balancing equations and Chandrashkaran – Deming formula to check completeness of registration data. Adjustments of age data, use of Myer and UN indices, Population composition, dependency ratio.


Introduction and 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 Death Rates.

Stationary and Stable population, Central Mortality Rates and Force of Mortality. Life (Mortality) Tables: Assumption, description, construction of Life Tables and Uses of Life Tables.

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

#### REFERENCES


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, 9<sup>th</sup> Edn. The World Press, Kolkata.
3. S. Biswas (1988) : Stochastic Processes in Demography & Application, Wiley Eastern Ltd.
4. Fredrick E. Croxton, Dudley J. Cowden, and S. Klein (1973) : Applied General Statistics , 3<sup>rd</sup> Ed. , Prentice Hall of India Pvt. Ltd.
5. N. Keyfitz and John a. Beckman ( ) : Demography through Problems, S-Verlag New York.

  
 CHAIRMAN  
 Dept. of Studies in Statistics  
 Gulbarga University,  
 GULBARGA-585106  
 (Karnataka, India)



#### 54: DSEP-3: LIST OF PRACTICALS


1. To calculate CDR and Age Specific Death rate for a given set of data
2. To find Standardized death rate by : 1) Direct Method , ii) Indirect Method.
3. To construct a complete life table
4. To fill in the missing entries in a life table.
5. To calculate CBR, GFT, SFR, TFR for a given set of data.
6. To calculate Crude rte of Natural Increase and Pearle's Vital Index for a given set of data.
7. Calculate GRR and NRR for a given set of data and compare them.

  
CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)

CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)

**54: DSEP-3: LIST OF PRACTICALS**

1. Calculate price and quantity index numbers using Laspeyre's, Paasche's, Marshall Edgeworth and Fisher's formulae.
2. To calculate the Chain Base index numbers for a given series of Fixed Base index numbers and show that the two are same.
3. To compute Chain Base index numbers for a given set of data.
4. To convert the Chain Base index numbers to Fixed Base index numbers.
5. Fitting and plotting of modified exponential curve by method of three selected points.
6. Fitting and plotting of Gompertz curve by method of partial sums.
7. Fitting and plotting of Logistic curve by method of three selected points.
8. Fitting of trend by Moving Average Method (for n even and n odd).
9. Measurement of Seasonal Indices Ratio- to – Trend method.
10. Measurements of Seasonal Indices Ratio- to –Moving Average Method.
11. Measurements of Seasonal Indices Link Relative Method.
12. Calculations of variance of random component by variate difference method.

  
CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)

CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)

## 54: DSET-3: Applied Statistics -1

Index Numbers: Definitions, Construction of index numbers and problems thereof for weighted and unweighted index numbers including Laspeyre's, Paasche's, Edgeworth-Marshall and Fisher. Factor reversal and time reversal tests. Chain index numbers, conversion of fixed based to chain based index numbers and vice-versa.. Consumer price index numbers.

Introduction to times series data, application of time series from various fields. Components of a times series.


Trend : Estimation of trend by free hand curve method, method of semi averages, fitting of various mathematical curve, and growth curves. 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 of Trend. Ratio to Moving Averages and Link Relative method, Deseasonalization. Random Component : Variate component method.

LPP : Definition, Definitions of some importation terms; solving LPP by Graphical method.

### REFERENCES

1. Goon A.M., Gupta M.K. and Dasgupta B. (2002): Fundamentals of Statistics , Vol. I & II , 8<sup>th</sup> Edn., The world Press, Kolkata.
2. Gupta, S.C. and Kapoor, V.K. (2008): Fundamentals of Applied Statistics, 4<sup>th</sup> Ed., (reprint), Sultan Chand and Sons.
3. Mood, A.M., Graybill, F.A. and Boes, D.C.(2007) : Introduction to the Theory of Statistics, 3<sup>rd</sup> Edn, (Reprint), Tata McGraw-Hill Pub Co. Ltd.
4. Kendall M.G. (1976) : Times Series , Charles Griffin.
5. Chatfield C. (1980) : The Analysis of Time Series – An Introduction, Chapman and Hall.
6. Mukhopadhyay P. (2011) : Applied Statistics , 2<sup>nd</sup> Ed., Revised Reprint, Books and Allied.

  
CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)



## SEMESTER-VI

### 61: SECT- 2: RESEARCH METHODOLOGY

Statistics is the science and practice of developing human knowledge through the use of empirical data expressed in quantitative form. There are basic steps depending on the subject matter and researcher. Research is structural and to conduct researchers use pre-collected data, called secondary data analysis. This course would help the student to understand the use of both primary as well as secondary data and various techniques to collect the data, analyze the data and interpret the results thereafter.

Introduction : Meaning, objection and Motivation in research, types of research, research approach, significance of research. Research problems : Definition , Selection and necessity of research problems, techniques in defining a research problems.

Survey methodology and data collection : Introduction, inference and error in surveys, the target populations, sampling frames and coverage error, methods of data collection, non response, questions and answers in surveys.


Data analysis and interpretation : review of various techniques for data analysis covered in core statistics papers , techniques of interpretation, precaution in interpretation.

Report Writing : Layout of a research report, Characteristics of a good research report.

### REFERENCES

1. Kothari, C.R. (2004) : Research Methodology : Methods and Techniques, 2<sup>nd</sup> Revised Edition, New Age International Publishers.
2. Kumar, R(2011) : Research Methodology : A Step- by – step Guide for Beginners, SAGE Publications.

CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)

  
CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)

## 64: DSET -6: Applied Statistics – II & Demand Analysis and Linear Regression

### Applied Statistics – II


Quality : Definition, dimensions of quality, historical perspective of quality control and improvements starting from World War II, historical perspective of Quality Gurus and Quality Hall of Fame. Quality system and Standards: Introduction to ISO Quality Standards, Quality registration, Statistical Process Control – Seven tools of SPC, chance and assignable caused of quality variation.

Statistical Control Charts – Construction and Statistical basis of  $3\text{-}\sigma$  Control charts, analysis of patterns on control charts for variables: X-bar and R-chart, X-bar and s-chart. Control charts for attributes: np-chart, p-chart and u-chart. Comparison between control charts for variables and control charts for attributes.

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

### REFERENCES

1. Montgomery, D.C. (2009) : Introduction to Statistical Quality Control, 6<sup>th</sup> Edition, Wiley India Pvt. Ltd.
2. Goon A.M., Gupta M.K. and Dasgupta B. (2002): Fundamentals of Statistics, Vol. I & II , 8<sup>th</sup> Edn., The world Press, Kolkata.
3. Mukhopadhyay P. (2011) : Applied Statistics , 2<sup>nd</sup> Ed., Revised Reprint, Books and Allied.
4. Montgomery, D.C. Runger, G.C. (2008) : Applied Statistics and Probability for Engineers, 3<sup>rd</sup> Edition Reprint, Wiley India Pvt. Ltd.

  
CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)

CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)



## DSET- 6 (ii): Demand Analysis and Linear Regression

Demand Analysis: Demand function, price and income elasticity of demand, nature of commodities, laws of supply and demand, Income distributions, Pareto – curves of concentration. Utility and Production Functions : Utility function, constrained utility maximization, indifference curves, derivation of demand curve, production function, homogeneous production functions, Isoquant and Isocost curves. Elasticity of substitution, C.E.S. functions, Multiple production by monopolist, discriminating monopolistic form, multiplant form.


Simple Linear Regression Model : Two Variable Case Estimation of model by method of ordinary least squares, properties of estimators, goodness of fit, tests of hypothesis, scaling and units of measurements, confidence intervals, Gauss – Markov theorem and forecasting.

Multiple Linear Regression: OLS Estimation of parameters; properties of OLS estimators, goodness of fit –  $R^2$ , partial regression coefficients and testing of hypothesis on parameters (individual and joint).

Transportation Problems Definition of Some important terms, Method of Solving T.P. by  
i) NWCR ii) MMM

## REFERENCES


1. Croxton, F.E., Cowden, D.J. and Klein, S. (1982): Applied General Statistics, 3<sup>rd</sup> Edn, and Prentice Hall of India (P) Ltd.
2. Soni, R.S. (1996): Business Mathematics with Application in Business and Economics, Pitamber Publishing Co.
3. Montogemery, D.C. Peck, E.a. and Vining, G.G. (2006): Introduction to Linear Regression Analysis, 4<sup>th</sup> Ed. John Wiley and Sons.

  
CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)



## LIST OF PRACTICALS

1. Construction of X-bar and R chart ( without trial control limits)
2. Construction of X-bar and s chart ( without trial control limits)
3. Construction of p- chart (fixed sample size)
4. Construction of p- chart (variable sample size)
5. Construction of d- chart
6. Construction of c- chart
7. Construction of u- chart
8. Single sampling inspection plan
9. OC functions and OC curves.
10. Determination of the best plan on the ASN.



CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)

CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)

## DSEP-6: LIST OF PRACTICALS

1. Fitting of demand curve / function and Estimation of price elasticity of demand from time series data.
2. Fitting of Pareto curve to income data.
3. Fitting of Lorenz curve of concentration.
4. Estimability when X is a full rank matrix.
5. Estimability when X is not a full rank matrix.
6. Distribution of Quadratic forms.
7. Simple Linear Regression.
8. Multiple Regression
9. Tests for Linear Hypothesis.
10. Lack of fit
11. Testing of Hypothesis of partial correlation coefficient.

  
CHAIRMAN  
Dept. of Studies in Statistics  
Gulbarga University,  
GULBARGA-585106  
(Karnataka State)

Approved  
