Submitted to TSCHE on 18.06.2019

B.A./B.Sc. (STATISTICS)
Semester Pattern Syllabus (CBCS)
w.e.f: Academic Year: 2019-20
(With Mathematics Combination)

YEAR	SEMESTER	THEORY/ *PRACTICAL*	Paper Title	WORK LOAD (Hrs/ Week)	#CREDITS	MARKS
I	FIRST	**Paper-I**	**Descriptive Statistics and probability**	**4**	**4**	**100**
		Practical-1	*Descriptive Statistics and probability*	*3*	*1*	*50*
	SECOND	**Paper-II**	**Probability distributions**	**4**	**4**	**100**
		Practical-2	*Probability distributions*	*3*	*1*	*50*
II	THIRD	SEC-1		2	2	50
		SEC-2		2	2	50
		Paper-III	**Statistical Methods**	**4**	**4**	**100**
		Practical-3	*Statistical Methods*	*3*	*1*	*50*
	FOURTH	SEC-3		2	2	50
		SEC-4		2	2	50
		Paper-IV	**Statistical Inference**	**4**	**4**	**100**
		Practical-4	*Statistical Inference*	*3*	*1*	*50*
III	FIFTH	*GE*	*Basic Statistics*	*4*	*4*	*100*
		Paper-V	**Applied Statistics-1**	**4**	**4**	**100**
		Practical-5	*Applied Statistics-1*	*3*	*1*	*50*
	SIXTH					
		Project/ Optional		*4*	*4*	*100*
		Paper-VI	**Applied Statistics-2**	**4**	**4**	**100**
		Practical-6	*Applied Statistics-2*	*3*	*1*	*50*

	Sem-I	Sem-II	Sem-III	Sem-IV	Sem-V	Sem-VI	Total
No. of Credits:	4+1=5	4+1=5	4+1+2+2=9	4+1+2+2=9	4+1+4=9	4+1+4=9	**46**
Marks:	150	150	250	250	250	250	**1300**
						Total work load of (Sem-I, Sem-III, Sem-V):	29
						Total work load of (Sem-II, Sem-IV, Sem-VI):	29

(*)SEC-1,2,3,4: Skill Enhancement Courses for Statistics students (Theory exam only).
(**) GE: *For other than Statistics Course students (Theory exam only).*

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B.A./B.Sc. (STATISTICS)
Semester Pattern Syllabus (CBCS)
w.e.f: Academic Year: 2019-20
(With Mathematics Combination)

YEAR	SEMESTER	**THEORY/** *PRACTICAL*	**Paper Title**	**WORK LOAD (Hrs/ Week)**	#CREDITS	**MARKS**
I	**FIRST**	**Paper-I**	**Descriptive Statistics and probability**	**4**	**4**	**100 (External:80, Internal:20)**
		Practical-1	*Descriptive Statistics and probability*	*3*	*1*	*50*
	SECOND	**Paper-II**	**Probability distributions**	**4**	**4**	**100 (External:80, Internal:20)**
		Practical-2	*Probability distributions*	*3*	*1*	*50*

	Sem-I	**Sem-II**	**Sem-III**	**Sem-IV**	**Sem-V**	**Sem-VI**	**Total**
No. of Credits:	4+1=5	4+1=5					
Marks:	150	150					
Total work load per week of Sem-I:							7
Total work load per week of Sem-II:							7

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B.A./B.Sc. (STATISTICS)
Semester Pattern Syllabus (CBCS)
w.e.f: Academic Year: 2019-20
(With Mathematics Combination)

(Examination at the end of Semester-I)

Paper-I: Descriptive Statistics and Probability

[4 HPW :: 4 Credits :: 100 Marks (External:80, Internal:20)]

Unit-I

Descriptive Statistics: Concept of primary and secondary data, Methods of collection and editing of primary data, Designing a questionnaire and a schedule, Sources and editing of secondary data, Classification and tabulation of data, Measures of central tendency (Arithmetic mean, median, mode, geometric mean and harmonic mean) with simple applications, Absolute and relative measures of dispersion (range, quartile deviation, mean deviation, standard deviation and variance) with simple applications, Importance of moments, central and non-central moments, their inter-relationships, Sheppard's correction for moments for grouped data, Measures of skewness based on quartiles and moments, kurtosis based on moments with real life examples.

Unit-II

Probability: Basic concepts of probability, deterministic and random experiments, trial, outcome, sample space, event, operations of events, mutually exclusive and exhaustive events, equally likely and favorable events with examples, Mathematical, Statistical and Axiomatic definitions of probability, their merits and demerits. Properties of probability based on axiomatic definition, Conditional probability and independence of events, Addition and multiplication theorems for 'n' events, Boole's inequality and Bayes' theorem, Problems on probability using counting methods and theorems**.**

Unit-III

Random Variables: Definition of random variable, discrete and continuous random variables, functions of random variables, probability mass function and probability density function with illustrations. Distribution function and its properties, Transformation of one-dimensional random variable (simple 1-1 functions only), Notion of bivariate random variable, bivariate distribution, statements of its properties, Joint, marginal and conditional distributions, Independence of random variables**.**

Unit-IV

Mathematical Expectation: Mathematical expectation of a function of a random variable, Raw and central moments, covariance using mathematical expectation with examples, Addition and multiplication theorems of expectation. Definitions of moment generating function (m.g.f), characteristic function (c.f), cumulant generating function (c.g.f), probability generating function (p.g.f) and statements of their properties with applications, Chebyshev's and Cauchy-Schwartz's inequalities and their applications.

List of reference books:

1. William Feller: Introduction to Probability theory and its applications, (Vol-I), Wiley.
2. V. K. Kapoor and S. C. Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
3. Goon A M, Gupta M K, Das Gupta B: Fundamentals of Statistics, (Vol-I), The World Press (Pvt) Ltd., Kolkata.
4. M. Jagan Mohan Rao and Papa Rao: A Text book of Statistics (Paper-I).
5. Sanjay Arora and Bansilal: New Mathematical Statistics, Satya Prakashan , New Delhi.
6. Hogg,Tanis, Rao: Probability and Statistical Inference, (7th edition), Pearson.
7. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC, PHI.
8. Gerald Keller: Applied Statistics with Microsoft Excel, Duxbury, Thomson Learning.
9. Levine, Stephen, Krehbiel, Berenson: Statistics for Managers using Microsoft Excel (4th edition), Pearson Publication.

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B.A./B.Sc. (STATISTICS)
Semester Pattern Syllabus (CBCS)
w.e.f: Academic Year: 2019-20
(With Mathematics Combination)
(Examination at the end of Semester-I)

Practical-1
Descriptive Statistics and Probability
(3 HPW :: 1 Credit :: 50 Marks)

Part - 1 (Using calculator)

1. Graphical presentation of data (Histogram, frequency polygon, Ogives). s
2. Diagrammatic presentation of data (Bar and Pie).
3. Computation of non-central and central moments – Sheppard's corrections for grouped data.
4. Computation of coefficients of Skewness and Kurtosis – Karl Pearson's, Bowley's, β_1 and β_2.

Part - 2 (Using MS-Excel)

1. Basics of Excel- data entry, editing and saving, establishing and copying formulae, built in Functions in excel, copy and paste and exporting to MS word document.
2. Graphical presentation of data (Histogram, frequency polygon, Ogives) using MS-Excel
3. Diagrammatic presentation of data (Bar and Pie) using MS-Excel
4. Computation of Measures of central tendency, dispersion, Coefficient of Variation and coefficients of Skewness, Kurtosis using MS-Excel.

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SUBMITTED TO TSCHE ON 18-06-2019
B.A./B.Sc. (STATISTICS)
Theory Question Paper Pattern
w.e.f: Academic Year: 2019-20
(With Mathematics Combination)

Time: 3 hours] [Max.Marks: 80

Section - A

Answer any EIGHT questions. All questions carry equal marks. (8Qx4m=32)

1. From Unit I
2. From Unit I
3. From Unit I
4. From Unit II
5. From Unit II
6. From Unit II
7. From Unit III
8. From Unit III
9. From Unit III
10. From Unit IV
11. From Unit IV
12. From Unit IV

Section - B

Answer ALL questions. All questions carry equal marks. (4Qx12m=48)

13. a) From Unit I
    (or)
    b) From Unit I

14. a) From Unit II
    (or)
    b) From Unit II

15. a) From Unit III
    (or)
    b) From Unit III

16. a) From Unit IV
    (or)
    b) From Unit IV

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SUBMITTED TO TSCHE ON 18-06-2019
B.A./B.Sc. (STATISTICS)
Semester Pattern Syllabus (CBCS)
w.e.f: Academic Year: 2019-20
(With Mathematics Combination)

Practical Examination Pattern

Semester	Pract No.	Method of Solving	No. of Problems given	Student has to attempt	Marks division		Total Marks	Duration of Exam
					Problem solving	Record		
I	Pract-1	Using Calculator	3	Any 2 ---------- ----- Any 1	3x15=45	5	**50**	3 hrs
		Using Computer (MS-Excel)	2					
II	Pract-2	Using Calculator	3	Any 2 ---------- ----- Any 1	3x15=45	5	**50**	3 hrs
		Using Computer (MS-Excel)	2					

Note: Each practical syllabus consists of two parts. From part-1, three problems will be given. Student has to answer any 2 problems. From part-2, two problems will be given. Student has to answer any one problem.

Production of Record is compulsory in student's own hand writing.
Periodically got signed by concerned lecturer, after completion of each topic.

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SUBMITTED TO TSCHE ON 18-06-2019
B.A./B.Sc. (STATISTICS)
Semester Pattern Syllabus (CBCS)
w.e.f: Academic Year: 2019-20
(With Mathematics Combination)

(Examination at the end of Semester-II)

Paper-II: **Probability Distributions**

[4 HPW :: 4 Credits :: 100 Marks (External:80, Internal:20)]

Unit-I

Discrete distributions – I : Uniform and Bernoulli distributions : definitions, mean, variance and simple examples. Definition and derivation of probability mass functions of Binomial distribution, Poisson distribution, properties of these distributions: median, mode, m.g.f, c.g.f., p.g.f., c.f., and moments upto fourth order, reproductive property (wherever exists) and their real life applications. Poisson approximation to Binomial distribution.

Unit-II

Discrete distributions – II: Negative binomial, Geometric distributions: Definitions and real life applications, properties of these distributions: m.g.f, c.g.f., p.g.f., c.f. and moments upto fourth order, reproductive property (wherever exists), lack of memory property for Geometric distribution. Poisson approximation to Negative binomial distribution.

Hyper-geometric distribution: definition, real life applications, derivation of probability function, mean, variance. Binomial approximation to Hyper-geometric distribution.

Unit-III

Continuous distributions – I : Rectangular and Normal distributions – definition, properties such as m.g.f., c.g.f., c.f. and moments up to fourth order, reproductive property, wherever exists and their real life applications. Normal distribution as a limiting case of Binomial and Poisson distributions.

Unit-IV

Continuous distributions – II: Exponential, Gamma distributions - definition, properties: m.g.f., c.g.f., c.f. and moments upto fourth order, reproductive property (wherever exists) and their real life applications. Beta distribution of two kinds: Definitions, mean and variance. Cauchy distribution - Definition and c.f..

Definition of convergence in Law, in probability and with probability one or almost sure convergence. Definition of Weak Law of Large Numbers (WLLN) and Strong Law of Large numbers (SLLN). Definition of Central Limit Theorem (CLT) for identically and independently distributed (i.i.d) random variables with finite variance.

List of reference books:

1. Goon A M, Gupta M K, Das Gupta B : Fundamentals of Statistics, (Vol-I), The World Press (Pvt) Ltd., Kolkata.
2. Hoel P.G: Introduction to Mathematical Statistics, Asia Publishing house.
3. M. Jagan Mohan Rao and Papa Rao: A Text book of Statistics (Paper-I).
4. Sanjay Arora and Bansilal: New Mathematical Statistics, Satya Prakashan , New Delhi.
5. V. K. Kapoor and S. C. Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
6. William Feller: Introduction to Probability theory and its applications, (Vol-I), Wiley.
7. Hogg,Tanis, Rao: Probability and Statistical Inference, (7th edition), Pearson.
8. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC, PHI.
9. Levine, Stephen, Krehbiel, Berenson: Statistics for Managers using Microsoft Excel (4th edition), Pearson Publication.

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SUBMITTED TO TSCHE ON 18-06-2019
B.A./B.Sc. (STATISTICS)
Semester Pattern Syllabus (CBCS)
w.e.f: Academic Year: 2019-20
(With Mathematics Combination)

(Examination at the end of Semester-II)

Practical-2

Probability Distributions

(3 HPW :: 1 Credit :: 50 Marks)

Part - 1 (Using calculator)

1. Fitting of Binomial distribution-Direct method.
2. Fitting of Binomial distribution-Recurrence relation Method.
3. Fitting of Poisson distribution-Direct method
4. Fitting of Poisson distribution-Recurrence relation Method.
5. Fitting of Negative Binomial distribution.
6. Fitting of Geometric distribution.
7. Fitting of Normal distribution-Areas method.
8. Fitting of Normal distribution - Ordinates method.

Part - 2 (Using MS-Excel)

1. Fitting of Binomial distribution-Direct method.
2. Fitting of Poisson distribution-Direct method.
3. Fitting of Normal distribution-Areas method.
4. Fitting of Exponential distribution.
5. Fitting of Cauchy distribution.

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SUBMITTED TO TSCHE ON 18-06-2019
B.A./B.Sc. (STATISTICS)
Theory Question Paper Pattern
w.e.f: Academic Year: 2019-20
(With Mathematics Combination)

Time: 3 hours] [Max.Marks: 80

Section - A

Answer any EIGHT questions. All questions carry equal marks. (8Qx4m=32)

1. From Unit I
2. From Unit I
3. From Unit I
4. From Unit II
5. From Unit II
6. From Unit II
7. From Unit III
8. From Unit III
9. From Unit III
10. From Unit IV
11. From Unit IV
12. From Unit IV

Section - B

Answer ALL questions. All questions carry equal marks. (4Qx12m=48)

13. a) From Unit I
    (or)
    b) From Unit I

14. a) From Unit II
    (or)
    b) From Unit II

15. a) From Unit III
    (or)
    b) From Unit III

16. a) From Unit IV
    (or)
    b) From Unit IV

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SUBMITTED TO TSCHE ON 18-06-2019
B.A./B.Sc. (STATISTICS)
Practical Question Paper Pattern
w.e.f: Academic Year: 2019-20
(With Mathematics Combination)

Time: 3 hours] [Max.Marks: 50

Solve any TWO problems from Section-A and any ONE problem from Section-B. (3Qx15m=45m) and Record: 5m

Section-A

1. From Part 1
2. From Part 1
3. From Part 1

Section - B

4. From Part 2
5. From Part 2

Osmania University
B.A/B.Sc. II Year III Semester (CBCS): Statistics Syllabus
(With Mathematics Combination)
(Examination at the end of II Year III Semester)
Paper-III: Statistical Methods (DSC-2C)
(4 HPW with 4 Credits and 100 Marks)

Unit –I

Bivariate data, Scattered diagram, Principle of least squares, fitting of straight line, quadratic and power curves. Concept of correlation, computation of Karl-Pearson correlation coefficient for grouped and ungrouped data and its properties.
Correlation ratio, Spearman's rank correlation coefficient and its properties. Simple linear regression, correlation verses regression, properties of regression coefficients.

Unit –II

Concepts of partial and multiple correlation coefficients (only for three variables). Analysis of categorical data, their independence, Association and partial association of attributes. Various measures of association: (Yule's) for two way data and coefficient of contingency (Pearson and Tcherprow) and coefficient of colligation**.**

Unit – III

Concepts of Population, Parameter, Random sample, Statistic, Sampling distribution and Standard error. Standard error of sample mean(s) and sample proportion(s). Exact sampling distributions - Statement and properties of χ^2, t and F distributions and their interrelationships. Independence of sample mean and variance in random sampling from normal distributions.
Point estimation of a parameter, concept of bias and mean square error of an estimate. Criteria of a good estimator- consistency, unbiasedness, efficiency and sufficiency with examples.

Unit – IV

Statement of Neyman's Factorization theorem, derivations of sufficient statistics in case of Binomial, Poisson, Normal and Exponential (one parameter only) distributions. Estimation by the method of moments, Maximum likelihood estimation (MLE), statements of asymptotic properties of MLE. Concept of interval estimation. Confidence intervals of the parameters of normal population by Pivot method.

List of Reference Books:

1. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand&Sons, New Delhi
2. Goon AM, Gupta MK,Das Gupta B : Outlines of Statistics , Vol-II, the World Press Pvt. Ltd.,Kolakota.
3. Hoel P.G: Introduction to matehematical statistics, Asia Publiushing house.
4. Sanjay Arora and BansiLal:.New Mathematical Statistics Satya Prakashan , New Delhi
5. Hogg and Craig :Introduction to Mathematical statistics. Prentice Hall
6. Siegal,S.,and Sidney: Non-parametric statistics for Behavioral Science. McGraw Hill.
7. GibbonsJ.D and SubhabrataChakraborti: Nonparametric Statistical Inference. Marcel Dekker.
8. ParimalMukhopadhyay: Mathematical Statistics. New Central Book agency.
9. Conover : Practical Nonparametric Statistics. Wiley series.
10. V.K.Rohatgi and A.K.Md.Ehsanes Saleh: An introduction to probability and statistics. Wiley series.
11. MoodAM,GraybillFA,Boe's DC. Introduction to theory of statistics. TMH
12. Paramiteyamariyuaparameteyaparikshalu. Telugu Academy.
13. K.V.S. Sarma: Statistics Made simple do it yourself on PC. PHI
14. Gerald Keller: Applied Statistics with Microsoft excel. Duxbury. Thomson Learning
15. Levin, Stephan, Krehbiel, Berenson: Statistics for Managers using Microsoft Excel.4th edition. Pearson Publication.
16. Hogg, Tanis, Rao. Probability and Statistical Inference.7th edition. Pearson Publication.
17. Milton and Arnold(fourth Edition):Introduction to Probability and statistics,Tata Mcgraw hill Publication.

Osmania University
B.A/B.Sc. II Year: Statistics Syllabus
(With Mathematics Combination)
(Examination at the end of Semester III)
Practical Paper – III (with 2 HPW, Credits 1 and Marks 25)

Part – A (Manual)

1. Generation of random samples from Uniform (0,1), Uniform (a,b) and exponential Distributions.
2. Generation of random samples from Normal and Poisson distributions.
3. Fitting of straight line and parabola by the method of least squares.
4. Fitting of power curves of the type $y= a x^b$, $y=a b^x$ and $y=a e^{bx}$ by the method of least squares.
5. Computation of Yule's coefficient of association.
6. Computation of Pearson's, Tcherprows coefficient of contingency.
7. Computation of correlation coefficient and regression lines for ungrouped data.
8. Computation of correlation coefficient, forming regression lines for ungrouped data.
9. Computation of correlation coefficient, forming regression lines for grouped data.
10. Computation of multiple and partial correlation coefficients.
11. Computation of correlation ratio

Part – B (Using Excel)

12. **Simulation of random samples from Uniform (0,1), Uniform (a,b), Exponential, Normal and Poisson distributions using MS Excel**.
13. **Fitting of straight line and parabola by the method of least squares using MS Excel.**
14. **Fitting of power curves of the type $y= a x^b$, $y=a b^x$ and $y=a e^{bx}$ by the method of least squares using MS Excel.**
15. **Computation of correlation coefficient, forming regression lines using MS Excel.**
16. **Computation of multiple and partial correlation coefficients using MS Excel.**

Osmania University
B.A/B.Sc. II Year III Semester (CBCS): Statistics Syllabus
(With Mathematics Combination)
(Examination at the end of II Year III Semester)
SEC-1- Concepts of Sequences of Random Variables
(2 HPW with 2 Credits and 50 Marks)

Unit –I

Stochastic process, Index set, state space, classification of stochastic processes with examples, stationary process, Covariance stationary process, Martingale sequence of random variables. Applications of stochastic processes through examples.

Unit II

Definition and examples of finite – dimensional distributions of a Markov Chain, time – homogeneity, Transition probability matrix, marginal distribution. Classification of states – recurrent, transient, positive recurrent and null recurrent states.

Reference Books:

1. Medhi, J. (1982) : Stochastic Processes, Wiley Eastern.
2. U. N. Bhat (1984) : Elements of Applied Stochastic Processes, Wiley series.

Osmania University
B.A/B.Sc. II Year IV Semester (CBCS): Statistics Syllabus
(With Mathematics Combination)
(Examination at the end of II Year IV Semester)
SEC-2-Statistics for Psychology and Education
(2 HPW with 2 Credits and 50 Marks).

Unit - I

Introduction, Scaling procedures, scaling of rankings in terms of Normal Probability curves.

Unit - II

Reliability of test scores, effect of test length and different ranges on reliability of the test, Validity of test scores, comparison between reliability and validity.

Reference Books :

SC Gupta and VK Kapoor : Fundamentals of Applied Statistics, Sultan Chand & Sons

Osmania University
B.A/B.Sc. II Year IV Semester (CBCS): Statistics Syllabus
(With Mathematics Combination)
(Examination at the end of II Year IV Semester)
Paper-IV: Inference (DSC-2D)
(4 HPW with 4 Credits and 100 Marks)

Unit–I

Concepts of statistical hypotheses, Null and Alternative hypothesis, Critical region, two types of errors, Level of significance and Power of a test. One and two tailed tests, test function (non-randomized and randomized). Statement and Proof of Neyman-Pearson's fundamental lemma for Randomized tests. Examples in case of Binomial, Poisson, Exponential and Normal distributions and their power of the test functions.

Unit-II

Large sample tests for single sample mean, difference of means, single sample proportion, difference of proportions and difference of standard deviations. Fisher's Z-transformation for population correlation coefficient(s**)** and testing the same in case of one sample and two samples**.** Definition of order statistics and statement of their distributions.

Unit – III

Tests of significance based on χ^2 - χ^2-test for specified variance, goodness of fit and test for independence of attributes (rxs, 2xk and 2x2 contingency tables). Tests of significance based on student's - t – t-test for single sample specified mean, difference of means for independent and related samples, sample correlation coefficient. F - test for equality of population variances.

Unit – IV

Non-parametric tests - their advantages and disadvantages, comparison with parametric tests. Measurement scale - nominal, ordinal, interval and ratio. Use of Central Limit Theorem in testing. One sample runs test, sign test and Wilcoxon-signed rank tests (single and paired samples). Two independent sample tests: Median test, Wilcoxon –Mann-Whitney U test, Wald Wolfowitz's runs test**.** Use of central limit theorem in testing.

List of Reference Books:

1. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand&Sons, New Delhi
2. Goon AM, Gupta MK,Das Gupta B : Outlines of Statistics , Vol-II, the World Press Pvt. Ltd.,Kolakota.
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6. Siegal,S.,and Sidney: Non-parametric statistics for Behavioral Science. McGraw Hill.
7. GibbonsJ.D and SubhabrataChakraborti: Nonparametric Statistical Inference. Marcel Dekker.
8. ParimalMukhopadhyay: Mathematical Statistics. New Central Book agency.
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11. MoodAM,GraybillFA,Boe's DC. Introduction to theory of statistics. TMH
12. Paramiteyamariyuaparameteyaparikshalu. Telugu Academy.
13. K.V.S. Sarma: Statistics Made simple do it yourself on PC. PHI
14. Gerald Keller: Applied Statistics with Microsoft excel. Duxbury. Thomson Learning
15. Levin, Stephan, Krehbiel, Berenson: Statistics for Managers using Microsoft Excel.4th edition. Pearson Publication.
16. Hogg, Tanis, Rao. Probability and Statistical Inference.7th edition. Pearson Publication.
17. Milton and Arnold(fourth Edition):Introduction to Probability and statistics,Tata Mcgraw hill Publication.

Osmania University
B.A/B.Sc. II Year: Statistics Syllabus
(With Mathematics Combination)
(Examination at the end of Semester IV)
Practical Paper – IV (with 2 HPW, Credits 1 and Marks 25)

Part – A (Manual)

1. Large sample tests for mean(s), proportion(s), Standard deviation(s) and correlation coefficient.
2. Small sample tests for single mean and difference of means and correlation coefficient.
3. Paired t-test.
4. Small sample test for single and difference of variances.
5. $\chi 2$ – test for goodness of fit and independence of attributes.
6. Nonparametric tests for two independent samples (Median test,Wilcoxon Mann Whitney - U test, Wald - Wolfowitz's runs test)

Part – B (Using Excel)

7. Small sample tests for mean(s), paired t-test and correlation coefficient using MS Excel.
8. Small sample test for single and difference of variances using MS Excel.
9. $\chi 2$ – test for goodness of fit and independence of attributes using MS Excel.
10. Nonparametric tests for single and related samples (sign test and Wilcoxon signed rank test) and one sample runs test.

Note: Training shall be on establishing formulae in Excel cells and deriving the results. The Excel output shall be exported to MSWord for writing inferences.

Osmania University
B.A/B.Sc. III Year V Semester (CBCS): Statistics Syllabus

(With Mathematics Combination)

(Examination at the end of III Year V Semester)

Paper-V: Sampling Theory, Time series, Index Numbers and Demand Analysis

(DSC-2E)

(3 Hours Per Week with 3 Credits and 75 Marks)

UNIT-I

Sample Surveys: Concepts of population, sample, sampling unit, parameter, statistic, sample frame and standard error. Principal steps in sample surveys - need for sampling, census versus sample surveys, sampling and non- sampling errors, sources and treatment of non-sampling errors, advantages and limitations of sampling.

Sampling Methods: Types of sampling: Subjective, probability and mixed sampling methods. Methods of drawing random samples with and without replacement. Estimates of population mean, total, and proportion, their variances and the estimates of variances in Simple Random Sampling With and Without Replacement

UNIT-II

Estimates of population mean, total, and proportion, their variances and the estimates of variances in the following methods.

(i) Stratified Random Sampling with Proportional and Neyman allocation, and

(ii) Systematic Sampling when N= nk.

Comparison of relative efficiencies. Advantages and disadvantages of SRS, Stratified and Systematic sampling methods.

Time series: Time series and its components with illustrations, additive, multiplicative and mixed models. Determination of trend by least squares and moving average methods. Growth curves and their fitting with reference to Modified exponential, Gompertz and Logistic curves. Determination of seasonal indices by Ratio to moving average, ratio to trend and link relative methods.

UNIT-III

Demand Analysis: Introduction. Demand and supply, price elasticity of supply and demand. Methods of determining demand and supply curves, Leontief's ,Pigous's methods of determining demand curve from time series data, limitations of these methods Pigou's method from time series data. Pareto law of income distribution curves of concentration.

Index Numbers: Concept, construction, uses and limitations of simple and weighted index numbers. Laspeyer's, Paasche's and Fisher's index numbers, criterion of a good index numbers, problems involved in the construction of index numbers. Fisher's index as an ideal index number. Fixed and chain base index numbers. Cost of living index numbers and wholesale price index numbers. Base shifting, splicing and deflation of index numbers.

Reference Books:

1. V.K. Kapoor and S.C. Gupta : Fundamentals of Applied Statistics. Sultan Chand

2. Parimal Mukhopadhyay : Applied Statistics, New Central Book agency.

3. Daroga Singh and Chowdhary: Theory and Analysis of Sample survey designs. Wiley Eastern.

4. M.R.Saluja : Indian Official Statistics. ISI publications.

5. B.L.Agarwal: Basic Statistics.New Age publications.

6. S.P.Gupta : Statistical Methods. Sultan Chand and Sons.

7. Anuvartita Sankhyaka Sastram – Telugu Academy.

8. Arora, SumeetArora,S.Arora: Comprehensive Statistical Methods. S.Chand.

9. A.M.Goon, M.K.Gupta, B. Dasgupta: Fundamentals of Statistics Vol II World Press Private Ltd.,Calcutta

10. A.M.Goon,M.K.Gupta,B.Dasgupta An outline of Statistical Theory Vol II World Press Private Ltd.,Calcutta17.

Note: Theory paper is for 60 Marks and Internal is 15 Marks

Osmania University
B.A/B.Sc. III Year V Semester (CBCS): Statistics Syllabus

(With Mathematics Combination)

(Examination at the end of III Year V Semester)

Paper-VI A: Statistical Quality Control and Reliability (DSE-2E)

(3 Hours Per Week with 3 Credits and 75 Marks)

Unit –I

Statistical Quality Control: Importance of SQC in industry. Dimensions of quality, Statistical basis of Shewart control charts. Construction of control charts for variables (mean, range and standard deviation) and attributes (p , np with fixed and varying sample sizes) and their Interpretation.

Unit –II

Control charts for attributes (c and u charts with fixed and varying sample sizes) and their Interpretation. Construction of control charts for Natural tolerance limits and specification limits, process capability index and modified control charts.

Unit –III

Acceptance sampling plans:. Concept of AQL and LTPD. Producers risk and consumer's risk Single and Double sampling plans for attributes and their OC and ASN functions. Design of single and double sampling plans for attributes using Binomial and Poisson distributions. Construction of OC and ASN functions.

Reliability: Introduction. Hazard function, Exponential distribution as life model, its memory- less property. Reliability function and its estimation.
System reliability - series, parallel and k out of N systems and their reliabilities with simple examples.

Reference Books:

1. D.C. Montgomary: Introduction to Statistical Quality Control. Wiley
2. V.K. Kapoor and S.C.Gupta L Fundamentals of Applied Statistics. Sultan Chand
3. Parimal Mukhopadhyay : Applied Statistics . New Central Book agency
4. Anuvartita Sankhyakasastram – Telugu Academy.
5. R.C.Gupta: Statistical Quality Control.
6. S.K.Sinha: Reliability and life testing. Wiley Eastern
7. L.S.Srinath: Reliability Engineering. Affiliated East-West Press.

Note: Theory paper is for 60 Marks and Internal is 15 Marks

OsmaniaUniversity
B.A/B.Sc. III Year V Semester (CBCS): Statistics Syllabus

(With Mathematics Combination)
(Examination at the end of III Year V Semester)

Paper-VI B: Bio-Statistics - I (DSE-2E)

(3 HPW with 3 Credits and 75 Marks)

Unit –I

Bioassay: The purpose and structure of biological assay. Types of biological assays, Direct assays, Ratio estimates, asymptotic distributions: Feller's theorem. Regression approach to estimate dose – response and relationships.

Unit –II

Logit and Probit approaches when dose-response curve for standard preparation is unknown, quantal responses, methods of estimation of parameters, estimation of extreme quantiles, dose allocation schemes, polychotomous quantal response, estimation of points on the quantal response function.

Unit –III

Statistical Genetics: Basic terminology of genetics.Frequencies of genes and genotypes, Mendal's law, Hardy-Weinberg equilibrium. Mating Frequencies, estimation of allele frequency (dominant / codominant cases). Multiple alleles.

Approach to equilibrium for X-linked gene, natural selection, mutation, genetic drift, equilibrium when both natural selection and mutation are operative.

Reference Books:

1. D.J.Finney (1970): Statistical methods in Biological Assay. Charles Griffin.
2. Govindarajulu (2000): Statistical Techniques in Bioassay. Karger Publishers/Panther Publishers.
3. C.C.Li (1976): First course in population genetics. Boxwood press, California.
4. Falcon and Mackay (1998) : Introduction to quantitative genetics. Longman
5. J.F.Lawless: Statistical models and methods of life data. Wiley.
6. James F Crow and Motoo Kimura: An Introduction to Population Genetics Theory. Alpha edition.

Note: Theory paper is for 60 Marks and Internal is 15 Marks

OsmaniaUniversity
B.A/B.Sc. III Year V Semester (CBCS): Statistics Syllabus

(With Mathematics Combination)

(Examination at the end of III Year V Semester)

Paper-VI C: Actuarial Statistics - I (DSE-2E)

(3 HPW with 3 Credits and 75 Marks)

Unit –I

Utility theory, insurance and utility theory, models for individual claims and their sums, survival function, curate future lifetime, force of mortality.

Unit –II

Life table and its relation with survival function examples, assumptions of fractional ages, some analytical laws of mortality select and ultimate tables.

Multiple life functions, joint life and last survivor status, insurance and annuity benefits through multiple life functions, evaluation for special mortality laws.

Unit –III

Multiple decrement models, deterministic and random survivorship groups, associated single decrement tables, central rates of multiple decrement, net single premiums and their numerical evaluations.

Distribution of aggregate claims, compound Poisson distribution and its applications.

Reference Books:

1. N.L.Bowers, H.U.Gerber, J.C.Hickman, D.A.Jones and C.J.Nesbitt (1986): Actuarial Mathematics, Society of Actuaries, Ithaca, Illinois,USA .
2. Neill,A.(1977): Life contingencies, Heineman.
3. Spurgeon E.T.(1972): Life contingencies, Cambridge University Press
4. Benjamin,B and Pollard,J.H(1980): Analysis of Mortality and other Actuarial Statistics.
5. Federation of Insurance Institutes study courses: mathematical basis of Life Assurance (Published by Federation if Insurance Institutes, Bombay).

Note: Theory paper is for 60 Marks and Internal is 15 Marks

Osmania University
B.A/B.Sc. III Year V Semester (CBCS): Statistics Syllabus

(With Mathematics Combination)

(Examination at the end of III Year V Semester)

Practical Paper-V: Theory Paper V and Elective VI A

(with 2 HPW, Credits 1 and 25 Marks)

Section – A

Estimation of Population mean, population total and variance of these estimates by

1. Simple random sampling with and without replacement. Comparison between SRSWR and SRSWOR
2. Stratified random sampling with proportional and optimum allocations. Comparison between proportional and optimum allocations with SRSWOR
3. Systematic sampling with N = nk. Comparison of Systematic sampling with Stratified and SRSWOR
4. Measurement of trend by method of least squares and moving averages.
5. Determination of seasonal indices by the method of Ratio to moving averages.
6. Determination of seasonal indices by the method of Ratio to trend.
7. Determination of seasonal indices by the method of link Relatives.

Section - B

8. Construction of $\overline{X}$, R and σ - charts.
9. Construction of p, np, charts with fixed and varying n.
10. Construction of c and u charts.
11. Designing a single sampling plan and construction of its OC and ASN curves.
12. Designing a double sampling plan and construction of its OC and ASN curves.

Note: The question paper consists of TWO sections. Section A Consists of 2 Questions from Section A of Practical paper V and Section B consists of 2 questions from Section B of Practical paper V.

Osmania University
B.A/B.Sc. III Year V Semester (CBCS): Statistics Syllabus

(With Mathematics Combination)

(Examination at the end of III Year V Semester)

Practical Paper-V: Theory Paper V and Elective VI B

(with 2 HPW, Credits 1 and 25 Marks)

Section – A

Estimation of Population mean, population total and variance of these estimates by

1. Simple random sampling with and without replacement. Comparison between SRSWR and SRSWOR
2. Stratified random sampling with proportional and optimum allocations. Comparison between proportional and optimum allocations with SRSWOR
3. Systematic sampling with N = nk. Comparison of Systematic sampling with Stratified and SRSWOR
4. Measurement of trend by method of least squares and moving averages.
5. Determination of seasonal indices by the method of Ratio to moving averages.
6. Determination of seasonal indices by the method of Ratio to trend.
7. Determination of seasonal indices by the method of link Relatives.

Section – B

8. Fitting of exponential growth model to data by linearization method.
9. Fitting of logistic growth model.
10. Dose response relation and its estimation by least squares method and by MLE method.
11. Estimation of extreme quantiles and points on the quantal response .
12. Hardy –Weinberg equilibrium frequencies and Estimation of allele frequencies.

22. Effects of mutation and selection and the Hardy -Weinberg test.

23. Equilibrium—Balance between selection and mutation.

Note: The question paper consists of TWO sections. Section A Consists of 2 Questions from Section A of Practical paper V and Section B consists of 2 questions from Section B of Practical paper V.

Osmania University
B.A/B.Sc. III Year V Semester (CBCS): Statistics Syllabus

(With Mathematics Combination)

(Examination at the end of III Year V Semester)

Practical Paper-V: Theory Paper V and Elective VI C

(with 2 HPW, Credits 1 and 25 Marks)

Section – A

Estimation of Population mean, population total and variance of these estimates by

1. Simple random sampling with and without replacement. Comparison between SRSWR and SRSWOR
2. Stratified random sampling with proportional and optimum allocations. Comparison between proportional and optimum allocations with SRSWOR
3. Systematic sampling with N = nk. Comparison of Systematic sampling with Stratified and SRSWOR
4. Measurement of trend by method of least squares and moving averages.
5. Determination of seasonal indices by the method of Ratio to moving averages.
6. Determination of seasonal indices by the method of Ratio to trend.
7. Determination of seasonal indices by the method of link Relatives.

Section – B

8. Computation of values of utility function.
9. Computation of various components of life tables.
10. Construction of multiple decrement table for deterministic survival group.
11. Determination of distribution function, survival function and force of mortality.
12. Construction of multiple decrement table for random survivorship group.
13. Construction of select, ultimate and aggregate mortality.
14. Calculation of p.d.f. and distribution function of aggregate claims.

Note: The question paper consists of TWO sections. Section A Consists of 2 Questions from Section A of Practical paper V and Section B consists of 2 questions from Section B of Practical paper V.

Osmania University
B.A/B.Sc. III Year V Semester (CBCS): Statistics Syllabus

(With Mathematics Combination)

(Examination at the end of III Year V Semester)

Practical Paper-VI: MS - EXCEL

(with 2 HPW, Credits 1 and 25 Marks)

Section – A

Time Series Analysis

1. Measurement of trend by method of least squares and moving averages.
2. Determination of seasonal indices by the method of Ratio to moving averages.
3. Determination of seasonal indices by the method of Ratio to trend.
4. Determination of seasonal indices by the method of link Relatives.

Demand Analysis

5. Construction of Lorenz curve.
6. Fitting of Pareto law to an income data.

Section – B

Statistical Quality Control

1. Construction of $\bar{x}$, **R** and **σ**- charts.
2. Construction of p and np charts with fixed n.
3. Construction of p and np charts with varying n.
4. Construction of c and u charts.

Index Numbers

5. Base shifting, splicing and Deflation.

Note 1 : Training shall be on establishing formulae in Excel cells and deriving the results. The excel output shall be exported to MSWord for writing inferences.

Note 2 : The question paper consists of TWO sections. Section A Consists of 2 Questions and Section B consists of 2 questions respectively.

Osmania University
B.A/B.Sc. III Year VI Semester (CBCS): Statistics Syllabus
(With Mathematics Combination)
(Examination at the end of III Year V Semester)
SEC-3: Big Data Analysis
(2 HPW with 2 Credits and 50 Marks)

UNIT I

The Rise of Big Data: What is Big Data and why does it matter; Web Data: The original Big Data; The cross section of Big Data and the value they hold;

UNIT II

Taming Big Data: The Technologies, Process and Methods: The Evolution of Analytic Scalability, The Evolution of Analytic Process, The Evolution of Analytic Tools and Methods.

Text Book:

1. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012. (Chapters 1 to 6).

Reference Books:

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.

2. Glenn J. Myatt, "Making Sense of Data", John Wiley & Sons, 2007

3. Pete Warden, "Big Data Glossary", O'Reilly, 2011.

Note: Theory paper is for 40 Marks and Internal is 10 Marks

Osmania University
B.A/B.Sc. III Year: Statistics Syllabus
(Generic Elective-GE-1)
(Examination at the end of III Year, Semester V)
GE – 1 –Basic Statistics-1(with 2 HPW, Credits 2 and Marks 50).

UNIT–I

Origin, Importance and growth of Statistics, Collection and tabulation of data.Frequency distribution.Graphical and Pictorial representation of data. Measures of central tendency: Mean, Median and Mode their merits and demerits with examples. Partition Values: Quartiles, Deciles and percentiles and examples.

Measures of dispersion: Range and standard deviation, coefficient of variation. Central and non-Central moments, coefficient of Skewness and Kurtosis, Examples.

Unit - II

Review of permutations and combinations. Deterministic and random experiment, Sample space, event mutually exclusive, equally likely and independent events with examples. Mathematical, Statistical and axiomatic definition of probability, Addition theorem, conditional probability and multiplication theorem of probability. Statistical independence and Bayes theorem –simple examples (all theorems without proofs and only statements).

List of reference books:

1. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi
2. GoonAM,GuptaMK,Das Gupta B : Fundamentals of Statistics , Vol-I, the World Press Pvt.Ltd., Kolakota.
3. Charles M.Grinstead and Laurie Snell, J: Introduction to Probability, American Mathematical Society

Note: Theory paper is for 40 Marks and Internal is 10 Marks

OsmaniaUniversity
B.A/B.Sc. III Year VI Semester (CBCS): Statistics Syllabus

(With Mathematics Combination)

(Examination at the end of III Year VI Semester)

Paper-VII: Design of Experiments, Vital Statistics, Official Statistics and Business Forecasting (DSC-2F)

(3 HPW with 3 Credits and 75 Marks)

Unit –I

Analysis of Variance and Design of Experiments : Concept of Gauss-Markoff linear model with examples, statement of Cochran's theorem, ANOVA – one-way, two-way classifications with one observation per cell Expectation of various sums of squares, Statistical l analysis, Importance and applications of design of experiments.

Principles of experimentation: Analysis of Completely randomized Design (C.R.D), Randomized Block Design (R.B.D)

Unit –II

Latin Square Design (L.S.D) including one missing observation, expectation of various sum of squares. Comparison of the efficiencies of above designs.

Official Statistics: Functions and organization of CSO and NSSO. Agricultural Statistics, area and yield statistics. National Income and its computation, utility and difficulties in the estimation of national income.

Business Forecasting: Role of forecasting in Business, Steps in Forecasting, Methods of Forecasting, Choice of a method of Forecasting, Theories of Business Forecasting, Cautions while using Forecasting Techniques.

Unit – III

Vital statistics: Introduction, definition and uses of vital statistics. Sources of vital statistics, registration method and census method. Rates and ratios, Crude death rates, age specific death rate, standardized death rates, crude birth rate, age specific fertility rate, general fertility rate, total fertility rate. Measurement of population growth, crude rate of natural increase- Pearl's vital index. Gross reproductive rate sand Net reproductive rate, Life tables, construction and uses of life tables and Abridged life tables.

Reference Books:

1. V.K.Kapoor and S.C.Gupta : Fundamentals of Applied Statistics. Sultan Chand
2. ParimalMukhopadhyay : Applied Statistics . New Central Book agency.
3. M.R.Saluja : Indian Official Statistics. ISI publications.
4. B.L.Agarwal: Basic Statistics. New Age publications.
5. S.P.Gupta : Statistical Methods. Sultan Chand and Sons.
6. Pratirupa Sidhanthamulu – Telugu Academy. Prayoga Rachana and Visleshana – Telugu Academy.

Note: Theory paper is for 60 Marks and Internal is 15 Marks

Osmania University
B.A/B.Sc. III Year VI Semester (CBCS): Statistics Syllabus

(With Mathematics Combination)

(Examination at the end of III Year VI Semester)

Paper-VIII A: Operations Research (DSE-2F)

(3 Hours Per Week with 3 Credits and 75 Marks)

Unit –I

Operations Research: Meaning and scope of OR. Convex sets and their properties. Definition of general LPP. Formulation of LPP. Solution of LPP by graphical method. Statements of Fundamental theorem of LPP and other related theorems. Simplex algorithm.

Concept of artificial variables. Big –M /Penalty method and two-phase simplex methods. Concept of degeneracy and resolving it.

Unit –II

Concept of duality of LPP. Dual Primal relationship, Statement of Fundamental Theorem of Duality.

Definition of transportation problem, TPP as a special case of LPP, Initial basic feasible solutions by North-West Corner Rule, Matrix minimum method and VAM. Optimal solution through MODI tableau and stepping stone method for balanced and unbalanced transportation problem.

Unit –III

Degeneracy in TP and resolving it. Concept of Transshipment problem.
Formulation and description of Assignment problem and its variations. Assignment problem as special case of TP and LPP. Unbalanced assignment problem, optimal solution using Hungarian method and traveling salesman problem and its solution.
Problem of Sequencing. Optimal sequence of N jobs on two and three machines without passing.

Reference Books:

1. Kanti Swaroop, P.K.Gupta and ManMohan: Operations Research. Sultan Chand.
2. S.D. Sharma: Operations Research
3. J.K. Sharma: Operations Research Theory and Applications. Macmillan Publishers India LTD.
4. Parikriya Parishodhana - Telugu Academy.

Note: Theory paper is for 60 Marks and Internal is 15 Marks

OsmaniaUniversity
B.A/B.Sc. III Year VI Semester (CBCS): Statistics Syllabus

(With Mathematics Combination)

(Examination at the end of III Year VI Semester)

Paper-VIII B: Bio-Statistics - II (DSE-2F)

(3 HPW with 3 Credits and 75 Marks)

Unit –I

Survival Analysis: Survival functions and hazard rates. Types of censoring and likelihood in these cases. Life distributions - Exponential, Gamma, Weibull, Lognormal, and Pareto. Linear failure rate. Point estimation, confidence intervals, scores, likelihood ratio, MLE, tests for these distributions.

Unit –II

Life tables, failure rates, mean residual life and their elementary properties, Ageing classes and their properties, Bathtub failure rate. Estimation of survival function.

Acturial estimator, Kaplan-Meier estimator, estimation under the assumption of IFR/ DFR. Tests of exponentiality against nonparametric classes, total time on test.

Unit –III

Introduction to modern epidemiology, principles of epidemiological investigation, serveillance and disease monitoring in populations.

Epidemiologic measures: Organizing and presenting epidemiologic data, measures of disease frequency, measures of effect and association, causation and casual inference.

Design and analysis of epidemiologic studies. Types of studies, case-control studies, cohort studies, cross over design, regression models for the estimation of relative risk.

Meta –analysis, quantitative methods in screening.

Reference Books:

1. Cox.D.R. and Oakes.D (1984): analysis of survival data. Chapman and Hall.
2. Miller, R.G. (12981): Survival analysis. John wiley.
3. Anil gore and S.A.Paranjpe (2000). A course in mathematical and statistical ecology. Kulwer Academic Publishers.
4. Rielon E.C (1977): An introduction to Mathematical Ecology. Wiley.
5. J.F.Lawless: Statistical models and methods of life data. Wiley.
6. James F Crow and Motoo Kimura: An Introduction to Population Genetics Theory. Alpha edition.
7. Abraham M.Lilienfeld : Foundations of Epidemiology. Oxford University Press.

Note: Theory paper is for 60 Marks and Internal is 15 Marks

OsmaniaUniversity
B.A/B.Sc. III Year VI Semester (CBCS): Statistics Syllabus

(With Mathematics Combination)

(Examination at the end of III Year VI Semester)

Paper-VIII C: Actuarial Statistics - II (DSE-2F)

(3 HPW with 3 Credits and 75 Marks)

Unit –I

Elements of compound interest (nominal and effective rate of interest)

Life annuities: single payment, continuous life annuities, discrete life annuities, life annuities with monthly payments, communication functions.

Unit –II

Varying Life annuities, recursions and complete annuities- immediate and apportioable annuities –due.

Net premiums: Continuous and discrete premiums, true monthly payment premiums, apportionate premiums, commutation functions, and accumulation type benefits.

Unit –III

Net premium reserves: continuous and discrete net premium reserve, reserves on a semi continuous basis, reserves based on true monthly premiums, reserves on an apportionable or accounted continuous basis reserves at fractional durations.

Reference Books:

1. N.L.Bowers, H.U.Gerber, J.C.Hickman, D.A.Jones and C.J.Nesbitt (1986): Actuarial Mathematics, Society of Actuaries, Ithaca, Illinois,USA .
2. Neill,A.(1977): Life contingencies, Heineman.
3. Spurgeon E.T.(1972): Life contingencies, Cambridge University Press
4. Benjamin,B and Pollard,J.H(1980): Analysis of Mortality and other Actuarial Statistics.
5. Federation of Insurance Institutes study courses: mathematical basis of Life Assurance
8. F.I.21 (Published by Federation if Insurance Institutes, Bombay).

Note: Theory paper is for 60 Marks and Internal is 15 Marks

Osmania University

B.A/B.Sc. III Year VI Semester (CBCS): Statistics Syllabus

(With Mathematics Combination)

(Examination at the end of III Year VI Semester)

Practical Paper-VII: Theory Paper VII and Elective VIII A (DSC-2F)

(with 2 HPW, Credits 1 and Marks 25)

Section –A

1. Analysis of CRD
2. Analysis of RBD and Comparison of RBD with CRD with and without missing observation.
3. Analysis of RBD with one missing observation and computation of Critical Difference.
4. Analysis of LSD and Comparison of LSD with RBD with CRD.
5. Analysis of LSD with one missing observation and computation of Critical Difference.
6. Computation of Morality rates and Fertility rates and Construction of complete life tables.

Section –B

7. Solution of L.P. problem by simplex method and reading the solution of the dual problem from Optimal Simplex table.
8. Solution of L.P. problem by Big-M Method.
9. Two-phase simplex method.
10. IBFS for a transportation problem by North-West corner rule, Matrix minimum method and Vogel's approximation method and also Optimum solution to balanced and unbalanced transportation problem by MODI method.
11. Optimum solution to balanced and unbalanced Assignment problem by Hungarian method and also Solution of traveling salesman problem.
12. Computation of Optimal Sequence and idle time for N jobs on 2 and 3 machines.

Note: The question paper consists of TWO sections. Section A Consists of 2 Questions from Section A of Practical paper VII and Section B consists of 2 questions from Section B of Practical paper VII.

Osmania University

B.A/B.Sc. III Year VI Semester (CBCS): Statistics Syllabus

(With Mathematics Combination)

(Examination at the end of III Year VI Semester)

Practical Paper-VII: Theory Paper VII and Elective VIII B (DSC-2F)

(with 2 HPW, Credits 1 and Marks 25)

Section –A

1. Analysis of CRD
2. Analysis of RBD and Comparison of RBD with CRD with and without missing observation.
3. Analysis of RBD with one missing observation and computation of Critical Difference.
4. Analysis of LSD and Comparison of LSD with RBD with CRD.
5. Analysis of LSD with one missing observation and computation of Critical Difference.
6. Computation of Morality rates and Fertility rates and Construction of complete life tables.

Section –B

7. Parameter estimation in exponential and Weibull distributions—Type-I, Type-II censoring.
8. LR tests for exponential and Weibull distribution.
9. Actuarial method of estimation.
10. Kaplan-Meier estimator.
11. Fitting bathtub shaped hazard function.
12. Risk difference, risk ratio and odd ratio.
13. Cox Regression.

Note: The question paper consists of TWO sections. Section A Consists of 2 Questions from Section A of Practical paper VII and Section B consists of 2 questions from Section B of Practical paper VII.

Osmania University

B.A/B.Sc. III Year VI Semester (CBCS): Statistics Syllabus

(With Mathematics Combination)

(Examination at the end of III Year VI Semester)

Practical Paper-VII: Theory Paper VII and Elective VIII C (DSC-2F)

(with 2 HPW, Credits 1 and Marks 25)

Section –A

1. Analysis of CRD
2. Analysis of RBD and Comparison of RBD with CRD with and without missing observation.
3. Analysis of RBD with one missing observation and computation of Critical Difference.
4. Analysis of LSD and Comparison of LSD with RBD with CRD.
5. Analysis of LSD with one missing observation and computation of Critical Difference.
6. Computation of Morality rates and Fertility rates and Construction of complete life tables.

Section –B

7. Computation of compound interest (nominal and effective rate of interests).
8. Annuities and annuity dues.
9. Computation of discrete and continuous net premiums.
10. Annuities payable more frequently than one year.
11. Complete and special annuities.
12. Office premium
13. Assurances payable at the moment of death.

Note: The question paper consists of TWO sections. Section A Consists of 2 Questions from Section A of Practical paper VII and Section B consists of 2 questions from Section B of Practical paper VII.

Osmania University

B.A/B.Sc. III Year VI Semester (CBCS): Statistics Syllabus

(With Mathematics Combination)

(Examination at the end of III Year VI Semester)

Practical Paper-VIII: (Practical using MS-Excel and TORA) (DSC-2F)

(with 2 HPW, Credits 1 and Marks 25)

Section –A

Designs of Experiments

1. Analysis of CRD
2. Analysis of RBD with and without missing observation. Comparison of RBD with CRD
3. Analysis of LSD with and without missing observation. Comparison of LSD with RBD and CRD

Vital Statistics

4. Computation of Morality rates, Fertility rates and Reproduction rates.
5. Construction of life tables and abridged life tables.

Section –B (TORA)

Operations Research

1. Solution of L.P. problem by Graphical method.
2. Solution of L.P. problem by simplex method.
3. Solution of L.P. problem by Big-M and two-phase simplex method.
4. Optimum solution to balanced and unbalanced transportation problem using North-West corner rule, Matrix minimum method and Vogel's approximation method for IBFS.
5. Solution of Assignment problem for both maximization and minimization
6. Solution of travelling salesman problem.
7. Computation of Optimal Sequence and idle time for N jobs on 2 and 3 machines.

Note 1 : Training shall be on establishing formulae in Excel cells and deriving the results. The excel output shall be exported to MSWord for writing inferences.

Note 2 : The question paper consists of TWO sections. Section A Consists of 2 Questions and Section B consists of 2 questions respectively.

Osmania University
B.A/B.Sc. III Year VI Semester (CBCS): Statistics Syllabus
(With Mathematics Combination)
(Examination at the end of III Year VI Semester)
SEC-4: Statistical Techniques in Data Mining
(2 HPW with 2 Credits and 50 Marks)

UNIT-I

Introduction: Introduction to Data mining, The nature of Data sets, Types of structure, Models and patterns, Data mining Tasks, components of data mining algorithms, The Interacting roles of Statistics and Data mining, Data mining: Dredging, snooping and fishing.

Data mining: Definitions, KDD vs Data mining, DBMS vs DM, other related areas, DM Techniques, other mining problems, Issues and challenges in Data mining,

Association Rules: What is an association rule, methods to discover association rules; Apriori Algorithm, Partition Algorithm

UNIT-II

Association Algorithms: Dynamic Item Set Counting Algorithm, FP Tree growth algorithm.

Clustering Algorithms: Introduction, Clustering Paradigm, K-Medoid Algorithm, DBSCAN

Classification Algorithms: Introduction, Nearest Neighbor methods

Decision tree Algorithms: Introduction, Pruning technique.

Reference Books:

1. David Hand, Heikki Manila and Padhraic Smyth (2012): Principles of Data Mining, PHI, New Delhi, (Text Book: Ch. 1, Ch. 2, Ch. 10.6)
2. Arun K Pujari (2013): Data Mining Techniques, University Press Inia private Ltd. Third Edition. (T.B-2: (T.B.2: Ch 5.4, 5.8, Ch. 6.18).

Note: Theory paper is for 40 Marks and Internal is 10 Marks

Osmania University
B.A/B.Sc. III Year: Statistics Syllabus
(Generic Elective-GE-2)
(Examination at the end of III Year, Semester VI)
GE – 2 –Basic Statistics-2 (with 2 HPW, Credits 2 and Marks 50).

Unit - I

Definition and sample examples of random variables and distribution function, probability mass function and probability density function. Mathematical expectation and moments-simple examples.

Discrete probability distributions: Bernoulli, Binomial, Poisson. (Concept, definition, statements of mean and variance only) with real life examples.

Continuous probability distributions: Uniform, Normal and Exponential distributions (concept, definition, statements of mean, variance and other properties).

Unit - II

Empirical bivariate distributions, Covariance, Karl Pearson coefficient, Rank Correlation, Curve fitting byleast squares principle. Simple linear regression.

Concept and definition of population, parameter, sample, statistic, sampling distribution and standard error.

Properties of Estimates: Unbiasedness, Consistency and Efficiency (concept and definition only), simple examples.

Concept of testing Statistical hypothesis-Definition of Null and Alternative hypothesis, Critical region, Types of errors, level of Significance and Power of a Test.

Tests of significance based on Chi-Square, t and F distributions and ANOVA (One and Two way) with examples (No mathematical derivation only methodology).

List of reference books:

1. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi
2. GoonAM,GuptaMK,Das Gupta B : Fundamentals of Statistics , Vol-I, the World Press Pvt.Ltd.,Kolakota.
3. Charles M.Grinstead and Laurie Snell.J: Introduction to Probability, American Mathematical Society

Note: Theory paper is for 40 Marks and Internal is 10 Marks