UNIVERSITY OF JAMMU

Syllabus and Courses of Study in Statistics for B. Sc./B.A. (Semester III) Under CBCS For the Examination to be held in December 2017, 2018 and 2019

Paper Code: USTTC 301   **Title: STATISTICAL INFERENCE**

Credits: 4

Total Marks: 100

Internal Test: 20(1 Hour)

End semester Exam: 80($2\frac{1}{2}$Hours)

Objectives: The main objectives of this course is to provide knowledge to the students about the theory of estimation, obtaining estimates of unknown parameters using different methods, testing of Hypothesis, Test of significance and use of non-parametric test in the situations where parametric tests are not applicable.

Unit-I

The concept of sampling distribution, standard error and its significance, sampling distribution of Chi Square, t and F with derivations, properties of these distributions and their inter relations.

Unit-II

Estimation: Problem of estimation; point estimation, interval estimation, criteria for a good estimator, unbiasedness, consistency, efficiency and sufficiency with examples. Method of moments and maximum likelihood and application of these method for obtaining estimates of parameters of binomial, Poisson and normal distributions, properties of M.L.E's (without proof), merits and demerits of these methods.

Unit-III

Testing of Hypothesis: Statistical hypothesis, Null and alternative hypothesis, simple and composite hypothesis, two types of error, critical region, power of test, level of significance. Best Critical Region, NP Lemma, its applications to find most powerful in case of binomial. Poisson and normal distributions.

Unit IV

Small sample tests based on t, F and Chi-square distribution and test based on normal distribution, confidence interval for single mean, difference of means and variance (only for normal case)confidence interval for single mean, difference of means and variance (only for normal case). Test of significance for large samples for attributes and variable, proportions and means, single sample, two samples (both paired and independent).

Unit V

Non- parametric tests: Concept of Non-parametric tests, advantages of Non-parametric tests over parametric tests. Sign test for single sample and two sample problems (for paired and independent samples), Wilcoxon-signed rank test, Mann-Whitney U-test, run test. Median test and test for independence based on Spearman's rank correlation.

EVALUATION/EXAMINATION PATTERN/NOTE FOR PAPER SETTING
(*EXCEPT FOR SKILL BASED COURSES*)

(a) Internal Assessment Test: **Time Duration-1 Hour**
(20 Marks)

Section A-   **5 Very Short Answer questions of 2 marks each to be attempted**
(10 marks)   **from 8 given questions covering 50% of the syllabus, set across all**
          Units(atleast 2) covered.

Section B-   **1 Long Answer question of 10 marks to be attempted out of 2**
(10 marks)   **given questions set from at least two different units of the 50%**
          syllabus covered.

(b)External End Semester University Examination: **Time Duration--$2\frac{1}{2}$ Hours**
(80 Marks)

Section A-   **5 Short Answer compulsory questions representing all units/syllabi**
(15 marks)   **i.e., at least one from each unit having 70-80 words answer/**
          attempted in about 6 minutes and of 3 marks each with atleast one
          question set from each Unit.

Section B-   **5 Medium Answers compulsory questions representing all units/syllabi**
(35 marks)   **i.e., at least one from each unit having 250-300 words answer/attempted**
          in about 12 minutes and of 7 marks each with at least one question set
          from each Unit .

Section C-   **2 Long Answer Questions of 15 marks each to be attempted from**
(30 marks)   **4 given questions set from/across(covering) all units of the**
          Syllabus having 500-600 words/attempted in 30 minutes.

Books Recommended

1. Goon, Gupta and Dass Gupta: An outline of statistical inference, Vol-II

2. H.C. Saxena; Statistical inference.

3. Gibbons, J.D.: Non-parametric statistical inference.

4. Kendall and Stuart: The advanced theory of statistics Vol-II

5. Connor W.J.: Practical Non-parametric Inference

6. Hogg.V. and Craig A.T.: Introduction of Mathematical Statistics.

7. Mood and Graybill: An introduction to theory of Statistics.

8. Srivastava and Srivastava: Statistical Inference: Testing of Hypothesis.

9. Gupta, R.K. and Hakak, A.K.: An Introduction to Statistics.

Paper Code: USTPC 302   **Title: Statistical Computing-III**

Credits: 2   **Total Marks: 50**
                                  Internal : 25
                                  External: 25(Exam: 20   Viva-Voce: 05)

Objectives: The objective of the course is to expose the students to the real life applications of Statistical Tools.

There shall be atleast twenty computing exercises covering the applications of Statistics based on the entire syllabus of course USTTC301.

Practical Examination/Evaluation

(a) <u>Internal-   25 Marks</u>

    Components: Attendance- 5 marks

                  Viva Voce-   5 marks

                  Day to day Performance/Practical Work- 10 Marks

                  Internal Test(before semester end)- 5 marks

(b) <u>External- 25 Marks</u>

    Components: External Test(Semester End)- 20 marks

                 Viva Voce-   5 marks.

III SEMESTER

Paper Code: USTPS 303   **Title: Computational Statistics(Software)-1**

Credits: 4   **Total Marks: 100**
                                                    Internal 1 : 40(2 Hrs)
                                                    Internal Final: 60(3 hrs)

Objectives: The objective of the course is to expose the students to the real life skills for statistical computing, analysis and graphical interpretation using Software skills.

Course: Introduction to Computers: Historical evolution of computers, Generations of Computers, Classification of Computers, Hardware : CPU, I/O Devices, Block diagram.

Windows : The user Interface, The Desk Top, The Task Bar, The Control Panel, The Find Features, Properties, Font Management, Systems Tools, Character Map, Note Pad, The My Computer ICON, Folders, Short-Cuts.

Word Processing : Creating and Saving a document, Editing the text; Printing , saving and importing Documents, Basics of Excel, Data Entry. Built in functions in Excel.

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, box plot and stem-leaf. Measures of central tendency, Partition Values and Measures of dispersion.

Hands on training on the problems related to all topics above can be done on any one of the statistical software to enhance data analysis skills using software.

EVALUATION/EXAMINATION PATTERN/NOTE FOR PAPER SETTING

(*FOR SKILL BASED COURSES*)

Theory Cum Practical Skill Evaluation

(a) Internal Mid Semester Test: **Time Duration-2 Hours**
   (40 Marks)

Two long answer type exercises of 15 marks each to be attempted out of Three exercises using computational facilities and Five short answer type theoretical questions of 2 marks each are to be set with no choice.

(b)Internal End Semester Examination: **Time Duration- 3 Hours**
   (60 Marks)

Three long answer type exercises of 15 marks each to be attempted out of Four exercises using computational facilities and Five short answer type theoretical questions of 3 marks each are to be set with no choice.

Books Recommended:

V Rajaraman: **Fundamentals of Computers**. PHI.

 S Cashman: **Discovering Computer and MS office 2013**. Cengage Learning.

Sanders, H.D.: **Computer Today**. Mc Graw Hill.

Rusen and Ballew : **Windows 8.1 Step by Step**. Microsoft Press.

S P Gupta: **Statistics**, S Chand and Co.

Levine, Stephan and Szabat: **Statistics for managers using MS Excel**. Pearson.

 Andy Field: **Discovering Statistics Using SPSS**. Sage publications.

Conard Carlberg (2011): **Statistical Analysis**, Pearsons Education, Inc.

 Gopal K. Kanji (2006): **100 Statistical Tests**, 3rdEd., Sage Publication.

 Brend Held (2007): **Microsoft Excel Functions and Formulas**, Wordware Publishing, Inc.

 D. Remenyi, G. Onofrei, J. English (2011) :**An Introduction Statistics using Microsoft Excel**, Academic Publishing Limited.

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

Note: The practical/hands on training for the academic semester should not be less than 50 Hours and for related theoretical concepts and their applications should be atleast 10 Hours.

Scheme of Examination(Except Skill based Courses)

The 20% of the marks allotted to each theory paper and 50% of the marks allotted to each practical paper including field work, wherever prescribed, shall be reserved for internal assessment. The evaluation of a candidate shall be awarded and record thereof maintained in accordance with the Regulations prescribed for the purpose under the CBCS as per the following:

THEORY	Syllabus to be covered in the examination	Time allotted	% Weightage (Marks)
Internal Assessment Test (**Pattern**: As proposed by the concerned BOS and approved by Academic Council)	Upto 50%(after 45 days)	1 hour	20
External End Semester University Exam (**Pattern**: As proposed by the concerned BOS and approved by Academic Council)	Upto 100%(after 90 days)	$2\frac{1}{2}$ hours	80
Total			**100**
PRACTICAL			
Daily evaluation of practical records/Viva voce/attendance etc.			50(**25 marks**)(including 20% for attendance, 20% for Viva-voce, 20% for internal test and 40% for day to day performance)
Final Practical Performance + viva voce (External Examination)	100% Syllabus		50 (**25 marks**) 40 External Test 10 viva-voce
Total			**100**

Scheme of Examination(for Skill based Courses)

The 20% of the marks allotted to each skill based paper shall be reserved for internal assessment test -1 . The evaluation of a candidate shall be awarded and record thereof maintained in accordance with the Regulations prescribed for the purpose under the CBCS as per the following:

THEORY CUM PRACTICAL	Syllabus to be covered in the examination	Time allotted	% Weightage (Marks)
Internal Assessment Test-1 (**Pattern**: Two long answer type exercise of 15 marks using computational facilities and Five short answer type theoretical questions of 2 mark each)	Upto 50%(after 45 days)	2 hour	40
Internal Final End Semester Exam (**Pattern**: Three long answer type exercises of 15 marks each using computational facilities and Five short answer type theoretical questions of 3 mark each)	100%Syllabus(after 90 days)	3 hour	60
Total			**100**

Syllabus and Courses of Study in Statistics for B. Sc./B.A. (Semester IV) Under CBCS For the Examination to be held in April-May 2018, 2019 and 2020

Paper Code: USTTC 401   **Title: SAMPLING AND DESIGN**
Credits: 4   **Total Marks: 100**
                                Internal Test: 20(1 Hour)
                                End semester Exam: 80($2\frac{1}{2}$Hours)

Objectives: To introduce the techniques of sampling designs and experimental designs for drawing inferences from data.

Unit- I

Complete enumeration Vs sample enumeration; advantages and disadvantages of sample survey, objectives of sampling, principal steps in a sample survey, limitations. of sampling, sampling and non sampling errors, types of sampling, probability sampling purposive sampling and mixed sampling, random numbers. Simple random sample from finite population, S.R.S. with & without replacement, estimation of mean and variance and their unbiasedness, merits and demerits of SRS.

Unit- II

Meaning of Stratification, Method of Stratified sampling and its advantages and disadvantages. Mean and Variance of Stratified sampling, Method of allocation: equal allocation, Proportional allocation, optimum allocation/Neyman allocation, comparison of stratified random sampling with SRS.

Unit- III

Systematic sampling, Cluster sampling with equal and unequal cluster sizes, estimation of mean and variance.

Unit- IV

Analysis of variance for one way and two way classification, basic principles of design of experiment, concept and analysis of completely randomized design, randomized block design, advantages and disadvantages of these design.

Unit- V

Concept and analysis of Latin square of design, one missing plot technique for RBD and LSD. Factorial experiments, their advantages, Factorial experiments for 2^2 and 2^3 design, main effects, interaction and their analysis.

(a) Internal Assessment Test: **Time Duration-1 Hour**
(20 Marks)

Section A-   **5 Very Short Answer questions of 2 marks each to be attempted**
(10 marks)   **from 8 given questions covering 50% of the syllabus, set across all**
                   Units(atleast 2) covered.

Section B-   **1 Long Answer question of 10 marks to be attempted out of 2**
(10 marks)   **given questions set from at least two different units of the 50%**
                   syllabus covered.

(b)External End Semester University Examination: **Time Duration--$2\frac{1}{2}$ Hours**
(80 Marks)

Section A-   **5 Short Answer compulsory questions representing all units/syllabi**
(15 marks)   **i.e., at least one from each unit having 70-80 words answer/**
                   attempted in about 6 minutes and of 3 marks each with atleast one
                   question set from each Unit.

Section B-   **5 Medium Answers compulsory questions representing all units/syllabi**
(35 marks)   **i.e., at least one from each unit having 250-300 words answer/attempted**
                   in about 12 minutes and of 7 marks each with at least one question set
                   from each Unit .

Section C-   **2 Long Answer Questions of 15 marks each to be attempted from**
(30 marks)   **4 given questions set from/across(covering) all units of the**
                   Syllabus having 500-600 words/attempted in 30 minutes.

Books Recommended

1. F.S. Choudhary and Daroga Singh: SamplingTheory

2. CochranW.J.: Sampling Technique

3. Sukhatme P.V. and Sukhatme B.V. :Sampling theory survey with applications.

4. Murty, M.N.: Sampling theory and methods

5. Honson and others: Sample survey methods and theory Vol-I

6. Gupta and Kapoor; Fundamental of applied Statistics.

7. Fisher, RA. ; Design of experiments

8. PanseV.G. and Sukhatme P.V. :Statistical methods of agricultural workers.

9. Umaraji, RR: Probability and Statistical methods.

10.Srivastava S.R; Applied statistics.

11.Goon, Gupta, Dass Gupta; Fundamentals of Statistics ,Vol-II.

12. Gupta, R.K. and Hakak, A.K.: An Introduction to Statistics.

IV SEMESTER

Paper Code: USTPC 402   Title: **Statistical Computing-IV**

Credits: 2   **Total Marks: 50**
                                  Internal : 25
                                  External: 25(Exam: 20   Viva-Voce: 05)

Objectives: The objective of the course is to expose the students to the real life applications Statistical Tools.

There shall be at least twenty computing exercises covering the applications of Statistics based on the entire syllabus of course USTTC401.

Practical Examination/Evaluation

(a) Internal-   25 Marks

   Components: Attendance- 5 marks

                   Viva Voce-   5 marks

                   Day to day Performance/Practical Work- 10 Marks

                   Internal Test(before semester end)- 5 marks

(b) External- 25 Marks

   Components: External Test(Semester End)- 20 marks

                   Viva Voce-   5 marks.

Paper Code: USTPS 403 **Title: Computational Statistics(Software)-2**
Credits: 4 **Total Marks: 100**
  Internal 1 : 40(2 Hrs)
  Internal Final: 60(3 Hrs)

Objectives: The objective of the course is to expose the students to the real life skills for statistical computing, analysis and graphical interpretation using Software skills.

Course: Concept and types of Data: Concepts of a statistical population and sample from a population; qualitative and quantitative data; nominal and ordinal data; cross sectional and time series data; discrete and continuous data; frequency and non- frequency data. Different types of scales - nominal, ordinal, ratio and interval.

Fitting of polynomials, exponential curves and plotting of probability distributions.

Correlation and regression, Testing of hypothesis: Basic concepts, t, z , f and Chi –square tests. Hands on training on the following problems can be done on any one of the statistical software to enhance data analysis skills using software:

(i) Fitting of Binomial, Poisson, Negative Binomial, Normal Distributions.
(ii) Applications of Chi-square, t , Z and F Distributions.
(iii) Calculation of correlation coefficient, Rank Correlation ,etc.
(iv) Fitting of polynomials and regression curves.
(v) Analysis of Variance: One way and Two way.

EVALUATION/EXAMINATION PATTERN/NOTE FOR PAPER SETTING

(*FOR SKILL BASED COURSES*)

Theory Cum Practical Skill Evaluation

(a) Internal Mid Semester Test: **Time Duration-2 Hours**
  (40 Marks)

Two long answer type exercises of 15 marks each to be attempted out of Three exercises using computational facilities and Five short answer type theoretical questions of 2 marks each are to be set with no choice.

(b)Internal End Semester Examination: **Time Duration- 3 Hours**
  (60 Marks)

Three long answer type exercises of 15 marks each to be attempted out of Four exercises using computational facilities and Five short answer type theoretical questions of 3 marks each are to be set with no choice.

Books Recommended:
Cooke, Cramer and Clarke: **Basic Statistical Computing**. Chapman and Hall
Levine, Stephan and Szabat: **Statistics for managers using MS Excel**. Pearson.

Andy Field: **Discovering Statistics Using SPSS**. Sage publications.

Gopal K. Kanji (2006): **100 Statistical Tests**, 3rdEd., Sage Publication.

Brend Held (2007): **Microsoft Excel Functions and Formulas**, Wordware Publishing, Inc.

D. Remenyi, G. Onofrei, J. English (2011) :**An Introduction Statistics using Microsoft Excel**, Academic Publishing Limited.

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

Note: The practical/hands on training for the academic semester should not be less than 50 Hours and for related theoretical concepts and their applications should be atleast 10 Hours.

General Scheme of Examination(Except Skill based Courses)

The 20% of the marks allotted to each theory paper and 50% of the marks allotted to each practical paper including field work, wherever prescribed, shall be reserved for internal assessment. The evaluation of a candidate shall be awarded and record thereof maintained in accordance with the Regulations prescribed for the purpose under the CBCS as per the following:

THEORY	Syllabus to be covered in the examination	Time allotted	% Weightage (Marks)
Internal Assessment Test (**Pattern**: One long answer type question of 10 marks and Five short answer type questions of 2 marks each)	Upto 50%(after 45 days)	1 hour	20
External End Semester University Exam (**Pattern**: As proposed by the concerned BOS and approved by Academic Council)	Upto 100%(after 90 days)	3 hour	80
Total			**100**
PRACTICAL			
Daily evaluation of practical records/Viva voce/attendance etc.			50(including 20% for attendance, 20% for Viva-voce and 60% for internal test and day to day performance)
Final Practical Performance + viva voce (External Examination)	100% Syllabus		50 40External Test 10 viva-voce
Total			**100**

Scheme of Examination(for Skill based Courses)

The 20% of the marks allotted to each skill based paper shall be reserved for internal assessment test -1 . The evaluation of a candidate shall be awarded and record thereof maintained in accordance with the Regulations prescribed for the purpose under the CBCS as per the following:

THEORY CUM PRACTICAL	Syllabus to be covered in the examination	Time allotted	% Weightage (Marks)
Internal Assessment Test-1 (**Pattern**: One long answer type exercise of 15 marks using computational facilities and Five short answer type theoretical questions of 1 mark each)	Upto 50%(after 45 days)	2 hour	40
Internal Final End Semester Exam (**Pattern**: Three long answer type exercises of 20 marks each using computational facilities and Five short answer type theoretical questions of 4 mark each)	100%Syllabus(after 90 days)	3 hour	60
Total			**100**

ESSENTIAL REQUIREMENTS IN COLLEGES FOR RUNNING SKILL BASED COURSES IN STATISTICS

1. **Soft lab (Statistics Laboratory) with Computing Facilites (Softwares like Minitab/MS Excel/ SPSS /STATISTICA etc.)) and having atleast 25 Computers .**

2. **Trained Staff having knowledge of Statistics and Statistical Softwares.**

3. **Invited lectures from Guest faculty/Experts in the fields of Computer and Statistical Softwares.**

4. **Training on use of Statistical Softwares for concerned faculty in the Department of Statistics, University of Jammu.**

Syllabus and Courses of Study in Statistics for B. Sc./B.A. (Semester V)
Under CBCS For the Examination to be held in
November-December 2018, 2019 and 2020

Paper Code: USTTE 501   Title: **APPLIED STATISTICS-1**

Credits: 4   **Total Marks: 100**

                                                  Internal Test: 20(1 Hour)

                                                  End semester Exam: $80(2\frac{1}{2}$ Hours)

Objectives: The main objective of this course is to provide knowledge to the students about applied statistics such as Demographic methods, Economic statistics, Time series analysis and Econometrics

Unit-I

Demographic Methods: Source of demographic data-census, register, adhoc survey, hospital records, demographic profiles of Indian census, Measurement of mortality and life table-crude death rates, infant mortality rate, measurement of fertility-crude birth rates, general fertility rate, total fertility rate gross reproduction rate, net reproduction rate.

UNIT-II

Economic Statistics; Index number its definition, application of index number, price relative quantity or volume relative, link and chain relative problem involved in computational of index numbers, use of averages, simple aggregative and weighted averages methods. Laspeyre's, Paache's and Fisher's index number, consumer price index.

Unit-III

Static laws of demand and supply, price elasticity of demand, analysis of income and allied size distribution, Pareto distribution, graphical test, fitting of pareto law, log-normal distribution and its properties, Lorenz curve and Gini's Coefficients.

Unit-IV

Time series Analysis:- Economic time series, its components, illustration, additive and multiplicative models, determination of trend, analysis of seasonal fluctuations, construction of seasonal indices. Logistic and Modified exponential growth curves.

Unit-V

Econometrics: Definition, scope and goals of econometrics; specification of the model; variables in mathematical form of the model, simple Regression. Analysis, stochastic and

non-stochastic of relation, Estimation Regression. Parameters, Least square estimation and its properties. BLUE.

EVALUATION/EXAMINATION PATTERN/NOTE FOR PAPER SETTING

(*EXCEPT FOR SKILL BASED COURSES*)

(a) Internal Assessment Test: **Time Duration-1 Hour**
   (20 Marks)

Section A-   **5 Very Short Answer questions of 2 marks each to be attempted**
(10 marks)   **from 8 given questions covering 50% of the syllabus, set across all**
                Units(atleast 2) covered.

Section B-   **1 Long Answer question of 10 marks to be attempted out of 2**
(10 marks)   **given questions set from at least two different units of the 50%**
                syllabus covered.

(b)External End Semester University Examination: **Time Duration--$2\frac{1}{2}$ Hours**
   (80 Marks)

Section A-   **5   Short Answer compulsory questions representing all units/syllabi**
(15 marks)   **i.e., at least one from each unit having 70-80 words answer/**
                attempted in about 6 minutes and of 3 marks each with atleast one
                question set from each Unit.

Section B-   **5 Medium Answers compulsory questions representing all**
 (35 marks)   **units/syllabi   i.e., at least one from each unit having 250-300 words**
                answer/attempted in about 12 minutes and of 7 marks each with at
                least one question set from each Unit .

Section C-   **2 Long Answer Questions of 15 marks each to be attempted from**
(30 marks)   **4 given questions set from/across(covering) all units of the**
                Syllabus having 500-600 words/attempted in 30 minutes.

Books Recommended

1. Croxton F.E. and Cowden D.J. (1969); Applied general Statistics, Prentice Hall of

India.

2. Goon A.M. Gupta M.K. Das Gupta B. (1986): Fundamentals of Statistics, Vol. II,

World Press Calcutta.

3. Guide of current Indian official Statistics: Central Statistical Organization, Govt. of

India, New Delhi.

4. Saluja M.P. Indian official Statistical systems. Statistical Publishing Society,

Calcutta.

5. Kapoor,V.K. and Gupta, S.C: Fundamentals of Applied Statistics.

V SEMESTER

Paper Code: USTPE 502   **Title: Statistical Computing-V**

Credits: 2   **Total Marks: 50**
                            Internal : 25
                            External: 25(Exam: 20   Viva-Voce: 05)

Objectives: The objective of the course is to expose the students to the real life applications of Statistical Tools.

There shall be at least fifteen computing exercises covering the applications of Statistics based on the entire syllabus of course **USTTC 501**

Practical Examination/Evaluation

(a) Internal-   25 Marks

   Components: Attendance- 5 marks

          Viva Voce-   5 marks

          Day to day Performance/Practical Work- 10 Marks

          Internal Test(before semester end)- 5 marks

(b) External- 25 Marks

   Components: External Test(Semester End)- 20 marks

          Viva Voce-   5 marks.

Paper Code: USTPS 503　　　　　　　**Title: Research Methodology**

Credits: 4　　　　　　　　　　　　**Total Marks: 100**
　　　　　　　　　　　　　　　　　　　Internal 1 : 40(2 Hrs)
　　　　　　　　　　　　　　　　　　　Internal Final: 80(3 Hrs)

Objectives: The objective of the course is to expose the students to the real life skills for 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.

Course: 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 problem.

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. Collection and Scrutiny of Data: Primary data - designing a questionnaire and a schedule; checking their consistency. Secondary data - its major sources including some government publications. Complete enumeration, controlled experiments, observational studies and sample surveys. Scrutiny of data for internal consistency and detection of errors of recording. Ideas of cross-validation.

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.

EVALUATION/EXAMINATION PATTERN/NOTE FOR PAPER SETTING

(*FOR SKILL BASED COURSES*)

Theory Cum Practical Skill Evaluation

(a) Internal Mid Semester Test:　　　　　　　**Time Duration-2 Hours**
　　　(40 Marks)

Two long answer type exercises/questions of 15 marks each to be attempted out of Three exercises/questions and Five short answer type theoretical questions of 2 marks each are to be set with no choice.

(b)Internal End Semester Examination:　　　　　**Time Duration- 3 Hours**
　　　(60 Marks)

Three long answer type exercises of 15 marks each to be attempted out of Four exercises using computational facilities and Five short answer type theoretical questions of 3 marks each are to be set with no choice.

REFERENCES:

1. Kothari, C.R. (2004): Research Methodology: Methods and Techniques, 2nd Revised Edition, New Age International Publishers.

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

3. Gupta,S.P.: Statistical Methods

Scheme of Examination(Except Skill based Courses)

The 20% of the marks allotted to each theory paper and 50% of the marks allotted to each practical paper including field work, wherever prescribed, shall be reserved for internal assessment. The evaluation of a candidate shall be awarded and record thereof maintained in accordance with the Regulations prescribed for the purpose under the CBCS as per the following:

THEORY	Syllabus to be covered in the examination	Time allotted	% Weightage (Marks)
Internal Assessment Test (**Pattern**: As proposed by the concerned BOS and approved by Academic Council)	Upto 50%(after 45 days)	1 hour	20
External End Semester University Exam (**Pattern**: As proposed by the concerned BOS and approved by Academic Council)	Upto 100%(after 90 days)	$2\frac{1}{2}$ hours	80
Total			**100**
PRACTICAL			
Daily evaluation of practical records/Viva voce/attendance etc.			50(**25 marks**)(including 20% for attendance, 20% for Viva-voce, 20% for internal test and 40% for day to day performance)
Final Practical Performance + viva voce (External Examination)	100% Syllabus		50 (**25 marks**) 40 External Exam 10 viva-voce
Total			**100**

Scheme of Examination(for Skill based Courses)

The 20% of the marks allotted to each skill based paper shall be reserved for internal assessment test -1 . The evaluation of a candidate shall be awarded and record thereof maintained in accordance with the Regulations prescribed for the purpose under the CBCS as per the following:

THEORY CUM PRACTICAL	Syllabus to be covered in the examination	Time allotted	% Weightage (Marks)
Internal Assessment Test-1 (**Pattern**: Two long answer type exercise of 15 marks using computational facilities and Five short answer type theoretical questions of 2 mark each)	Upto 50%(after 45 days)	2 hour	40
Internal Final End Semester Exam	100%Syllabus(after 90	3 hour	60

(**Pattern**: Three long answer type exercises of 15 marks each using computational facilities and Five short answer type theoretical questions of 3 mark each)	days)		
Total			**100**

Syllabus and Courses of Study in Statistics for B. Sc./B.A. (Semester VI) Under CBCS For the Examination to be held in May 2019, 2020 and 2021

Paper Code: USTTE 601   **Title: APPLIED STATISTICS-II**

Credits: 4   **Total Marks: 100**

                                              Internal Test: 20(1 Hour)

                                              End semester Exam: 80($2\frac{1}{2}$Hours)

Objectives: The main objective of this course is to provide knowledge to the students about statistical quality control and computational techniques of Numerical Analysis and LPP

Unit- I

Indian applied statistical system; Present official statistical system in India, Method of collection of official statistics, Role and Functions of MOSPI, ESO, NSSO and Directorate of Economics and Statistics of J&K Government. Importance of statistical methods in industrial research and practice, types of inspections, determination of tolerance limits.

Unit- II

General theory of control charts,' cause of variation in quality, control limits, sub-grouping, summary of out of control and criteria charts for attributes, np-chart, p-chart, c-chart, charts for variables: mean and Range - Charts, design of mean and Range charts versus P charts, process capability studies.

Unit- III

Principle of acceptance sampling:- Problem of lot tolerance, stipulation of good and bad lots, producers and consumer risks, single and double sampling plans their OC functions, concept of AOL, LTPD, AOOL, average amount of inspection and ASN function. Rectifying inspection plan, Sampling Plan, Concept of 6- limits.

Unit- IV

Computational technique: difference table and method of interpolation, Newton and Langrange's method of interpolation, divided difference, numerical differentiation and integration, Trapezodial rule, simpson 1/3 and 3/8 rule.

Unit-V

Linear Programming: elementary theory of convex set, definition of general LPP, Formulation problem of LPP. Example of LPP, problem occurring in various fields, graphical and simplex method of solving an LPP, artificial variable, duality of LPP.

EVALUATION/EXAMINATION PATTERN/NOTE FOR PAPER SETTING
(*EXCEPT FOR SKILL BASED COURSES*)

(a) Internal Assessment Test: Time Duration-1 Hour
(20 Marks)

Section A-   5 Very Short Answer questions of 2 marks each to be attempted
(10 marks)   from 8 given questions covering 50% of the syllabus, set across all
                     Units(atleast 2) covered.

Section B-   1 Long Answer question of 10 marks to be attempted out of 2
(10 marks)   given questions set from at least two different units of the 50%
                     syllabus covered.

(b)External End Semester University Examination: Time Duration--$2\frac{1}{2}$ Hours
(80 Marks)

Section A-   5   Short Answer compulsory questions representing all units/syllabi
(15 marks)   i.e., at least one from each unit having 70-80 words answer/
                     attempted in about 6 minutes and of 3 marks each with atleast one
                     question set from each Unit.

Section B-   5 Medium Answers compulsory questions representing all units/
(35 marks)   syllabi i.e., at least one from each unit having 250-300 words
                     answer/attempted in about 12 minutes and of 7 marks each with at
                     least one question set from each Unit .

Section C-   2 Long Answer Questions of 15 marks each to be attempted from
(30 marks)   4 given questions set from/across(covering) all units of the
                     Syllabus having 500-600 words/attempted in 30 minutes.

Books Recommended

1. Brownlee K.A. (1960): Statistical Theory and Methodology in Science and
Engineering. John Wiley and sons
2. Grant E.L. (1964): Statistical quality control. McGraw Hill.
3. Duncan A.J. (1974); Quality control and Industrial Statistics. Taraporewala and
sons.
4. Gass S.I. (1975) Linear Progamming methods and applications. Mc Graw Hill.
5. Rajaraman, V (1981): Computer Oriented Numerical Methods. Prentice hall.
6. Sastry S.S. (1987) : Introductory methods of numerical analysis. Prentice hall
7. Taha H.A. (1989): Operation Research: An Introduction. Macmillan Publishing
Company.
Additional References
8. Broker H.A. and Liberman G.T. (1962): Engineering Statistics. Prentice Hall.

9. Cowden D.J (1960): Statistical Methods in Quality Control. Asia Publishing

Society.

10.Gavin W.W. (1960): Introduction to linear programming. Mc Graw Hill.

11.Mahajan M.2001): Statistical Quality Control. Dhanpat Rai and Co. (P)Ltd.

12.Rao S.S.(1984); Optimization Theory and Applications. Wiley Eastern.

13.Krishnamurthy E.V. and Sen S.K. (1976); Computer Based Numerical algorithms.

Afiliated East-West Press. .

VI SEMESTER

Paper Code: USTPE 602   **Title: Statistical Computing-VI**

Credits: 2   **Total Marks: 50**
                                 Internal : 25
                                 External: 25(Exam: 20   Viva-Voce: 05)

Objectives: The objective of the course is to expose the students to the real life applications of SQC and Computational techniques.

There shall be atleast fifteen computing exercises covering the applications based on the entire syllabus of course **USTTC 601.**

Practical Examination/Evaluation

(a) <u>Internal-   25 Marks</u>

   Components: Attendance- 5 marks

                  Viva Voce-   5 marks

                  Day to day Performance/Practical Work- 10 Marks

                  Internal Test(before semester end)- 5 marks

(b) <u>External- 25 Marks</u>

   Components: External Test(Semester End)- 20 marks

                  Viva Voce-   5 marks.

Paper Code: USTPS 603   **Title: Software Skills(Statistics)**

Credits: 4   **Total Marks: 100**
                                                     Internal 1 : 40(2 Hrs)
                                                     Internal Final: 60(3 Hrs)

Hands on training on the   problems related to all topics covered in previous semesters can be done using any one of the statistical software(Statistica, Minitab, R, SPSS etc.) to enhance data analysis skills using software. The topics covered should include real life case studies including social , economical, health and demography related data collection, tabulation, interpretation etc., using statistical tools of Central Tendency, Dispersion, diagrammatic and Graphical representation of Data, tests of hypothesis based on t, f, Chi square, Z etc ., Correlation, Regression, random sample generation, simulation, ANOVA techniques etc.

EVALUATION/EXAMINATION PATTERN/NOTE FOR PAPER SETTING
(*FOR SKILL BASED COURSES*)

Theory Cum Practical Skill Evaluation

(a) Internal Mid Semester Test: **Time Duration-2 Hours**
     (40 Marks)

Two   long answer type exercises of 15 marks each to be attempted out of Three   exercises using computational facilities and Five short answer type theoretical questions of 2 marks each are to be set with no choice.

(b)Internal End Semester Examination: **Time Duration- 3 Hours**
   (60 Marks)

 Three   long answer type exercises of 15 marks each to be attempted out of Four exercises using computational facilities and Five short answer type theoretical questions of 3 marks each are to be set with no choice.

Note: The practical/hands on training for the academic semester should not be less than 50 Hours and for related theoretical concepts and their applications should be atleast 10 Hours.

Scheme of Examination(Except Skill based Courses)

The 20% of the marks allotted to each theory paper and 50% of the marks allotted to each practical paper including field work, wherever prescribed, shall be reserved for internal assessment. The

evaluation of a candidate shall be awarded and record thereof maintained in accordance with the Regulations prescribed for the purpose under the CBCS as per the following:

THEORY	Syllabus to be covered in the examination	Time allotted	% Weightage (Marks)
Internal Assessment Test (**Pattern**: As proposed by the concerned BOS and approved by Academic Council)	Upto 50%(after 45 days)	1 hour	20
External End Semester University Exam (**Pattern**: As proposed by the concerned BOS and approved by Academic Council)	Upto 100%(after 90 days)	$2\frac{1}{2}$ hours	80
Total			**100**
PRACTICAL			
Daily evaluation of practical records/Viva voce/attendance etc.			50(**25 marks**)(including 20% for attendance, 20% for Viva-voce, 20% for internal test and 40% for day to day performance)
Final Practical Performance + viva voce (External Examination)	100% Syllabus		50 (**25 marks**) 40 External Exam 10 viva-voce
Total			**100**

Scheme of Examination(for Skill based Courses)

The 20% of the marks allotted to each skill based paper shall be reserved for internal assessment test -1 . The evaluation of a candidate shall be awarded and record thereof maintained in accordance with the Regulations prescribed for the purpose under the CBCS as per the following:

THEORY CUM PRACTICAL	Syllabus to be covered in the examination	Time allotted	% Weightage (Marks)
Internal Assessment Test-1 (**Pattern**: Two long answer type exercise of 15 marks using computational facilities and Five short answer type theoretical questions of 2 mark each)	Upto 50%(after 45 days)	2 hour	40
Internal Final End Semester Exam (**Pattern**: Three long answer type exercises of 15 marks each using computational facilities and Five short answer type theoretical questions of 3 mark each)	100%Syllabus(after 90 days)	3 hour	60
Total			**100**

ESSENTIAL REQUIREMENTS IN COLLEGES FOR RUNNING SKILL BASED COURSES IN STATISTICS

1. Soft lab (Statistics Laboratory) with Computing Facilites (Softwares like

Minitab/MS Excel/ SPSS /STATISTICA etc.)) and having atleast 25

Computers .

2. **Trained Staff having knowledge of Statistics and Statistical Softwares.**

3. **Invited lectures from Guest faculty/Experts in the fields of Computer and Statistical Softwares.**

4. **Training on use of Statistical Softwares for concerned faculty in the Department of Statistics, University of Jammu.**