

# PONDICHERRY UNIVERSITY

## DEPARTMENT OF STATISTICS



### SYLLABUS FOR M.Sc. 5 YEAR INTEGRATED STATISTICS (CBCS Pattern)

Effective from the Academic Year 2018-2019

**PONDICHERRY UNIVERSITY**  
**CHOICE BASED CREDIT SYSTEM**  
**SYLLABUS FOR THE M.Sc. 5 YEAR INTEGRATED STATISTICS COURSE**  
**Effective from the Academic Year 2015– 2016**

SEMESTER	COURSE CODE	TITLE OF THE COURSE	NATURE OF THE COURSE	NO. OF CREDITS
I	STAT 111	Basic Statistics	Hard Core	3
	STAT 112	Basic Probability Theory	Hard Core	3
II	STAT 121	Distribution Theory - I	Hard Core	3
	STAT 122	Applied Statistics	Hard Core	3
III	STAT 231	Distribution Theory - II	Hard Core	4
	STAT 232	Introduction to Sampling Theory	Hard Core	3
IV	STAT 241	Basic Estimation Theory	Hard Core	4
	STAT 242	Operations Research	Hard Core	3
	STAT 243	Practical – I (STAT 232 & STAT 241)	Hard Core	2
V	STAT 351	Elements of Testing Statistical Hypotheses	Hard Core	4
	STAT 352	Basic Regression Analysis	Hard Core	3
	STAT 353	Practical – II (STAT 351 & STAT 352)	Hard Core	2
VI	STAT 361	Principles of Experimental Design	Hard Core	3
	STAT 362	Elements of Statistical Quality Control	Hard Core	3
	STAT 363	Practical – III (STAT 361 & STAT 362)	Hard Core	2

**PONDICHERRY UNIVERSITY**  
**CHOICE BASED CREDIT SYSTEM**  
**SYLLABUS FOR THE M.Sc. INTEGRATED COMPUTER SCIENCE, MATHEMATICS**  
**COURSE**  
**Effective from the Academic Year 2015 – 2016**

SEMESTER	COURSE CODE	TITLE OF THE COURSE	NATURE OF THE COURSE	NO. OF CREDITS
I	STAT 111	Basic Statistics	Hard Core	3
	STAT 112	Basic Probability Theory	Hard Core	3
II	STAT 121	Distribution Theory - I	Hard Core	3
	STAT 122	Applied Statistics	Hard Core	3
III	STAT 231	Distribution Theory - II	Soft Core	4
	STAT 232	Introduction to Sampling Theory	Hard Core	3
IV	STAT 241	Basic Estimation Theory	Soft Core	4
	STAT 242	Operations Research	Hard Core	3
	STAT 243	Practical – I (STAT 232 & STAT 241)	Soft Core	2
V	STAT 351	Elements of Testing Statistical Hypotheses	Soft Core	4
	STAT 352	Basic Regression Analysis	Hard Core	3
	STAT 353	Practical – II (STAT 351 & STAT 352)	Soft Core	2
VI	STAT 361	Principles of Experimental Design	Soft Core	3
	STAT 362	Elements Statistical Quality Control	Soft Core	3
	STAT 363	Practical – III (STAT 361 & STAT 362)	Soft Core	2

## SEMESTER I

### STAT 111 - BASIC STATISTICS

CREDITS: 3

#### Unit I

Definition of statistics – Scope and limitations of statistics – Types of data – Nominal, Ordinal, Ratio, Interval scale data - Primary and Secondary data – Data presentation tools – One dimensional, two dimensional data presentation – line diagram – Box plots – stem and Leaf plots – Scatter plots

#### Unit II

Collection and presentation of data – summarizing data – frequency distribution – Measures of location – mean – median – mode – Percentiles - Simple problems.

#### Unit III

Measures of dispersion – Range – Quartile deviation – Mean deviation - Standard deviation – coefficient of variation – Moments about the origin and mean – Skewness, Kurtosis and their measures

#### Unit IV

Measures of association between attributes - coefficient of association and contingency; Measures of relation between two variables – correlation and Rank correlation – Kendall's Tau - Simple problems

#### Unit V

Partial and Multiple correlation coefficients (three variables only) – regression – Curve fitting by least squares – linear and quadratic

#### Text Books

1. Hooda.R.P.(2003): Statistics for Business and Economics , 3/e, Mac Millan .
2. Medhi.J. (1992): Statistical Methods an Introductory Text , Wiley Eastern Ltd.
3. Gupta.S.C. and Kapoor.V.K. (2000): Fundamentals of Mathematical Statistics , 10/e, Sultan Chand and sons.
4. Agarwal.B.L(1996): Basic statistics , 3/e, New Age International (P) Ltd.

#### Reference Books

1. Anderson.R, Sweeney.J and Williams.A (2002): Statistics for Business and Economics, 8/e, Thomson.
2. Guide to current Indian Official statistics – Central Statistical Organisation, Govt. of India.
3. Sheldon M.Ross (2006) : Introductory Statistics , 2/e, Elsevier Publications.
4. Murray R. Spiegel and Larry J. Stephens (2005): Schaum's Outline of Theory and Problems of Statistics, 3/e, Tata Mc Graw Hill Publishing Company Ltd, New Delhi.

## SEMESTER I

### STAT 112 - BASIC PROBABILITY THEORY

CREDITS: 3

#### Unit I

Events - Sample Space - Mathematical and Statistical definitions of Probability - Axiomatic definition of Probability – Addition and multiplication theorems - Conditional probability – Bayes' Theorem - Simple problems.

#### Unit II

Random variables - Discrete and Continuous - Distribution function and its properties - Expectation – Variance - Chebychev's inequality - Cauchy - Schwartz inequality

#### Unit III

Moment Generating function - Probability Generating function - characteristic function, its properties and uses.

#### Unit IV

Concept of Bivariate distributions - conditional and marginal distributions -Notion of Independence of Random variables - Conditional Expectation - Simple problems

#### Unit V

Definition of convergence in probability and distributions - Weak Law of Large numbers (WLLN) - Central Limit theorem for i.i.d case (statement only)

#### Text Books

1. Bansilal, Sanjay Arora and Sudha Arora (2006): Introducing Probability and Statistics, 2/e, Satya Prakashan Publications, New Delhi
2. Hogg, R.V. , Mc Kean J W and Craig, A.T.(2005): Introduction to Mathematical Statistics, 6/e Pearson Edition
3. Parzen E ( 1962):Modern Probability Theory and its applications, John Wiley and Sons

#### Reference Books

1. Gupta,S.C. and Kapoor, V.K. (2000): Fundamentals of Mathematical Statistics, 10/e, Sultan Chand and sons.
2. Bhat, B.R., Srivenkataramana, T and Rao Madhava, K.S. (1997): Statistics: A Beginner's Text, Vol. II New Age International (P) Ltd.
3. Goon, A.M., Gupta, M.K. and Das Gupta,B. (2001): Fundamentals of Statistics, Vol. II, World Press, Calcutta.
4. Mood, A.M., Graybill, F.A and Boes, D.C.(1974): Introduction to the Theory of Statistics, McGraw Hill.

## SEMESTER II

### STAT 121- DISTRIBUTION THEORY - I

CREDITS: 3

#### Unit I

Discrete Distributions: Definition, properties and simple problems of Bernoulli, Binomial - Poisson - Geometric – Discrete Uniform distributions - Power Series distributions

#### Unit II

Definition, properties and simple problems of Negative Binomial - Multinomial – Hypergeometric distributions

#### Unit III

Continuous Distributions: Definition, properties and simple problems of Uniform - Exponential - Normal distributions

#### Unit IV

Definition, properties and simple problems of Cauchy - Gamma (one and two parameters) - Beta distributions (First and Second kind)

#### Unit V

Definition, properties and simple problems of Lognormal - Logistic - Pareto distributions

#### Text Books

1. Rohatgi, V.K. and Saleh (2002): An Introduction to Probability Theory and Mathematical Statistics, John Wiley.
2. Hogg, R.V. , Mc Kean J W and Craig, A.T.(2005): Introduction to Mathematical Statistics, 6/e Pearson Edition
3. Bansilal, Sanjay Arora and Sudha Arora (2006): Introducing Probability and Statistics, 2/e, Satya Prakashan Publications, New Delhi

#### Reference Books

1. Gupta, S.C. and Kapoor, V.K.(2000): Fundamentals of Mathematical Statistics, 10/e, Sultan Chand and Sons
2. Goon, A.M., Gupta, M.K. and Das Gupta,B. (2001): Fundamentals of Statistics, Vol. II, World Press, Calcutta.
3. Mood, A.M., Graybill, F.A and Boes, D.C.(1974): Introduction to the Theory of Statistics, McGraw Hill.
4. Irwin Miller and Marlyees Miller (2002): John E Freund's Mathematical Statistics, 6/e, PHI

\* Properties of distribution related to mean, variance, m.g.f. and recurrence relations

## SEMESTER II

### STAT 122 - APPLIED STATISTICS

CREDITS: 3

#### Unit I

Index Numbers; Construction of index numbers ; fixed and chain base index numbers; weighted index numbers; standard index numbers ; Tests for index numbers ; cost of living index number and its construction.

#### Unit II

Time Series Analysis: Time Series models - Components of a time series - Methods of trend and isolation – Moving average, Seasonal indices, Ratio to trend, Link relative methods - Cyclical fluctuations

#### Unit III

Sources of Demographic data: Measures of mortality – Crude and specific rates, standardized rates, Infant mortality rate - Complete life table - its construction and uses. Abridged life tables

#### Unit IV

Measures of fertility: Crude Birth Rate (CBR), Age Specific Fertility Rate (ASFR), General Fertility Rate (GFR) and Total Fertility Rate (TFR) - Crude, Specific and standardized rates - Measures of migration, Population growth rates - Gross Reproduction Rate (GRR) and Net Reproduction Rate (NRR)

#### Unit V

Present official statistical system in India relating to population, agriculture, Industrial production, trade and prices - Methods of collecting official statistics, their reliability and limitations - Principal publications containing such statistics - Official agencies responsible for their collection and their functions.

#### Text Books

1. Kapoor.V.K. and Gupta.S. (2000): Fundamentals of Applied Statistics,Sultan Chand and Sons.
2. Parimal Mukhopadhyay(2005):Applied Statistics, 2/e, Books and Allied (P) Ltd, Kolkata.

#### Reference Books

1. Goon.A.M., Gupta.M.K. and DasGupta .B (1999) : Fundamental of Statistics , Vol. II, World Press , Calcutta.
2. Bogue.D.J.(1969) : Principles of Demography , John Wiley.
3. Misra.B.D.(1982): An Introduction to the Study of Population, South Asian Publishing.

## SEMESTER III

### STAT 231 – DISTRIBUTION THEORY – II

CREDITS: 4

#### Unit I

Bivariate Normal distribution - Conditional and marginal distributions – Simple problems

#### Unit II

Definition of Sampling distributions and standard error - Sampling distributions: t, F and chi-square distributions - Interrelationship among t, F and chi-square distributions and their characteristics

#### Unit III

Concept of Truncation - Truncated Binomial – Truncated Poisson distribution and their characteristics

#### Unit IV

Compound distribution – Notion, simple characteristics of Compound Binomial – Compound Poisson distributions

#### Unit V

Order statistics – Definition and uses - Distribution of  $r^{\text{th}}$  order statistics – Joint distribution of  $r^{\text{th}}$  and  $s^{\text{th}}$  order statistic – Distribution of the sample Range and mid range - Simple problems

#### Text Books

1. Rohatgi, V.K. and Saleh (2002): An Introduction to Probability Theory and Mathematical Statistics, John Wiley.
2. Hogg, R.V. , Mc Kean J W and Craig, A.T.(2005): Introduction to Mathematical Statistics, 6/e Pearson Edition
3. Bansilal, Sanjay Arora and Sudha Arora (2006): Introducing Probability and Statistics, 2/e, Satya Prakashan Publications, New Delhi

#### Reference Books

1. Gupta, S.C. and Kapoor, V.K.(2000): Fundamentals of Mathematical Statistics, 10/e, Sultan Chand and Sons
2. Goon, A.M., Gupta, M.K. and Das Gupta,B. (2001): Fundamentals of Statistics, Vol. II, World Press, Calcutta.
3. Mood, A.M., Graybill, F.A and Boes, D.C.(1974): Introduction to the Theory of Statistics, McGraw Hill.
4. Irwin Miller and Marlyees Miller (2002): John E Freund's Mathematical Statistics, 6/e, PHI

## SEMESTER III

### STAT 232 – INTRODUCTION TO SAMPLING THEORY

CREDITS: 3

#### Unit I

Concept of sampling - Need for sampling - population and sample - sampling unit and sample frame - Types of Population - Basic properties of population - sample survey and census - Principal steps in a Sample survey - Notion of sampling error.

#### Unit II

Simple Random Sampling with and without replacement - Estimation of Population mean and proportion and their variances- Determination of sample size.

#### Unit III

Stratified sampling - Principles of stratification - Estimation of population mean and its variance - Allocation techniques - Estimation of gain due to stratification

#### Unit IV

Systematic sampling - Estimation of population mean and its sampling variance - Circular systematic sampling - comparison of systematic, simple random and stratified random sampling - cluster sampling with equal sized clusters - estimation of population mean and variance.

#### Unit V

Large scale sample surveys - Sources of Non sampling errors and methods of controlling them - NSSO and CSO and their functions.

#### Text Books

1. Cochran, W.G. (1977): Sampling Techniques, 3/e, Wiley.
2. Singh D and Choudhary F.S. (1986): Theory and Analysis of Sample Survey and Designs, New Age International.

#### Reference Books

1. Desraj (2000): Sample survey theory, Narosa Publishing House.
2. Murthy M.N. (1967): Sampling theory and methods, Statistical Publishing society, Calcutta.
3. Sukhatme P.V. etal (1984): Sampling theory of surveys with applications, Iowa State University Press and IARS.
4. Sampath S.(2000): Sampling Theory and Methods, Narosa Publishing house.
5. Parimal Mukhopadhyay(2009): Theory of Sample Surveys, Prentice Hall of India



## SEMESTER IV

### STAT 241 -BASIC ESTIMATION THEORY

CREDITS: 4

#### Unit I

Basic problem of statistical Inference: Point estimation - Properties of estimators: Unbiasedness and consistency - Conditions for consistency – Sufficiency - Factorization theorem (without proof) – Simple problems

#### Unit II

Efficiency - Minimum Variance Unbiased Estimators (MVUE) and their properties - Cramer-Rao Inequality - Rao - Blackwell Theorem – Simple Problems

#### Unit III

Methods of Estimation: Methods of moments – Simple problems - Method of least squares – Method of minimum chi-square

#### Unit IV

Method of maximum likelihood estimation (MLE) – Properties of maximum likelihood estimators - Asymptotic properties of MLE (without proof) - Method of Scoring

#### Unit V

Confidence intervals: Basic Notions - Confidence Intervals for the mean, proportion, variance (for the case of one and two populations) and correlation coefficient - Large sample Confidence Intervals

#### Text Books

1. Hogg, R.V. , Mc Kean J W and Craig, A.T.(2005): Introduction to Mathematical Statistics, 6/e Pearson Edition
2. Gupta, S.C. and V.K. Kapoor (2000): Fundamental Mathematical Statistics, Sultan Chand and Co.
3. Mood,A.M., Graybill, A.M. and Boes, D.C. (1974): Introduction to theory of Statistics , Mc Graw Hill.
4. Goon, A.M., Gupta, M.K.and Das Gupta,B. (2001): An Outline of statistical theory , Vol. II , 6/e, World Press, Calcutta.

#### Reference Books

1. Larson(1982): Introduction to Probability Theory and Statistical Inference, 3/e, John Wiley.
2. Rohatgi,V.K. and Saleh, A.K.(2002): An Introduction to Probability and Statistics , 2/e, John Wiley.
3. Rao, C.R(1998): Linear Statistical Inference and its Applications, Wiley Eastern Ltd,.
4. Bansilal, Sanjay Arora and Sudha Arora (2006): Introducing Probability and Statistics, 2/e, Satya Prakashan Publications, New Delhi
5. Miller.I and Miller.M (2002): John E. Freunds Mathematical statistics, Pearson Education.

## SEMESTER IV

### STAT 242 - OPERATIONS RESEARCH

CREDITS: 3

#### Unit I

Introduction to Operations Research – Various Models in O.R. – Scope and limitations of O.R.– Phases of Operations Research study .

#### Unit II

Linear Programming Problem – Formulation - Graphical solution - Simplex method - Artificial variables Technique – Big M-method - Concepts of Duality – Conversion of primal problem to dual - simple problems

#### Unit III

Transportation Problem- Initial Basic Solution by North West Corner Rule and Vogel's Approximation Methods – Optimal Solution by Modified Distribution (MODI) Method - Assignment problem - Simple Problems

#### Unit IV

Game Theory – Pure and Mixed strategies, saddle point - Optimal Solution of two person zero sum games – Graphical solution of (2 x n) and (m x 2) games – Solving games using Dominance property.

#### Unit V

Network analysis by CPM / PERT: Basic concepts: Constructions of the network - concepts of slack and float in network analysis - Determination of the floats and critical path.

#### Text Books

1. Taha H.A. (1982): Operational Research: An Introduction, 4/e, McMillan.
2. P. Paneerselvam(2011): Operations Research, 2/e, PHI Learning Private Limited

#### Reference Books

1. Kanti Swarup, P.K. Gupta and Manmohan (1985): Operation Research, Sultan Chand and Sons.
2. J.K. Sharma (2001): Operation Research: Theory and Applications, MacMillan, India.
3. Goel and Mittal (1982): Operation Research, Pragati Pakashan, Meerut.
4. Hillier. F.S. and Leiberan. G.J. (2010): Introduction to Operations Research, Tata McGraw Hill
5. S.D. Sharma: Operations Research, Kedarnath, Ramnath and Co.

## **SEMESTER IV**

**STAT 243 - PRACTICAL I**  
**(Based on STAT 232 and STAT 241)**

**CREDITS: 2**

### **I. SAMPLING THEORY**

1. Use of random numbers and Simple random sampling
2. Stratified random sampling – Proportional allocation and Optimum allocation
3. Systematic sampling
4. Cluster sampling (equal size)

### **II. ESTIMATION THEORY**

1. Method of Moments
2. Method of Maximum Likelihood
3. Confidence Intervals

## SEMESTER V

### STAT 351 -ELEMENTS OF TESTING STATISTICAL HYPOTHESES CREDITS: 4

#### Unit I

Concept of hypothesis testing - Types of errors and power - most powerful tests - Neyman-Pearson Fundamental Lemma and its applications - Notion of Uniformly most powerful tests

#### Unit II

Likelihood Ratio tests: Description and property of LR tests - Application to standard distributions - Large sample properties

#### Unit III

Tests of significance (under normality assumption): Test for single mean and proportion for small and large samples – Test for correlation and variance

#### Unit IV

Test for equality of means and variances of two population (large and small samples) – Test for equality of proportions – Chi-square test for goodness of fit and test for independence of attributes

#### Unit V

Non Parametric Tests: Sign test, Signed rank test, Median test , Mann-Whitney test, Run test and One sample Kolmogorov –Smirnov test (Description, properties and applications only)

#### Text Books

1. Rohatgi, V.K. and Saleh, A.K. (2002): An Introduction to Probability and Statistics , 2/e, John Wiley.
2. Hogg, R.V. , Mc Kean J W and Craig, A.T. (2005): Introduction to Mathematical Statistics, 6/e Pearson Edition
3. Manoj Kumar Srivastava and Namita Srivastava (2009): Statistical Inference – Testing of Hypotheses, Prentice Hall of India
4. Bansilal, Sanjay Arora and Sudha Arora (2006): Introducing Probability and Statistics, 2/e, Satya Prakashan Publications, New Delhi

#### Reference Books

1. Gupta, S.C. and V.K. Kapoor (2000): Fundamentals of Mathematical Statistics, Sultan Chand and Co.
2. Mood, A.M., Graybill, A.M. and Boes, D.C. (1974): Introduction to Theory of Statistics , Mc Graw Hill.
3. Goon, A.M., Gupta, M.K. and Das Gupta, B. (2001): An Outline of Statistical Theory, Vol. II, 6/e, World Press , Calcutta.
4. Miller, I and Miller, M (2002): John E. Freund's Mathematical statistics, Pearson Education.
5. Gibbons, J.D. (1985) : Non Parametric Statistical Inference , 2/e , Marcel Dekker.

## SEMESTER V

### STAT 352 – BASIC REGRESSION ANALYSIS

CREDITS: 3

#### UNIT I

Simple Regression model: Description of data model – Assumption about the explanatory variable - Estimation and test of hypotheses - Confidence Intervals – Predicted values and standard errors – Evaluation of fit.

#### UNIT II

Analysis of residual - Residual plots – Transformation of variables – transformation to stabilize variance – Removal of heteroscedasticity

#### UNIT III

Multiple regression model: Description of data model – Properties of least square estimators – Predicted values and standard errors – Multiple correlation coefficient - Selection of variables – Forward selection procedure – Backward elimination procedure – Stepwise method (algorithms only).

#### UNIT IV

Test of hypothesis on the linear model — Testing a subset of regression coefficients equal to zero – Testing of equality of regression coefficients.

#### UNIT V

Multicollinearity and its effects on inference and forecasting – Detection of multicollinearity – Remedial measures

#### Text Books:

1. S.Chatterjee and B.Price (1977): Regression Analysis by Example, John Wiley & Sons, New York. Chapter 1,2,3 and relevant sections in chapters 4,5,6,7,8,9
2. 3. Douglas C.Montgomery, Elizabeth A. Peck and G.Geoffrey Vining(2007) : Introduction to Linear Regression Analysis, John Wiley & Sons (Asia) Pte. Ltd., Singapore

#### Reference Books:

1. Johnston J.(1984): Econometric Methods.
2. Thomas P.Ryan(2006): Modern Regression Methods, John Wiley and Sons,Inc.
3. N.R.Draper & H.Smith (1981), Applied Regression Analysis, Second Edition.

## SEMESTER V

STAT 353 - PRACTICAL II

CREDITS: 2

(Based on STAT 351 and STAT 352)

### I. STATISTICAL INFERENCE and REGRESSION ANALYSIS

1. Large Sample Tests: Means, Variances and Proportions
2. Tests based on Chi-square statistic: Population variance, Homogeneity of correlation coefficient
3. Test based on t statistic: Single mean, Difference of means, Paired t test, Correlation coefficient
4. Tests based on F statistic: Equality of two population variances
5. Testing the independence of attributes
6. Fitting of Binomial and Poisson distributions and test the goodness of fit
7. Non-parametric tests – Sign test, Wilcoxon test, Mann-Whitney U test, Median test, Run test and Kolmogorov –Smirnov one sample test
  
8. Simple Linear Regression – Model fitting – Test for regression coefficients and confidence intervals
9. Multiple Regression (Two Independent variables) - Model fitting – Test for regression coefficients and confidence intervals

## SEMESTER VI

### STAT 361 -PRINCIPLES OF EXPERIMENTAL DESIGN

CREDITS: 3

#### Unit I

Basic Principles for designing statistical experiments: Randomization, Replication and local control techniques - Determination of experimental units and notion of experimental error - Analysis of variance with one-way and two-way classifications - Models and Methods of analysis.

#### Unit II

Completely Randomized Design (CRD) and Randomized Block Design (RBD)- Models and estimates of parameters and their standard error - Analysis of data arising from such designs, Analysis when one or two observations are missing.

#### Unit III

Latin Square Design (LSD) – Model – Estimation of parameters – Method of analysis – Missing Plot technique in LSD

#### Unit IV

Multiple Comparison tests: Least Significant Difference, Student-Newman-Keuls test , Duncan's Multiple Range test, Tukey's test

#### Unit V

Factorial Experiments:  $2^2$ ,  $2^3$  and  $3^2$  designs; estimation of main effects and interactions and their standard errors

#### Text Books

1. Das, M.N. and Giri.N.C. (1986): Design and Analysis of Experiments, Wiley eastern.
2. Montgomery, C.D (2012): Design of Experiments, 8/e, John Wiley and Sons.

#### Reference Books

1. Goon.A.M, Gupta and Dasgupta.B. (2001): An Outline of statistical theory, vol. II, 6/e World Press Calcutta.
2. Gupta .S.C. and Kapoor.V.K.(2000): Fundamentals of Applied Statistics, Sultan Chand.
3. Parimal Mukhopadhyay(2005):Applied Statistics, 2/e, Books and Allied (P) Ltd, Kolkata.

## SEMESTER VI

### STAT 362- ELEMENTS OF STATISTICAL QUALITY CONTROL      CREDITS: 3

#### Unit I

Concept of Quality – Quality movement in India – Standardization for Quality – Quality movement – Quality management – Quality circles – Total Quality Management – ISO 9001.

#### Unit II

Need for SQC in industries; Process control: Chance and assignable causes of variation - specification and tolerance limits; process capability- Statistical basis for control charts:  $\bar{X}$ , R and standard deviation charts - their construction and analysis

#### Unit III

Control charts for attributes – p, np, c and u charts – their construction and analysis.

#### Unit IV

Product control: Acceptance sampling by attributes; Producer's and Consumer's risk- Notions of AQL, LTPD and AOQL – Concepts of Single and Double sampling plans

#### Unit V

OC, AOQ, ASN, ATI curves for Single and Double sampling plans – Concept of Sequential sampling plan for attributes.

#### Text Books

1. Montgomery .D.C (1985): Introduction to Statistical quality control, 2/e, John Wiley.
2. S.C.Gupta and V.K.Kapoor(2000), Fundamentals of Applied Statistics, Sultan Chand and Sons.

#### Reference Books

1. Gupta.S.C. and V.K. Kapoor (2000): Fundamentals of Applied Statistics, Sultan Chand and sons.
2. Ott, E.R. (1975): Process Quality Control; Mc Graw Hill.



## SEMESTER VI

**STAT 363 - PRACTICAL III**  
**(Based on STAT 361 and STAT 362)**

**CREDITS: 2**

### **I. DESIGN OF EXPERIMENTS**

1. Completely Randomised Design
2. Randomised Block Design and R.B.D. with one or two missing values
3. Latin Square Design and L.S.D. with one missing value
4.  $2^2$  Design,  $2^3$  Design and  $3^2$  Design
5. Total Confounding in  $2^3$  experiments

### **II. STATISTICAL QUALITY CONTROL**

6.  $\bar{X}$  and R chart
7. p chart and np chart
8. Control chart for number of defects
9. Single Sampling Plan – OC, ATI, AOQ curves
10. Double Sampling Plan - OC, ATI, AOQ curves