

**PUNYASHLOK AHILYADEVJI HOLKAR
SOLAPUR UNIVERSITY, SOLAPUR**



NAAC Accredited-2015

'B' Grade (CGPA 2.62)

**Name of the Faculty: Commerce & Management
CHOICE BASED CREDIT SYSTEM**

Syllabus: Advanced Statistics

**Name of the Course: M.Com. I (Sem-I & II)
(Syllabus to be implemented w.e.f. June 2020-21)**

PUNYASHLOK AHILYADEVJI HOLKAR

SOLAPUR UNIVERSITY, SOLAPUR

CBCS Pattern Syllabus

M.Com – I (Sem. – I and II)

Advanced Statistics

With effect from June – 2020

- 1) **Preamble :** To familiarize the students with concepts of the Statistics, Operations Research and a hands on practice of the various statistical tools and techniques are the main intentions of this paper.

It will enable them to improve their logical reasoning ability and interpretation of various results. The course aims at acquainting the students with the emerging issues in business, trade and commerce regarding analyzing business facts using Statistics.

Semester I

Objectives:-

1. To expose students to concepts of Statistics and Operations Research.
2. To inculcate an analytical approach to the subject matter.
3. To stimulate the students interest by showing the relevance and use of Statistical knowledge.
4. To study and critically analyze statistical reasoning to problems of business.
5. To boost quantitative thinking and develop numerical abilities.
6. To enlighten the student abilities to apply concepts of Statistics and Operations Research to real life problems in Commerce, Economics, Management, Marketing and Social fields.
7. To improve their logical reasoning ability and interpretation of various statistical results.

Course Outcomes:-

After completion of this course students will be able to

- 1) understand components of Statistics and Operations Research in Business.
- 2) understand the role of Statistics and Operations Research in taking various commercial decisions.
- 3) make his mind set for taking up entrepreneurship as career.

Semester – I
Advanced Statistics Paper I
Statistical Models for Business Decisions –I

Unit	Name of the Topic and Details	Lectures
1	<p>Matrix Algebra: Definition of a matrix, types of matrices, addition, subtraction, multiplication of matrices, inverse of matrix. Rank of Matrix, Determinant, Finding value of determinant. Solving the linear homogeneous and non-homogeneous system of equations by matrix method. Cramer's rule (for not more than three variables).</p>	15
2	<p>Introduction to Operations Research (O.R.) Origin, definition and scope of Operations Research, Phases in Operations Research, Applications of Operations Research.</p>	5
3	<p>Linear Programming Problem(L.P.P.): Definition and mathematical form of general L.P.P. Problems on formulation of L.P.P. Canonical form of L.P.P., Standard form of L.P.P. Definitions of Solution, Feasible solution and Optimum solution. Graphical Method of finding optimum solution to L.P.P. Definitions of slack variable, surplus variable, artificial variable, Basic feasible solution, degenerate and non-degenerate solutions. Simplex method for finding an optimum solution to L.P.P. Big-M method for finding an optimum solution to L.P.P. Numerical problems.</p>	25
4	<p>Transportation Problem : Definition and mathematical form of Transportation Problem. Transportation Problem as a special case of L.P.P. Condition for the existence of feasible solution to the transportation problem. Balanced and unbalanced transportation problems. Methods for finding initial basic feasible solution to the transportation problem- North-West corner method, Matrix minima method and Vogel's Approximation Method. Degeneracy in transportation problem. MODI method for finding an optimum solution to the transportation problem. Numerical problems.</p>	15

Reference Books:-

- 1 Shantinayakan : Text Book of Matrices
- 2 S.D. Sharma : Text Book of Linear Programming Problem
- 3 S.D.Sharma : Operations Research
- 4 R.K. Gupta : Text Book of Linear Programming
- 5 Kantiswarup, Gupta Man-Mohan : Operations Research
- 6 Goel And Mithal : Operations Research

Semester – I
Advanced Statistics Paper II
Sampling Techniques

Unit	Name of the Topic and Details	Lectures
1	<p>Introduction to sampling Concept of population, sample, parameter, statistic, sampling error, advantages of sampling and principal steps in sampling, Methods of Sampling-Probability Sampling and Non-probability Sampling.</p>	7
2	<p>Simple Random Sampling (SRS) Simple Random Sampling With Replacement(SRSWR) and Simple Random Sampling Without Replacement(SRSWOR). Methods of drawing a sample by SRSWR and SRSWOR. Unbiased estimator of population mean and population variance(without proof). SRS for attributes. Numerical problems on drawing of samples from given population and estimation of the parameters.</p>	18
3	<p>Stratified sampling: Homogeneous and Heterogeneous populations. Procedure of drawing sample by using Stratified sampling method. Unbiased estimator of population mean and population total(without proof), standard error of estimates (without proof). Concept of allocation. Types- Proportional allocation, optimum allocation. Numerical problems.</p>	18
4	<p>Systematic Sampling Situations where systematic sampling is appropriate. Technique of drawing sample by using systematic sampling method. Unbiased estimator of population mean and population total(without proof), standard error of estimates (without proof). Circular systematic sampling. Numerical problems.</p>	17

Reference Books:

- 1) Gupta and Kapoor : Applied Statistics
- 2) Goon, Gupta & Dasgupta : Fundamentals of Statistics (Vol. I & II)
- 3) Cochran W : Sampling Techniques
- 4) Des Raj : Sampling theory
- 5) Daroga & Singh : Sampling Techniques
- 6) Sukhatme & Sukhatme : Theory of sampling.

Semester II

Objectives:-

- 1) To impart knowledge of basic statistical concepts used in business.
- 2) To improve their logical reasoning ability and interpretation of various statistical results.
- 3) To study and critically analyze statistical reasoning to problems of business.

Course Outcomes:-

After completion of the course students will be able to

- 1) get well acquainted with the fundamentals of Probability
- 2) He will have understood the role of probability for taking various decisions.
- 3) He will have developed intelligence by recognizing statistical techniques in decision making.

Semester – II Advanced Statistics Paper I Statistical Models for Business Decisions –II

Unit	Name of the Topic and Details	Lectures
1	Assignment Problem : Definition and mathematical form of Assignment Problem. Assignment Problem as a special case of Transportation Problem. Balanced and unbalanced transportation problems. Hungarian method for finding an optimum assignment to the assignment problem. Numerical problems.	15
2	Network Analysis by CPM/PERT: Concept CPM and PERT. Differentiation between CPM and PERT. CPM: Definitions of Project, Activity, Event, Completion time of activity, Project completion time, Slack time, Critical Activity, Critical Path, Earliest Start (ES) time, Earliest Finish (EF) time, Latest Start (LS) time, Latest Finish (LF) time, Dummy activity. Construction of Network and its rules. Calculations of ES, LS, EF, LF and project completion time. PERT : Definitions of Optimistic time, Pessimistic time, Most likely time. Calculations of expected completion times of activities and their variances, expected completion time of the project and its variance. Numerical problems on CPM and PERT.	15

3	Replacement: Introduction of replacement problem, types of replacement problems, replacement policy for items whose maintenance cost increases with time when money value is fixed and money value changes with constant rate, worked examples, replacement of items that fail completely.	15
4	Inventory Management: Meaning of Inventory, different costs in Inventory, why inventory is maintained? different types of inventory models, Deterministic Elementary Inventory models, Concept of Economic Ordering Quantity (EOQ), Determination of EOQ by trial and error method, Graphical method, EOQ model without shortages with uniform demand, different rates of demand in different cycles.	15

Reference Books :

- 1 S.D. Sharma : Text Book of Linear Programming Problem
- 2 S.D.Sharma : Operations Research
- 3 R.K. Gupta : Text Book of Linear Programming
- 4 Kantiswarup, Gupta Man-Mohan : Operations Research
- 5 Goel And Mithal : Operations Research

Semester – II
Advanced Statistics Paper II
Designs of Experiments

Unit	Name of the Topic and Details	Lectures
1	Introduction to the basic terms of designs of Experiments: Experimental Units, Treatments, Randomization, Replications, Local Control, choice of size and shape of plot for uniformity trials. Analysis of variance: Analysis of variance for one - way classification: Mathematical model, assumptions basic hypothesis and ANOVA table. Analysis of variance for two -way classification: mathematical model, assumptions basic hypothesis, ANOVA table. Numerical problems.	15
2	Completely Randomized Design (CRD): Description, layout, mathematical model, hypothesis, and its analysis of variance, Test for equality of treatment effects (without derivation), ANOVA table. Numerical problems.	15
3	Randomized Block Design (RBD): Description, layout, mathematical model, hypothesis, and its analysis of variance, Test for equality of treatment effects (without derivation), ANOVA table. Numerical problems.	15

4	Latin square Design (LSD): Description, layout, Mathematical model, hypothesis, and its analysis of variance, ANOVA table. Numerical problems.	15
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Reference Books:

- 1 Gupta and Kapoor : Applied Statistics
- 2 Goon, Gupta & Dasgupta : Fundamentals of Statistics (Vol. I & II)
- 3 Cochran & Cox : Experimental designs
- 4 Feherer : Experimental Designs

Equivalence :

S. N.	Name of the Old Paper	Name of the New Paper
1	Sem-I : Advanced Statistics Paper I	Sem-I : Advanced Statistics Paper I
2	Sem-I : Advanced Statistics Paper II	Sem-II : Advanced Statistics Paper II
3	Sem-II : Advanced Statistics Paper I	Sem-II : Advanced Statistics Paper I
4	Sem-II : Advanced Statistics Paper II	Sem-I : Advanced Statistics Paper II