

**Anekant Education Society's
Tuljaram Chaturchand College of Arts, Science and Commerce,
Baramati**

Autonomous

Course Structure for T.Y. B.Com. BUSINESS STATISTICS (2022 Pattern)

Name of the Programme : T.Y. B.Com.

Program Code : UCBS

Class : T.Y. B.Com.

Semester : V

Paper Code	Title of Paper	No. of Credits
UCBS351(D)	Business Statistics-III	3
UCBS352(D)	Business Statistics-IV	3

Program Outcomes (POs) For B.Com Programme

PO1	Knowledge and Critical Thinking : Acquire skills in organising, analysing, evaluating and presenting information. Able to analysis issues logically, consider different options and viewpoints, make decisions and act with flexibility, adaptability and creativity.
PO2	Communication Skill : Able to communicate effectively, analyse the concepts and participate in healthy arguments and portray skill in communication and inwriting. Possess skills related with banking and other business.
PO3	Independent learning : Demonstrate the ability to acquire knowledge and business skills, the capacity for self-directed activity and the ability to work independently.
PO4	Leadership quality : Exhibit qualities associated with leadership such as accountability, integrity, respect, self-reflection
PO5	Teamwork : Able to work constructively, cooperatively, effectively and respectfully as part of a team.

SYLLABUS (CBCS) FOR T.Y.B.Com.
(2022 Pattern)
(w. e. from June, 2024)

Name of the Programme	: B.Com
Program Code	: UCBS
Class	: T.Y.B.Com.
Semester	: V
Course Name	: Business Statistics – III
Course Code	: UCBS351(D)
No. of Lectures	: 48
No. of Credits	: 3

A) Learning objectives:

1. To distinguish between random and non-random experiments.
2. To introduce the concept of random variables and their role in probability distributions.
3. To introduce basic probability concepts, such as sample space, events, and probability measures
4. To compute probabilities of events.
5. To introduce some standard discrete probability distribution and their applications.
6. To apply discrete probability distributions to model real-world situations
7. To concept of bivariate discrete random variables and compute probabilities of discrete bivariate random variable.

B) Learning outcomes:

Students should be able to:

CO1. distinguish between random and non-random experiments.

CO2. explore concept of random variables and their role in probability distributions.

CO3. use basic probability concepts, such as sample space, events, and probability measures.

CO4. compute probabilities of events.

CO5. demonstrate applications of standard discrete probability distributions.

CO6. apply discrete probability distributions to model real-world situations.

CO7. explore concept of bivariate discrete random variables and their role in probability distribution.

TOPICS/CONTENTS:

Unit-1. Introduction to Probability (12 L)

- 1.1 Definitions of Permutation, Combination, Sample Space
- 1.2 Event, different types of events, Probability of an event
- 1.3 Conditional Probability, Independence of two events
- 1.4 Partition of sample space, Bayes Theorem (statement only)
- 1.5 Examples and problems.

Unit 2. Uni-variate Discrete Probability Distribution (12 L)

- 2.1 Definitions of random variable, discrete random variable.
- 2.2 Probability distribution of discrete random variable
- 2.3 Probability mass function (p.m.f.), Cumulative distribution function, mean, variance and standard deviation. Properties of distribution function.
- 2.4 Examples and problems.

Unit 3. Some Standard Discrete Probability Distributions (12 L)

- 3.1 Bernoulli: p.m.f., mean and variance. (statement only)
- 3.2 Binomial: p.m.f., mean, variance and additive property. (Statement only), real life situation.
- 3.3 Poisson: p.m.f., mean, variance and additive property. (Statement only), real life situation.
- 3.4 Examples and problems.

Unit 4 Bi-variate Discrete Probability Distribution (12 L)

- 4.1 Bivariate discrete random variable
- 4.2 Joint probability distribution of bivariate discrete random variable
- 4.3 Marginal and conditional distribution and independence of two variables.
- 4.4 Examples and problems.

List of Practicals for Business Statistics for Sem-V

Practical No.	Name of Practical
1	Application of Binomial and Poisson Distribution
2	Application of Bivariate Discrete Probability Methods

Books Recommended:

1. Fundamentals of Mathematical Statistics: Gupta, Kapoor V.K.
2. Fundamentals of Statistics: S.C. Gupta.
3. Business Statistics : Gupta Indra
4. Fundamentals of Statistics: D.N. Elhance
5. Statistical Methods: S.P.Gupta

Course Outcomes	Program Outcomes				
	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	1	1
CO2	3	2	3	1	1
CO3	3	2	3	1	1
CO4	3	2	3	1	1
CO5	3	2	3	1	1
CO6	3	2	3	1	1
CO7	2	2	3	1	1

Weight: 1 - Partially related 2 - Moderately Related 3 - Strongly related

Justification:

PO1 Knowledge and Critical Thinking:

CO1: Distinguish between random and non-random experiments.

Weightage: 3 (Strongly Related)

Justification: Distinguishing between random and non-random experiments requires a deep understanding of probability theory, indicating a strong connection with knowledge and critical thinking.

CO2: Explore the concept of random variables and their role in probability distributions.

Weightage: 3 (Strongly Related)

Justification: Understanding the concept of random variables and their role in probability distributions is foundational to critical thinking in probability theory.

CO3: Use basic probability concepts, such as sample space, events, and probability measures.

Weightage: 3 (Strongly Related)

Justification: Utilizing basic probability concepts involves critical thinking, especially in the context of solving problems related to sample space, events, and probability measures.

CO4: Compute probabilities of events.

Weightage: 3 (Strongly Related)

Justification: Computing probabilities of events requires both knowledge and critical thinking skills, as it involves applying theoretical concepts to practical scenarios.

CO5: Demonstrate applications of standard discrete probability distributions.

Weightage: 3 (Strongly Related)

Justification: Demonstrating applications of probability distributions involves critical thinking to apply theoretical knowledge to real-world situations.

CO6: Apply discrete probability distributions to model real-world situations.

Weightage: 3 (Strongly Related)

Justification: Applying probability distributions to real-world situations requires critical thinking skills to model scenarios accurately.

CO7: Explore the concept of bivariate discrete random variables and their role in the probability distribution.

Weightage: 2 (Moderately Related)

Justification: While exploring bivariate discrete random variables is related to knowledge and critical thinking, it is more specialized and, therefore, moderately related.

PO2 Communication Skill:

All COs (CO1 to CO7):

Weightage: 2 (Moderately Related)

Justification: Communicating probability concepts, definitions, and applications effectively is essential, making all COs moderately related to communication skills.

PO3 Independent Learning:

All COs (CO1 to CO7):

Weightage: 3 (Strongly Related)

Justification: Probability theory involves complex concepts that require independent learning to grasp and apply effectively.

PO4 Leadership Quality:

All COs (CO1 to CO7):

Weightage: 1 (Partially Related)

Justification: Probability theory is more directly related to individual understanding and problem-solving than leadership qualities. However, the ability to apply these concepts in leadership decisions may still be relevant.

PO5 Teamwork:

All COs (CO1 to CO7):

Weightage: 1 (Partially Related)

Justification: Probability theory, being more individually focused, has less direct relevance to teamwork. However, in applied scenarios, collaborative problem-solving may involve probability concepts.

SYLLABUS (CBCS) FOR T.Y.B. Com.
(2022 Pattern)
(w. e. from June, 2024)

Name of the Programme	: B.Com.
Program Code	: UCBS
Class	: T.Y.B.Com.
Semester	: V
Course Name	: Business Statistics – IV
Course Code	: UCBS352(D)
No. of Lectures	: 48
No. of Credits	: 3

A) Learning Objectives:

1. To study the fundamental concepts of game theory, including players, strategies, payoffs, and equilibrium..
2. To study the basic principles and concepts of decision theory, including decision-making under uncertainty and risk.
3. To introduce different types of quality control techniques, such as statistical process control (SPC) and acceptance sampling.
4. To study the concept of replacement problem in operations management.
5. To apply various criteria, such as cost minimization and reliability maximization, in solving replacement problems.

B) Learning Outcome:

By the end of the course, students should be able to

- CO1. solve simple games using various techniques.
- CO2. to model and analyse conflicting situations using game theory.
- CO3. formulate decision making problems.
- CO4. identify decision alternatives, the states of nature and payoff associated with every possible combination of decision alternatives and states of nature.
- CO5. identify the one best decision alternative for decision situation of uncertainty and risk.

- CO6. understand the philosophy and basic concepts of quality control.
- CO7. understand the mathematical tools that are needed to solve optimization problems.
- CO8. to develop their ability to apply those concepts to the design and management of quality control processes in industries.

TOPICS/CONTENTS:

Unit 1 Game Theory: (10 L)

Meaning, two-person zero-sum game, pure and mix strategies, Pay off tables, saddle points, minimax and maximin principles, Dominance principles. Examples and problems.

Unit 2 Statistical Decision Theory: (16 L)

Introduction, acts, states of nature, pay off, regret, Decision Making Under Risk, Expected Opportunity Loss (EOL) Criterion and Expected Monetary Value (EMV) Criterion. Decision Making Under Uncertainty, Maximin Criterion, Maximax, Minimax Regret Criterion, Laplace Criterion, Hurvitz Criterion, Examples and problems.

Unit 3 Replacement Problem: (6 L)

Introduction, replacement of Item that deteriorates with time when value of money remains same during the period.

Unit 4 Statistical Quality Control: (16 L)

Introduction, Chance and assignable Causes of variation, Uses of SQC, Control limits, specification limits, Tolerance limits Process and product control, Control charts for mean, range, P-Chart, C-Chart, Process, Capability study, Interpretation of capability index C_p and C_{pk} .

List of Practicals for Business Statistics for Sem-V

Practical No.	Name of Practical
1	Game Theory
2	Statistics Decision Theory
3	Statistical Quality Control

Books Recommended:

1. Operations Research : Harmdy, Taha
2. Operations Research: Kantiswroop, Gupta
3. Business Mathematics : J. K. Sharma
4. Statistical Quality Control: Montgomery
5. Fundamentals of Mathematical Statistics: Gupta, Kapoor V.K.
6. Fundamentals of Statistics: S.C. Gupta

Course Outcomes	Programme Outcomes (POs)				
	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	1	1
CO2	3	2	3	1	1
CO3	3	2	3	1	1
CO4	3	2	3	1	1
CO5	3	2	3	1	1
CO6	2	2	3	1	1
CO7	3	2	3	1	1
CO8	2	2	3	1	1

Weight: 1 - Partially related 2 - Moderately Related 3 - Strongly related

Justification

PO1 Knowledge and Critical Thinking:

CO1: Solve simple games using various techniques.

Weightage: 3 (Strongly Related)

Justification: Solving games involves critical thinking and understanding various techniques applicable to game theory, aligning closely with the development of knowledge and critical thinking skills.

CO2: Model and analyze conflicting situations using game theory.

Weightage: 3 (Strongly Related)

Justification: Modeling and analyzing conflicting situations with game theory require a deep understanding of the theory, demonstrating a strong connection with knowledge and critical thinking.

CO3: Formulate decision-making problems.

Weightage: 3 (Strongly Related)

Justification: Formulating decision-making problems involves critical thinking to structure problems effectively, establishing a strong connection with knowledge.

CO4: Identify decision alternatives, the states of nature, and payoff associated with every possible combination of decision alternatives and states of nature.

Weightage: 3 (Strongly Related)

Justification: Identifying decision alternatives and their associated payoffs requires critical thinking skills and a comprehensive understanding of decision-making scenarios.

CO5: Identify the one best decision alternative for a decision situation of uncertainty and risk.

Weightage: 3 (Strongly Related)

Justification: Identifying the best decision alternative in uncertain and risky situations involves critical thinking and knowledge of decision-making strategies.

CO6: Understand the philosophy and basic concepts of quality control.

Weightage: 2 (Moderately Related)

Justification: While understanding quality control involves critical thinking, it is more directly related to domain-specific knowledge, making it moderately related.

CO7: Understand the mathematical tools needed to solve optimization problems.

Weightage: 3 (Strongly Related)

Justification: Understanding mathematical tools for optimization involves critical thinking and aligns closely with knowledge of optimization techniques.

CO8: Develop the ability to apply those concepts to the design and management of quality control processes in industries.

Weightage: 2 (Moderately Related)

Justification: Applying concepts to the design and management of quality control processes requires critical thinking within a specific domain, making it moderately related.

PO2 Communication Skill:

All COs (CO1 to CO8):

Weightage: 2 (Moderately Related)

Justification: Effectively communicating game solutions, decision-making formulations, and quality control concepts is crucial, contributing to moderately related communication skills.

PO3 Independent Learning:

All COs (CO1 to CO8):

Weightage: 3 (Strongly Related)

Justification: All outcomes involve complex concepts that necessitate independent learning for understanding and application.

PO4 Leadership Quality:

All COs (CO1 to CO8):

Weightage: 1 (Partially Related)

Justification: While decision-making and optimization skills may be relevant to leadership, the direct connection to leadership qualities is less pronounced.

PO5 Teamwork:

All COs (CO1 to CO8):

Weightage: 1 (Partially Related)

Justification: These outcomes, while involving problem-solving, are more individually focused and have limited direct relevance to teamwork.