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Bachelor of Commerce (B.Com)  
SEMESTER-II

## Cost Accounting

BCO-1201

ANNEXURE-II

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# **Cost Accounting**

**BCO-1201**

**Edited By**  
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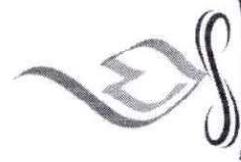
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Bachelor of Business Administration (BBA)  
SEMESTER-I

## Business Statistics

MGO-1102

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# **Business Statistics**

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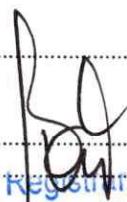
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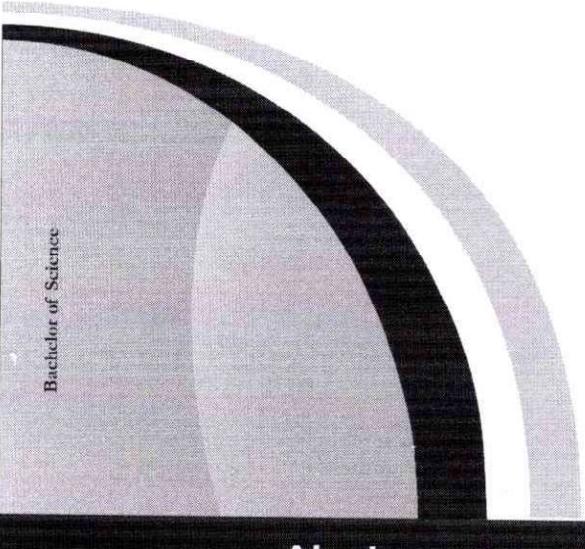
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Bachelor of Science

## Algebra

## Algebra

MAO-2111

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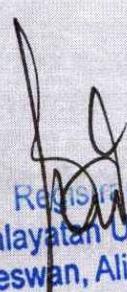
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## PREFACE

In this course, we shall deal with various aspects of Calculus

- Introduction to Groups
- Subgroups and Permutation Groups
- Normal Subgroups and Homomorphism
- Rings

## SYLLABUS

### Unit 1:

Symmetries of a square, The Dihedral groups. Definition and examples of groups including permutation groups and quaternion groups (illustration through matrices), Elementary properties of groups.

### Unit 2:

Subgroups and examples of subgroups, Centralizer, Normalizer, Center of a group, Product of two subgroups; Properties of cyclic groups, Classification of subgroups of cyclic groups.

### Unit 3:

Cyclic notation for permutations, Properties of permutations. Even and odd permutations, alternating groups; Properties of cosets, Lagrange's theorem and consequences including Fermat's Little theorem; Normal subgroups, factor groups, Cauchy's theorem for the finite abelian groups.

### Unit 4:

Group homomorphism. Properties of homomorphisms, Group isomorphisms. Cayley's theorem, Properties of isomorphisms. First, Second and Third isomorphism theorems for groups.

Definition and examples of rings, examples of commutative and non-commutative rings; rings from number systems.  $\mathbb{Z}_n$  the ring of integers modulo n, ring of real quaternions, rings of matrices, polynomial rings, and rings of continuous functions. Subrings and ideals, Integral domains and fields.

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**STRUCTURE**

- Groups
- Abelian or Commutative Group
- Finite and Infinite Groups
- Integral powers of an element
- Order of an element of a Group
- Modulo systems
- Division Algorithm
- Residue Classes modulo  $n$ 
  - Summary
  - Objective Evaluation

**LEARNING OBJECTIVES**

After reading this chapter, you should be able to learn:

- Definitions and examples of groups
- Elementary properties of groups

**1.1 INTRODUCTION**

The concept of a group is of fundamental importance in the study of algebra. The goal in studying groups is to classify all groups upto isomorphism which in practice means finding necessary and sufficient conditions for two groups to be isomorphic. The theory of groups, an important part in present mathematics, started early nineteenth century in connection with the solution of algebraic equations. Originally, a group was the set of all permutations of the roots of an algebraic equation, which has the property that combinations of any two of these permutations again belong to the set. Later, the idea was generalised to the concept of an abstract group. An abstract group is essentially the study of a set with an operation defined and Group Theory has many useful applications both within and outside mathematics.

**1.2 GROUPS**

Let  $G$  be a non-empty set and  $*$  be a binary operation defined on it, then the structure  $(G, *)$  is said to be a **group** if the following axioms are satisfied:

- (i) **Closure Property.**  $a * b \in G; \forall a, b \in G$ .
- (ii) **Associativity.** The operation  $*$  is associative on  $G$ , i.e.,  

$$a * (b * c) = (a * b) * c; \forall a, b, c \in G$$
- (iii) **Existence of Identity.** There exists an element  $e \in G$  such that  

$$a * e = e * a = a; \forall a \in G$$
  
 $e$  is called identity of  $*$  in  $G$ .
- (iv) **Existence of inverse.** For each element  $a \in G$ , there exist an element  $b \in G$  such that  

$$a * b = b * a = e$$

The element  $b$  is called the inverse of element  $a$  with respect to  $*$  and we write  
 $b = a^{-1}$ .

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## Introduction to Groups

(ii) If possible, let any element  $a \in G$  have two inverses say  $b$  and  $c$ , then, we have

$$a * b = e = b * a$$

and

Therefore,

$$a * c = e = c * a$$

$$\begin{aligned} b &= b * e = b * (a * c) = (b * a) * c \\ &= e * c = c \end{aligned} \quad (\text{By associativity})$$

$\Rightarrow$

$$b = c$$

Hence, every element of a group has unique inverse.

### REMARKS

- The identity element has its own inverse.

**Theorem 2.** If  $(G, *)$  is a group, then

$$(i) (a^{-1})^{-1} = a; \forall a \in G.$$

$$(ii) (a * b)^{-1} = b^{-1} * a^{-1}; \forall a, b \in G \quad (\text{Reversal rule})$$

**Proof.** (i) For each element  $a \in G$ , there exist an element  $b \in G$  such that

$$a * b = b * a = e$$

From the symmetry of this result, we have

$$a^{-1} = b \quad \dots (1)$$

$$\text{and} \quad b^{-1} = a \quad \dots (2)$$

Putting the value of  $b$  in equation (2), we get

$$(a^{-1})^{-1} = a$$

(ii) For all  $a, b \in G$  we have

$$(a * b) * (b^{-1} * a^{-1}) = a * (b * b^{-1}) * a^{-1} \quad (\text{by associativity})$$

$$= a * (e) * a^{-1} = (a * e) * a^{-1} \quad (\text{by associativity})$$

$$= a * a^{-1} = e$$

Similarly, We can easily show that

$$(b^{-1} * a^{-1}) * (a * b) = e$$

$$\text{Thus, } (b^{-1} * a^{-1}) * (a * b) = e$$

$$\text{Thus, } (a * b) * (b^{-1} * a^{-1}) = e = (b^{-1} * a^{-1}) * (a * b)$$

Hence, it follows that

$$(a * b)^{-1} = b^{-1} * a^{-1}$$

### REMARKS

- The above reversal law can be generalised as follows:

If  $a_1, a_2, \dots, a_n$  are elements of a group  $G$ , then

$$(a_1 * a_2 * \dots * a_n)^{-1} = a_n^{-1} * a_{n-1}^{-1} * a_{n-2}^{-1} * \dots * a_2^{-1} * a_1^{-1}$$

- In additive composition, above result can be started as follows:

$$(i) -(-a) = a \quad \forall a \in G$$

$$(ii) -(a+b) = (-b) + (-a) \quad \forall a, b \in G.$$

**Theorem 3.** If  $a, b, c$  are three elements of a group  $(G, *)$  then

$$a * c = b * c \Rightarrow a = b \quad (\text{Right cancellation law})$$

$$c * a = c * b \Rightarrow a = b \quad (\text{Left cancellation law})$$

**Proof.** (i)  $a * c = b * c \Rightarrow (a * c) * c^{-1} = (b * c) * c^{-1} \quad (\because c^{-1} \in G)$

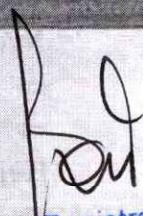
$$\Rightarrow a * (c * c^{-1}) = b * (c * c^{-1}) \quad (\text{By Associativity})$$

$$\Rightarrow a * e = b * e \Rightarrow a = b$$

$$c * a = c * b \Rightarrow c^{-1} * (c * a) = c^{-1} * (c * b)$$

$$\Rightarrow (c^{-1} * c) * a = (c^{-1} * c) * b$$

$$\Rightarrow e * a = e * b \Rightarrow a = b$$

  
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**REMARKS**

- When we say  $*$  is a binary operation defined on a non-empty set  $G$ , it implies that  $G$  is closed for the binary operation  $*$ , i.e.,  
 $a \in G, b \in G \Rightarrow a * b \in G \quad \forall a, b \in G$ .
- A group is not simply a set, but it is an algebraic structure.
- Because of the associativity, the parenthesis can be dropped in products of more than two elements of a group and instead of writing  $a * (b * c)$  or  $(a * b) * c$  we may simply write  $a * b * c$ . The associative law can be extended to any finite number of elements.
- We know that  $*$  is a binary operation on  $G$  we must have  $a * b \in G \quad \forall a, b \in G$ . Hence, in our definition of a group there is no necessity of mentioning the closure axioms. We mentioned it to emphasize the fact that while showing the group postulates in a problem, one should not forget the closure axioms.

**1.3 ABELIAN OR COMMUTATIVE GROUP**

A group  $(G, *)$  is said to be abelian or commutative if  $a * b = b * a; \forall a, b \in G$ . The group which is not abelian is called non-abelian or non-commutative.

**REMARKS**

- An abelian group under addition is sometimes called a 'module'.
- The commutative group is also known as Abelian group after the name of famous mathematician Abel.
- The smallest group for a given composition is the set  $\{e\}$ , containing identity elements.
- A group consisting the identity element only, is called a trivial group, other are called non-trivial groups.

**1.4 FINITE AND INFINITE GROUPS**

If a group contains a finite number of elements, it is called a **finite group**. If the number of elements in a group is infinite, it is called an **infinite group**.

**Order of a Group.** The number of elements in a finite group is called the order of the group. It is denoted by  $o(G)$ .

An infinite group is called a group of infinite order.

**ILLUSTRATIONS**

- The set  $\mathbf{Z}$  of integers is an infinite abelian group with respect to the operation of addition but  $\mathbf{Z}$  is not a group with respect to the multiplication.
- Let  $G = \{1\}$ , then  $G$  is an abelian group of order 1 with respect to multiplication.
- Let  $G = \{0\}$ , then  $G$  is an abelian group of order 1 with respect to addition.
- Let  $G = \{1, -1\}$ , then  $G$  is an abelian group of order 2 with respect to multiplication.

**1.4.1 GENERAL PROPERTIES OF GROUPS**

Here, we shall discuss some important properties of groups.

**Theorem 1.** Let  $(G, *)$  be a group, then

(i) the identity element is unique.

(ii) every element of  $G$  has unique inverse in  $G$ .

**Proof.** (i) Let, if possible  $e_1$  and  $e_2$  be two distinct identities of the group  $G$ . Then, by definition of identity, we have

and

Hence, it follows that  $e_1 = e_2$

$\Rightarrow$  Identity is unique.

$$e_1 * e_2 = e_1$$

$$e_1 * e_2 = e_2$$

(since  $e_2$  is identity)

(since  $e_1$  is identity)

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Bachelor of Science

## Basic Analytical Chemistry

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# Basic Analytical Chemistry

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1. INTRODUCTION
2. ANALYSIS OF WATER
3. ANALYSIS OF FOOD PRODUCTS
4. ANALYSIS OF COSMETICS



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## CHAPTER

# 1

### INTRODUCTION

#### ANALYTICAL CHEMISTRY : ROLE

Analytical chemistry is concerned with the chemical characterisation of matter and the answer to two important questions: What is it (qualitative) and how much is it (quantitative)? Chemicals make up everything we use or consume, and knowledge of the chemical composition of many substances is important in our daily life. Analytical chemistry plays an important role in nearly all aspects of chemistry, for example, clinical, agricultural, environmental, forensic, manufacturing, metallurgical, and pharmaceutical concerns. The nitrogen content of a fertilizer determines its value. Food must be analysed for contaminants (e.g., pesticide residues) and for essential nutrients (e.g., vitamin contents). The air in the cities must be analyzed for carbon monoxide. Blood glucose must be monitored for diabetes and, in fact, most diseases are diagnosed by chemical analysis. The quality of manufactured products often depends upon proper chemical proportions, and measurement of the constituents is a necessary part of quality control. The carbon content of steel will determine its quality. The purity of drugs will determine their efficacy.

The above description of analytical chemistry provides an overview of the discipline of analytical chemistry.

Analytical chemistry provides the methods and tools needed for insight into our material world, for answering our basic questions about a material sample:

- ◆ What ?
- ◆ Where ?
- ◆ How much ?
- ◆ What arrangement, structure or form ?

Analytical chemistry seeks ever improved means of measuring the chemical composition of natural and artificial materials. The techniques of this science are used to identify the substances which may be present in a material and to determine the exact amounts of the identified substances.

An Analytical chemist tries to serve the needs of many fields:

- ◆ In medicine, analytical chemistry is the basis of clinical laboratory <sup>Registration</sup> which help physicians to diagnose diseases and chart <sup>Mangalayatan University</sup> Beswan, Aligarh recovery.
- ◆ In industry, analytical chemistry provides the means of testing raw materials and for assuring the quality of finished product whose chemical composition is critical. Many house-hold products, fuels, paints, pharmaceuticals, etc. are analyzed by the procedures developed by the analytical chemists before being sold to the consumer.

- ♦ Environmental quality is often evaluated by testing for suspected contaminants using the techniques of analytical chemistry.
- ♦ The nutritional value of food is determined by chemical analysis of major components such as proteins and carbohydrates and trace components such as vitamins and minerals. Indeed, even the calories in food are often calculated from its chemical analysis.
- ♦ An analytical chemist also makes important contribution to fields as diverse as forensics, archaeology and space science.

Analytical chemistry consists of two types of analysis:

1. Qualitative Analysis
2. Quantitative Analysis

Qualitative analysis deals with the identification of elements, ions or compounds present in a sample.

Quantitative analysis deals with the determination of how much of one or more constituents is present in the sample which may be solid, liquid, gas or mixture.

### **TYPES OF ANALYSIS**

To select an appropriate method of analysis, following important factors must be taken into account:

(a) The nature of the information which is sought.

(b) The size of the sample available and the proportions of the constituents to be determined and,

(c) The purpose for which analytical data are required.

**With respect to the information which is furnished, different types of chemical analysis may be classified as follows:**

**1. Proximate Analysis:** In this analysis the amount of each element in a sample is determined with no concern as to the actual compounds present.

**2. Partial Analysis:** It deals with the determination of selected constituents in the sample.

**3. Trace constituents Analysis:** It is a specialised instance of partial analysis which is concerned with the determination of specified component present in very minute quantity.

**4. Complete Analysis:** In this analysis, the proportion of each component of the sample is determined.

**On the basis of sample size, the analytical methods are again classified into following classes:**

**1. Macro Analysis:** Macro analysis is concerned with the quantities of 0.1 g or more.

**2. Meso Analysis (semimicro):** This analysis measures quantities ranging from  $10^{-2}$  g to  $10^{-1}$  g.

**3. Micro Analysis:** This type of analysis deals with the quantities ranging from  $10^{-3}$  to  $10^{-2}$  g of sample.

**4. Submicro Analysis:** In submicro analysis the sample quantity ranges from  $10^{-4}$  to  $10^{-3}$  g.

**5. Ultra micro Analysis:** It deals with quantities below  $10^{-4}$  g.

**On the basis of the concentration of constituents in the sample analysis is again classified into three categories:**

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**1. Major Constituent Analysis:** It is one, which accounts for 1–100 percent of sample under investigation.

**2. Minor Constituent Analysis:** In this type of analysis, the minor constituent is present in the range of 0.01–1 percent.

**3. Trace Constituent Analysis:** Here trace constituent is analysed which is present at a concentration of less than 0.01 percent.

With the development of increasingly sophisticated analytical techniques it has become possible to determine substances present in quantities much lower than 0.01 percent upper level, set for trace constituents. Therefore a further division is made:

**1. Trace Analysis:** Corresponds to  $10^2$ – $10^4$   $\mu\text{g}$  per gram, or  $10^2$ – $10^4$  ppm.

**2. Micro trace Analysis:** Corresponds to  $10^2$ – $10^{-1}$   $\mu\text{g}$  per gram, or  $10^{-2}$ – $10^{-7}$  ppm.

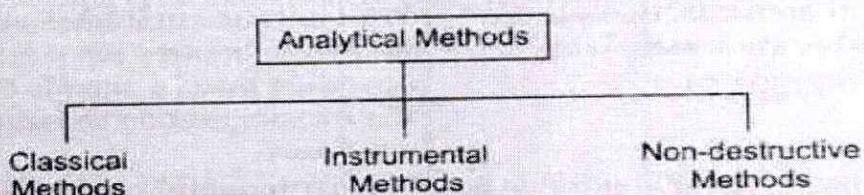
**3. Nanotrace Analysis:** Corresponds to  $10^2$ – $10^{-1}$  fm per gram, or  $10^{-7}$  to  $10^{-10}$  ppm.

**4. Subtrace Analysis:** When the sample weight is less than 0.01 percent.

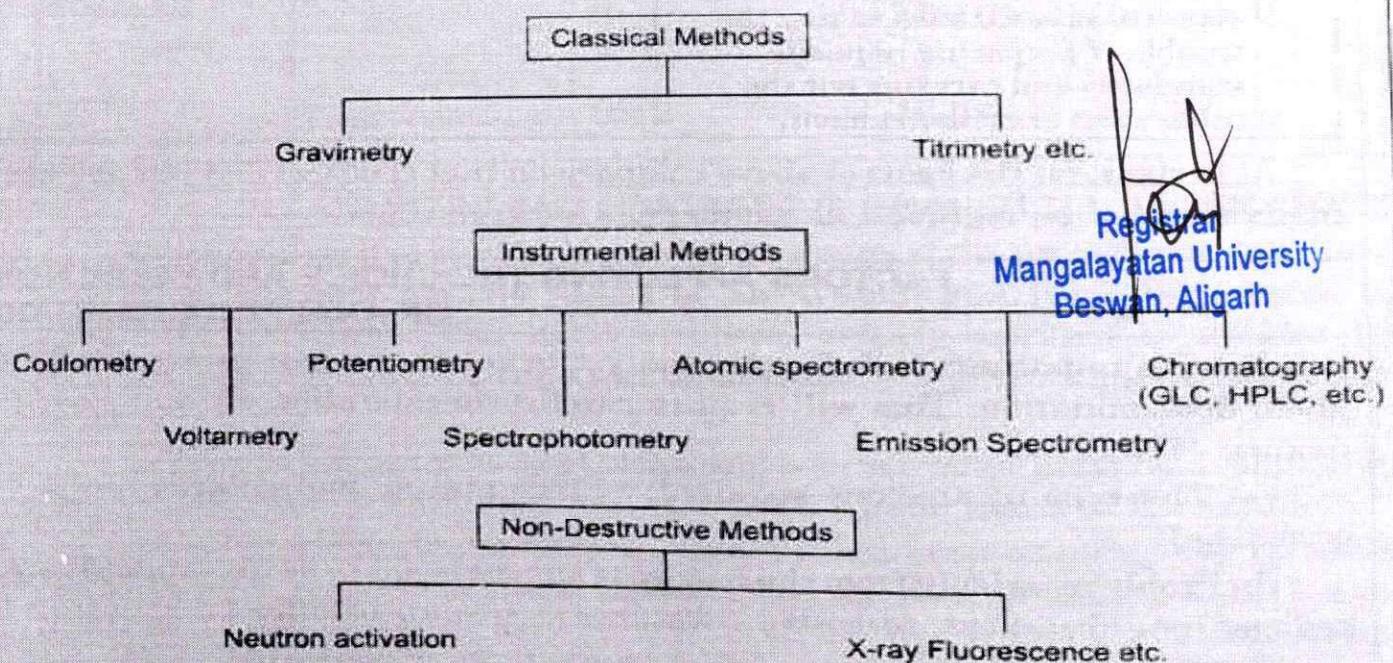
**5. Ultratrace Analysis:** When the sample is less than 0.001 percent.

### CLASSIFICATION OF ANALYTICAL METHODS

Analytical methods are divided into three categories, as follows:



The classical methods are again divided into different classes, such as:



### ANALYTICAL METHODS

There are mainly three types of analytical methods available, such as:

1. Classical Methods



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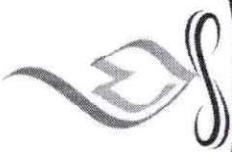
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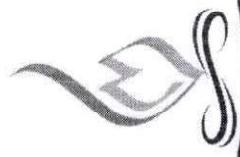
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User Orientation



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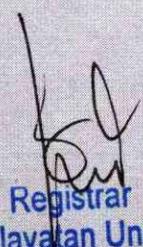
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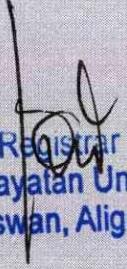
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MASTER OF ARTS (MA ENGLISH)  
SEMESTER-I

**British Drama**

**MAO-6103**

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Edited By  
**Dr. Rashmi Saxena**

  
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- About the Author
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- Dramatic Personal
- Major Characters- An Intensive Study
- Important Themes, Motifs and Symbols
- Summary and Analysis
- Review Questions
- Suggested Reading

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Answer to check your progress  
Review Questions  
Suggested Reading



# **HISTORIOGRAPHY**

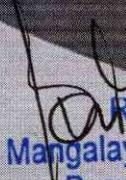
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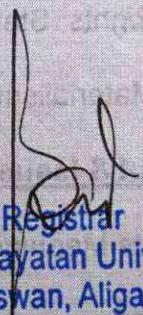


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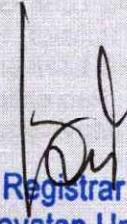


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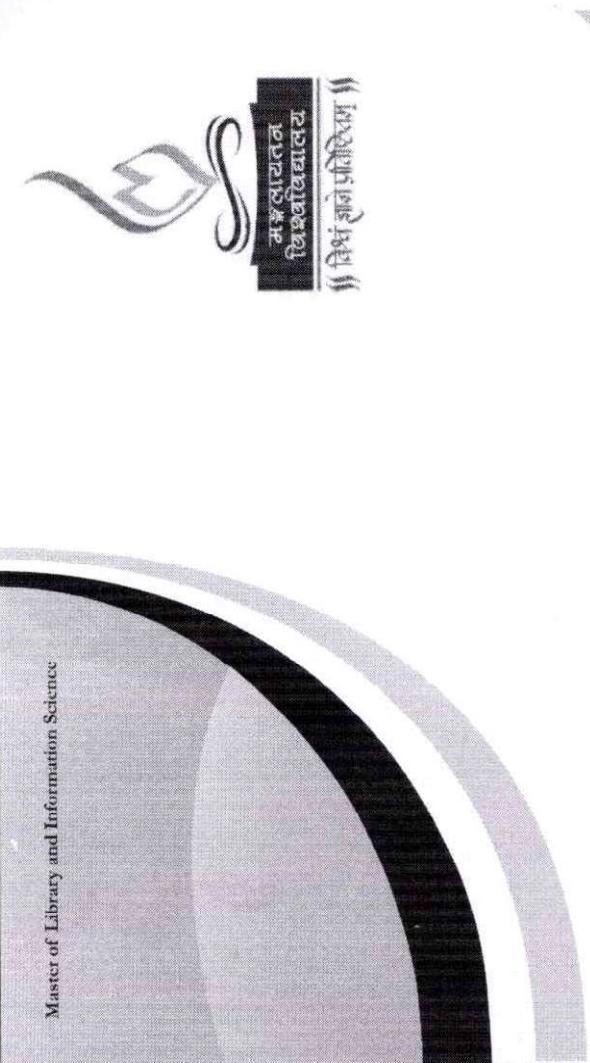
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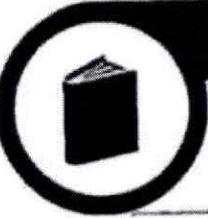


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## Research Methodology and Statistical Techniques

# Syllabus

### Unit 1: Research

- Concept, Meaning, Purpose of Research ; Types of Research - Fundamental and Applied Including Interdisciplinary and Multidisciplinary Approach ; Trends in LIS Research

### Unit 2 : Research Design

- Conceptualization and Operationalization ; Types of Research Design ; Identification and Formulation of Problem ; Hypothesis: Nominal and Operational Definition ; Literature Review

### Unit 3 : Research Methods and Techniques

- Scientific Methods ; Historical Methods ; Descriptive Methods ; Survey Methods and Case Study Methods ; Experimental Methods and Sampling ; Data Collection Techniques; Questionnaire ; Interview ; Observation ; Schedules

### Unit 4 : Data Analysis and Interpretation

- Descriptive Static-measures of Central Tendency: Mean, Mode and Median ; Classification and Tabulation; Standard Deviation ; Graphical Presentation: Bar Diagram, Line Graph, Histograms, Pie-Chart ; Testing of Hypothesis: Z-T test, Chi-Square Test

### Unit 5 : Bibliometrics Laws

- Bibliometrics: Bibliometric Laws : Bradford; Zipf's; Lotka Scientometrics ; Informatics ; Webometrics ; Research Report Writing: Structure, Style, Contents

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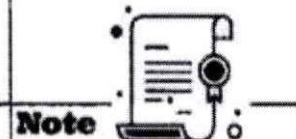
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# Research

## 1.1 Introduction

Man is a curious creature who is always curious to know new facts. As a result of the inquisitive nature of human beings, new ideas are born every day. When a person thinks deeply on these ideas and proves their truth through experiments and analysis, then these ideas are converted into systematic knowledge. Systematic knowledge has played an important role in human development. In the journey from the agricultural age to the industrial age and from the industrial age to the information age, the path has been knowledge. Today whom we call developed nations are information and knowledge based societies. There in the social and economic activities the latest information is generated, exchanged and used. While the majority of the Gross Domestic Product (GDP) comes from the activities of the R & D and services sector. Research and development and academic activities in these countries are encouraged and supported at all levels. At the same time, the latest scientific researches in the fields of science, social sciences and even the humanities have been promoted all around in these nations.

Need is the mother of invention. The ever-increasing needs and demands of society have given rise to new inventions. Today R & D activities have become a collective or organized effort rather than a single effort and research institutes and laboratories have been established to encourage R & D activities and achieve quick results. These institutions are engaged in research work day and night. Governments have also understood the importance of R & D



Note

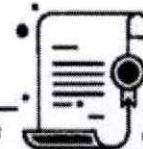


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## **UNIT- 1**

### **RESEARCH**



**Note**

3. P.M. Kukra has given some characteristics about the initial letters of the word "Research", which are as follows :
- R - Rational way of thinking
  - E - Expert and exhaustive treatment
  - S - Search of Solution
  - E - Exactness
  - A - Analysis
  - R - Relationship of facts
  - C - Critical observation, careful recording, constructive attitude and condensed generalizations.
  - H - Honesty and hard working

On the basis of these above-mentioned research definitions, it can be said that research is not just a discovery, but it is a scientific, purposeful, logical and systematic search. The researcher does this in a critical and reasoned manner.

#### **1.4 Purpose of Research**

The research objectives are as follows :

- To search for new knowledge, new findings, new solutions and new facts.
- Verifying available knowledge.
- Finding solutions to new problems being faced by human life.
- Detection of future problems and possible solutions.
- To add onto the collection of knowledge.
- To find work-cause relationships of various events.
- Socio-economic development of the people.
- To find out the complexities of nature and human properties interrelationships and to find solutions for them.

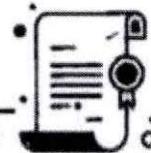
#### **1.5 Characteristics of Research**

Characteristics of research are as follows :

- Research design is related to social research.
- Research design gives the researcher an idea of a certain direction of research.

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## UNIT- 1 RESEARCH



Note

Intradisciplinary researchers from different fields not only work closely together on a common problem over an extended period of time but also create a shared conceptual model of the problem that integrates and transcends their separate disciplinary perspectives.

### 1.9.4 Differences in Multidisciplinary and Interdisciplinary Research

The multidisciplinary and interdisciplinary research are based on different ideologies. The following table identifies the basic differences between the multidisciplinary and interdisciplinary research.

	Multidisciplinary	Interdisciplinary
1.	Working with several disciplines	Working between two or more disciplines
2.	Members from different disciplines work on different aspects of a project or in parallel or sequential manner, and later add up the results.	Members from different disciplines work jointly on the same project and produce integrated outcomes.
3.	Individual goals from different professions are applied to the given problem	Goals are shared among the members.
4.	Participants maintain own disciplinary roles while working together.	Participants accept the common role but still maintain a discipline-specific base.
5.	Disciplinary boundaries remain unchanged.	Blurring of disciplinary boundaries.
6.	External coherence (motivated by a desire to focus on client's needs)	External as well as internal coherence (motivated by a desire to focus on different dimensions of the issue at hand and the needs of the team).
7.	Participants learn about each other about their respective disciplines.	Participants learn about and from each other and develop a common understanding.

  
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