**B.COM.**
**SEMESTER I**
**Commercial Arithmetic – I (CC 4)**
**(100 marks - 60 Lectures)**

**Objectives:**

- **To provide basic knowledge of mathematics and its applications in the field of Commerce and industry.**
- **To acquaint the students with wide ranging applications of mathematical techniques to Commerce, Economics and practical situations.**

**Unit I Mathematical Logic and Set Theory**

**(a) Mathematical Logic (10marks - 7 Lectures)**

- Logical Statement, Truth value.
- Compound Statement, Negation, Conjunction, Disjunction
- Conditional and Bi-conditional statement
- Truth tables
- Logical equivalence
- Tautology and Contradiction
- Argument, Validity of an argument (using truth table for 2 statements only)

**(b) Set Theory (10marks - 6 Lectures)**

- Quadratic equation, Solution of general quadratic equation $ax^2 + bx + c = 0$
- Sets: Definition, Representation of sets
- Types of sets: Finite and infinite sets, null sets, singleton set, examples
- Venn diagrams
- Subset, Complement of a set, Union, Intersection and Difference of sets, Power sets
- De Morgan's Law, Verification by examples and Venn diagrams
- Number of elements of a set, Results involving number of sets (upto three sets) and problems based on these results

**Unit II Permutations and Combinations (20marks - 15 Lectures)**

- Fundamental Principle – examples
- Factorial notation
- Definition of Permutation
- Number of permutations of *n* different things taken *r* at a time
- Permutations with repetition
- Definition of Combination
- Number of combinations of *n* different things taken *r* at a time (no proof for results)

**Unit II Progressions and Mathematics of Finance**

**(a) Progressions ( 20marks - 10 Lectures)**

- Arithmetic Progression (A.P.)
- Definition of A.P.
- Formula for nth term of an A.P.
- Sum of the first n terms of an A.P.
- Business applications of A.P.
- Geometric Progression (G.P.)
- Definition of G.P.
- Formula for nth term of a G.P.
- Sum of the first n terms of a G.P.
- Business applications of G.P.

**(b) Mathematics of Finance (25marks - 12 Lectures)**

- Simple Interest
- Compound Interest – compounded annually, six monthly, quarterly, monthly and daily
- Nominal and Effective rate of interest
- Present and future value
- Ordinary annuity, Present value of ordinary annuity
- EMI using Interest on reducing balance and Flat Interest rate

**Unit IV Determinants and Matrices (15marks - 10 Lectures)**

- Determinant - Meaning , Order Minor , Co-factor, Expansion (Order 2 and 3)
- Cramer's Rule
- Matrices - Definition, Notation, Types of matrices
- Algebra of Matrices – Negative, Transpose, Equality, Addition and Subtraction, Scalar multiplication, Matrix multiplication.
- Applications to Business Problems

**B.COM.**
**SEMESTER II**
**Commercial Arithmetic – II (CC 8)**
**(100 marks - 60 Lectures)**

**Unit I The Straight Line (25marks - 12 hours)**

- Rectangular Cartesian Co-ordinate System
- Distance formula, Section formula (Simple problems only)
- Slope and intercepts of a straight line
- Equations of lines parallel to the axes.
- Equations of lines in slope point form, two point form, slope intercept form, two Intercept form
- General equation of a line, Parallel and perpendicular lines
- Intersection of lines
- Graphs of linear equations and inequalities
- Graphical solution of Linear Programming Problems with two variables only

**Unit 2 Calculus I**

**(a) Relations and Functions (5marks - 4 Lectures)**

- Ordered pair
- Cartesian product
- Relation, Function – Domain, Co-domain, Range.

**(b) Limits and Continuity (5marks - 4 Lectures)**

- Definition
- Operations of finding limits
- Algebra of limits
- Concept of continuity and examples

**(c) Derivatives and their Applications (25 marks - 12 Lectures)**

- Concept of derivatives
- Standard forms
- Algebra of derivatives
- Derivatives of composite functions
- Higher order derivatives
- Applications – Total revenue function, Total cost function, Elasticity of demand and supply
- Increasing and decreasing function/sign of derivative (economic applications)

- Maxima and Minima (economic applications)

**Unit III Calculus II**

**(a) Integration and its Applications (15marks - 12 Lectures)**

- Definition
- Standard forms $x^n$, $e^x$, $a^x$, 1/x
- Integral of f(x) + g(x) and kf(x)
- Integral of $(ax+b)^n$, $e^{ax+b}$, $k^{ax+b}$, 1/ax+b
- Applications – Total revenue function, Total cost function
- Definite integration
- Area under a curve (formula only)
- Consumer's Surplus and Producer's Surplus

**(b) Partial Derivatives (5marks - 4 Lectures)**

- Definition
- Partial derivatives of first and second order
- Economic applications: Demand function, Utility function, Production function

**Unit IV Commercial Mathematics (20marks - 12 Lectures)**

- Ratio
- Proportion
- Percentage
- Discount – Trade Discount, Cash discount, Discount and profit.

**References**


1. Joshi N. and Chitale S.G., *A New Approach To Mathematical Techniques* ,Sheth Publishers
2. Vaidya M.L., Deshpande A.V., Kumtha A.P., *Elementary Business Mathematics*, VipulPrakashan
3. DikshitAmarnath, Jain Jinendra Kumar, *Business Mathematics*, Himalaya Publishing House
4. GoelAjayandGoelAlka, *Mathematics and Statistics*, Taxmann Allied Services
5. Vaidya M.V., KumthaA. P., *Business Mathematics*, VipulPrakashan
6. ShahS., *Business Mathematics(for ICWAI International Course),* New Central Agency.
7. Abranches, M.E, *Mathematical Techniques*, Gracias Print Arts.

**B.COM.**
**SEMESTER III**
**Business Statistics– I (GE 3)**
**(100 Marks - 60 Lectures)**

**Unit I Data Analysis (15 Lectures -24 marks)**

Introduction:Meaning and definition of Statistics,function,scope and limitation of Statistics, Basic Statistical concepts: Population, sample, variate, attribute, parameter and Statistic. Types of data-Primary and secondary data, Sources and methods of collecting data, classification-univariate frequency distribution and questionnaire design. Graphs and diagrams-Frequency polygon,frequency curve and Ogives, Simple, multiple, subdivided bar diagram, pie chart.

**Unit II Summarisation Measures (24 Lectures -40 marks)**

Measures of Central Tendency: Meaning, objectives and requirement of a good measure of central tendency, Arithmetic Mean,Mode and Median(with & without grouping), Harmonic Mean(ungrouped data), Quartiles, deciles and percentiles. Measures of Dispersion: Meaning,objectives and requirement of a good measure of dispersion,absolute and relative measure, Range,quartile deviation, mean deviation,standard
deviation, Coefficient of range, , Coefficient of quartile deviation, , Coefficient of mean deviation, Coefficient of variation, Skewness- Karl Pearson's and Bowley's measure and coefficient of Skewness.

**Unit III Index Numbers (13 Lectures -18 marks)**

Meaning,types, uses and limitations of index numbers, Methods of constructing price and quantity Index numbers by weighted and unweighted methods, Weighted aggregative-Laspeyre's, Paasche's , Fishers and Value index numbers,Weighted average of price relatives, fixed base,chain base,shifting of base, deflating and splicing of Index numbers, cost of living Index numbers.

**Unit IV Analysis of Time series (8 Lectures -18 marks)**

Components andmodels of Time series, Measurement of trend-semi averages, moving averages, freehand and least square method(linear and non linear).

**References:**


1. Gupta S.P.,*Statistical Methods*, Sultan Chand & sons.
2. Gupta C.B., *Fundamentals of Statistics*, Himalaya Publishing House.
3. Shah, R.J., *Statistical Methods*.
4. Mazumdar Neeta, *Statistical Techniques*, RajhaunsVitaran.

**B.COM.**
**SEMESTER IV**
**Business Statistics – II (GE 5)**
**(100 Marks - 60 Lectures)**

**Unit I Correlation and Regression Analysis (14Lectures -30marks)**
Meaning, Types and Methods of studying Correlation, Scatter Diagram, Karl Pearson's Coefficient of Correlation, Spearman's Rank Coefficient of Correlation, Properties of Coefficient of correlation, Linear Regression, Lines of regression and regression coefficients.

**Unit II Probability Theory (21Lectures -36 marks)**
Elements of Probability-Random Experiments, events, definition of probability, conditional probability, addition and multiplication theorem, Mathematical expectation. Theoretical Distribution - Random variable, Binomial, Poisson and Normal Distribution.

**Unit III Sampling Theory (14Lectures -16 marks)**
Methods of sampling- Census and Sample enumeration, Methods of Sampling: Simple Random Sampling, Systematic Sampling, Stratified Sampling, Cluster Sampling, Purposive Sampling, Quota and multi stage sampling (with examples). Test of Hypothesis and Estimation- Sampling distribution, Standard error, Sample mean and Sample proportion, confidence limits, population mean and population proportion, Procedure for testing of hypothesis, Type I and Type II error, critical region, level of significance, test of significance for large samples.

**Unit IV Interpolation and Extrapolation (11Lectures -18marks)**
Finite differences, Forward and Backward differences, Forward and Backward difference table, Newton-Gregory forward and backward difference formula for equidistant values of the argument (only applications), Lagrange's Interpolation formula for unequally spaced points(only applications), Shift Operator, Binomial Expansion method to find missing values (maximum 2 missing values).

**References:**

1. Gupta S.P., *Statistical Methods*, Sultan Chand & sons.
2. Gupta C.B., *Fundamentals of Statistics*, Himalaya Publishing House.
3. Shah R.J., *Statistical Methods*.
4. Mazumdar Neeta, *Statistical Techniques*, RajhaunsVitaran.
5. Sastry S.S., *Introductory Methods of Numerical Analysis*