SYLLABUS FOR THE BATCH FROM YEAR 2023 TO YEAR 2026

B.A. / B.Sc.

(12+3 SYSTEM OF EDUCATION)

Quantitative Techniques

(Credit Based Grading System)

Examinations: 2023–26

GURU NANAK DEV UNIVERSITY AMRITSAR

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B.A./B.Sc. (12+3 System of Education) *(Semester–I) (CBGS) (Batch 2023-26)*
(Faculty of Economics & Business)

SEMESTER–I

QUANTITATIVE TECHNIQUES

QUANTITATIVE TECHNIQUES-I

Time: 3 Hours **Credits : L - T - P**
4 - 0 - 0
Total Marks: 100

Note : 1 Credit = 1 hour of Teaching
4 Credit = 6 lectures of 40 minutes per week

Instructions for the Paper Setters:-
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION–A

Solution of Linear Equations: Solution of Simultaneous Linear Equations (upto two variable case), Application of Linear Equation in Economics; Solution of Quadratic Equations. Series: Arithmetic Progression Series, Geometric Progression Series and their applications in economics.

SECTION–B

Elements of Analytical Geometry: Straight line; Concepts of combination and permutation, Elements of set theory, union, intersection, difference, symmetric difference, complementation, Venn diagrams.

SECTION–C

Difference between a constant and a variable, concept of functions, classifications of functions, graph of linear and quadratic functions (Economic applications).
Limits and continuity of a function. Concept of differentiation (ab-intio principle).

SECTION–D

Derivatives (Excluding Trigonometric and Inverse Functions): Rules of derivatives; functions of functions rule; derivatives of implicit functions, parametric functions, exponential functions, logarithmic functions (Application in Economics).

Books Recommended:-

1. Monga, G.S.: Mathematics and Statistics for Economics
2. Yamane, Taro: Mathematics for Economists.
3. Allen, R.G.D.: Mathematical Analysis for Economists.
4. Edward T Dowling: Introduction to Mathematical Economics.

B.A./B.Sc. (12+3 System of Education) *(Semester–II) (CBGS) (Batch 2023-26)*
(Faculty of Economics & Business)

SEMESTER–II

QUANTITATIVE TECHNIQUES

QUANTITATIVE TECHNIQUES-II

Time: 3 Hours **Credits : L - T - P**
4 - 0 - 0
Total Marks: 100

Note : 1 Credit = 1 hour of Teaching
4 Credit = 6 lectures of 40 minutes per week

Instructions for the Paper Setters:-
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION–A

Statistics : Definition, Scope in Economics, Significance, Limitations. Tabulation, Classification and Graphical representation of data (Pie Chart, Bar Diagram, Histogram, Frequency Polygon, Ogive Curve, etc.).

SECTION–B

Concepts and Measures of Central Tendency: Mean, Median and Mode; Concepts and Measures of Relative Dispersion.

SECTION–C

Correlation Analysis: Introduction, Importance, Karl-Pearson's Coefficient of Correlation, Spearman's Rank Correlation Coefficient, Simple Regression Analysis; Difference between Correlation and Regression, Lines of Regression, Properties of Correlation and Regression Cofficients (Stress on numerical examples).

SECTION–D

Index Numbers: Concept of Index Number, Purpose Construction & Problems, Laspeyre, Paasche and Fisher's Formulae, Tests of Consistency.
Analysis of Time Series: Definition, Components of Time Series, Measurement of Trend by different methods; stress on examples.

Books Recommended:-

1. Gupta, S.P.: Statistical Methods (1981).
2. Croxton, Cowden & Klein: Applied General Statistics (1973).
3. Ya-lun-chou: Statistical Analysis (1975)
4. Kapur and Sexena: Mathematical Statistics (1970)
5. Murry, R. Speigal: Theory and Problems of Statistics (1972).

B.A./B.Sc. (12+3 System of Education) *(Semester–III) (CBGS) (Batch 2023-26)*
(Faculty of Economics & Business)

SEMESTER–III

QUANTITATIVE TECHNIQUES

QUANTITATIVE TECHNIQUES-III

Time: 3 Hours **Credits : L - T - P**
4 - 0 - 0
Total Marks: 100

Note : 1 Credit = 1 hour of Teaching
4 Credit = 6 lectures of 40 minutes per week

Instructions for the Paper Setters:-
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION–A

Differentiation: Maxima and Minima of Functions, Partial derivatives, Higher order partial derivatives.

SECTION–B

Integration (Excluding Trigonometric and Inverse Functions): Indefinite Integrals; Integration by Partial Fractions; Integration by substitution; Integration by parts; Definite Integrals.
Application of Integration in Consumer Surplus and Producer Surplus.

SECTION–C

Matrices: Definition, Types, Addition, Subtraction and Multiplication of Matrices, Scaler Multiplication, Transposition, Determinants and their Properties, Minors and Co-factors, Rank of a Matrix, Inverse of a Matrix, Crammer's Rule for Solution of Simultaneous system of equations. Applications of matrices in economics.

SECTION–D

Linear Programming: Formulation of problem, Assumptions, Graphical solution, Simplex method. Use of Artificial Variables, Dual Simplex method.
Input-Output Analysis: Basic concepts, Input-Output tables for closed and open economies, Leontief Basic Input-Output Model.

Recommended Texts:

1. Yamane Taro: Mathematics for Economics, Prentice Hall of India, New Delhi, 1995.
2. Allen R.G.D.: Mathematical Analysis for Economists, ELBS and Macmillan Press, 1971.
3. Chaing, A.: Fundamental Methods of Mathematical Economics.

B.A./B.Sc. (12+3 System of Education) *(Semester–IV) (CBGS) (Batch 2023-26)*
(Faculty of Economics & Business)

SEMESTER–IV

QUANTITATIVE TECHNIQUES

QUANTITATIVE TECHNIQUES-IV

Time: 3 Hours **Credits : L - T - P**
4 - 0 - 0
Total Marks: 100

Note : 1 Credit = 1 hour of Teaching
4 Credit = 6 lectures of 40 minutes per week

Instructions for the Paper Setters:-
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION–A

Multiple Linear Regression: Concepts, Estimation and Applications (without derivations) of Partial and Multiple Correlation.
Non-Linear Regression: Quadratic and Exponential; Estimation of Fitting of Various Growth Curves (Modified Exponential, Gempertz and Logistic).

SECTION–B

Probability: Definition, Additive & Multiplicative Laws and their Applications, Bayes Theorem, Concept of Random Variable, Probability Mass Function & Density Function, Mathematical Expectation (meaning and properties), Moments elementary treatment.

SECTION–C

Theoretical Probability Distributions: Derivations of the properties of Binomial, Poisson, Normal, Beta and Gamma Distributions.

SECTION–D

Sampling: Various concepts – Population, Sampling Units, Complete Enumeration sample Surveys, Concept of an Estimator and The Standard Error, Standard Error of Estimates. Features of a Good Sample, Random and Subjective Sampling, Simple Random Sampling (with and without replacement), Stratified Random Sampling (applications only).

Books Recommended:

1. Mood Graybill and Boes: Introduction to the Theory of Statistics (1974)
2. Snedecor and Cochran: Statistical Methods.
3. Sukhatme and Sukhatme: Sampling Theory of Surveys with Applications (1970).
4. Croxton Cowden and Applied General Statistics (I 973).
5. Kapur and Gupta: Fundamentals of Mathematical Statistics.
6. Murray R. Spiegel: Theory and Problems Statistics (1972)

B.A./B.Sc. (12+3 System of Education) *(Semester–V) (CBGS) (Batch 2023-26)*
(Faculty of Economics & Business)

SEMESTER –V

QUANTITATIVE TECHNIQUES

QUANTITATIVE TECHNIQUES–V

Time: 3 Hours **Credits : L - T - P**
4 - 0 - 0
Total Marks: 100

Note : 1 Credit = 1 hour of Teaching
4 Credit = 6 lectures of 40 minutes per week

Instructions for the Paper Setters:-
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION–A

Statistical Inference: Point & Interval Estimation; Properties of a Good Estimator, Maximum Likelihood Method of Estimation, its applications for Binomial, Poisson and Normal distributions. Basic Concepts of Null and Alternative Hypotheses, Types of Errors; One Tailed and Two Tailed Tests, Power of Test, Critical Region.

SECTION–B

Sampling Distributions: Derivation of properties of Z, T, Chi Square and F distributions.

SECTION–C

Tests of significance based upon distribution of Z, t, F and Chi-square.

SECTION–D

Analysis of Variance: Introduction, Assumptions, Techniques of Analyzing Variance, Analysis of Variance of one-way and two-way classification.

Books Recommended:

1. Sukhatme, P.V. and Sukhatme, B.V.: Sampling Theory of Surveys with Applications, Lowa State University Press, Ames, Lowa (1970).
2. Goon, Gupta and Dass Gupta:An Outlines of Statistical Theory, Dass Gupta Vol. 1(1977).
3. Kapur and Gupta: Fundamentals of Mathematical Statistics, Sultan Chand, New Delhi.
4. Murry, R. Spiegal Statistics: Theory & Practical (1972), McGraw Hill, New York.

SEMESTER–VI

QUANTITATIVE TECHNIQUES

QUANTITATIVE TECHNIQUES–VI

Time: 3 Hours **Credits : L - T - P**
4 - 0 - 0
Total Marks: 100

Note : 1 Credit = 1 hour of Teaching
4 Credit = 6 lectures of 40 minutes per week

Instructions for the Paper Setters:-
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION–A

Definition, Scope and Nature of Econometrics. Simple Linear Regression Model (OLS method) with applications.

SECTION–B

General Linear Regression Model, assumptions, properties (BLUE).
Gauss-Markov Theorem, Concepts of R^2 and $\bar{R}^2$, Test of Significance (Stress on Numericals).

SECTION–C

Econometric Problems of Heteroscedasticity and Multicollineraity in the Regression Analysis: Sources, Consequences, Tests and Remedial Measures. Specification Bias.

SECTION–D

Problem of Auto-Correlation in the Regression Analysis: Sources, Consequences, Tests and Remedial Measures. Distributed Lag Models and Auto-Regressive Models (Introductory). Dummy Variable Technique and its Uses.

Books Recommended:

1. Koutoyannis, A.: Theory of Econometrics.
2. Gujarati: Basic Economics (2003).
3. Mehta and Madnani: Basic Economics.
4. Stock and Watson: Introduction to Econometrics (2004).
5. Dougherty C.: Introduction to Econometrics (2007).