

Rayat Shikshan Sanstha's
Karmaveer Bhaurao Patil College Vashi, Navi Mumbai
Autonomous College
[University of Mumbai]
Syllabus for Approval

Sr. No.	Heading	Particulars
1	Title of Course	F.Y.B.Com.- Mathematical & Statistical Techniques
2	Eligibility for Admission	12th and equivalent [of recognized Boards]
3	Passing Marks	40%
4	Ordinances/Regulations (if any)	
5	No. of Years/Semesters	One year/Two semester
6	Level	U.G.
7	Pattern	Semester
8	Status	Revised
9	To be implemented from Academic year	2019-20

AC- 02 /03 / 2018

Item No-2.33



**Rayat Shikshan Sanstha's
KARMAVEER BHAURAO PATIL COLLEGE, VASHI.
NAVI MUMBAI**

Sector-15- A, Vashi, Navi Mumbai - 400 703

(AUTONOMOUS COLLEGE)

Syllabus for Mathematics

Program: B.Com.

Course: F.Y.B.Com.- Mathematical & Statistical Techniques

**(Choice Based Credit, Grading and Semester System
with effect from the academic year 2019-2020)**

Preamble of the Syllabus:

Bachelor of Commerce (B.Com.) is a under graduation Programme of Department of Commerce, Karmaveer Bhaurao Patil College Vashi, Navi Mumbai [Autonomous College]

The Choice Based Credit and Grading System to be implemented through this curriculum, would allow students to develop a strong footing in the fundamentals and specialize in the disciplines of his/her liking and abilities. The students pursuing this course would have to develop understanding of various aspects of the computer. The conceptual understanding, development of experimental skills, developing professional skills, acquiring basic concepts and understanding of computer techniques are among such important aspects.

Semester I

Course: Mathematical and Statistical Techniques-I Course code: UGMS101

[A] MATHEMATICS: (24 marks)

Unit I: Interest and Annuity:

Learning Outcomes:

1. Understand and calculate simple and compound interest.
2. Identify the situation, when interest is earned and paid.
3. Apply simple and compound interest to different business problems.
4. Describe Future and Present value of various annuities based on the information given.

Content of the Unit:

- a. **Interest:** Simple Interest, Compound Interest (Nominal & Effective Rate of Interest), Calculations involving up to 4 time periods.
- b. **Annuity:** Annuity Immediate and its Present value, Future value, Equated Monthly Installments (EMI) using reducing balance method & amortization of loans, Stated Annual Rate & Affective Annual Rate Perpetuity and its present value, Simple problems involving up to 4 time periods.

Unit II: Matrices, Determinants and Linear Programming Problems:

Learning Outcomes:

1. Define a matrix and its types. Explain the operations defined on a matrix.
2. Find determinant of matrices.
3. Solve system of linear equations using Cramer's rule.
4. Find inverse of a square matrix (up to order 3) using adjoint rule.
5. Formulate and solve Linear Programming Problem graphically.

Content of the Unit:

- a. **Matrices:** Some important definitions and some important results. Matrix operation (Addition, scalar multiplication, matrix multiplication, transpose of a matrix).
- b. **Determinants** of a matrix of order two or three properties and results of Determinants, solving a system of linear equations using Cramer's rule, Inverse of a Matrix (up to order three) using adjoint of a matrix and matrix inversion method, Input Output Analysis.
- c. **Linear Programming Problem:** Sketching of graphs of (i) linear equation $Ax + By + C = 0$, (ii) linear inequalities, Mathematical Formulation of Linear Programming Problems up to 3 variables, Solution of Linear Programming Problems using graphical method up to two variables.

[B] STATISTICS: (36 marks)

Unit III: Summarization Measures:

Learning Outcomes:

1. Define average and its types.
2. Calculate mean, median and mode for grouped as well as ungrouped data.
3. Calculate Quartile, deciles and percentiles for grouped as well as ungrouped data.
4. Using graphs locate median and quartiles and using histogram find mode.
5. Calculate mean deviation, standard deviation and variance for a given data.

Content of the Unit:

- a. **Measures of Central Tendencies:** Definition of Average, Types of Averages: Arithmetic Mean, Median, and Mode for grouped as well as ungrouped data. Quartiles, Deciles and percentiles. Using Ogive locate median and Quartiles, Using Histogram locate mode. Combined and Weighted mean.
- b. **Measures of Dispersions:** Concept and idea of dispersion. Various measures Range, Quartile Deviation, Mean Deviation, Standard Deviation, Variance, Combined Variance.

Unit IV: Permutation and Combination and Elementary Probability Theory:

Learning Outcomes:

1. Define permutation and combination and solve problems.
2. Define probability and solve examples on it.
3. Solve examples on probability distribution of discrete random variable.
4. Find expectation and variance of random variable.

Content of the Unit:

- a. **Permutation and Combination:** Factorial Notation, Fundamental principle of counting, Permutation as arrangement, combination as selection, Relation between n_{C_r} and n_{P_r} , Examples on commercial application of permutation and combination.
- b. **Probability Theory:** Concept of random experiment/trial and possible outcomes; Sample space and Discrete Sample Space, Events & their types, Algebra of Events, Mutually Exclusive and Exhaustive Events, Complimentary events. Classical definition of Probability, Addition theorem, Independence of Events: $P(A \cap B) = P(A)P(B)$, Simple examples.
- c. **Random Variable:** Probability distribution of a discrete random variable; Expectation and Variance of random variable, simple examples on probability distributions.

Unit V: Decision Theory:

Learning Outcomes:

1. Find optimum decision using given criteria.
2. Formulate payoff matrix.
3. Draw decision tree for a given data.
4. Solve examples based on Expected Monetary value and Expected opportunity Loss.

Content of the Unit:

Decision making situation, Decision maker, Courses of Action, States of Nature, Pay-off and Pay-off matrix; Decision making under uncertainty, Maximin, Maximax, Minimax regret and Laplace criteria; simple examples to find optimum decision. Formulation of Payoff Matrix. Decision making under Risk, Expected Monetary Value (EMV); Decision Tree; Simple Examples based on EMV. Expected Opportunity Loss (EOL), simple examples based on EOL.

Semester II

Course: Mathematical and Statistical Techniques-II
Course code: UGMS201

[A] MATHEMATICS: (24 marks)

Unit I: Functions, Derivatives and Their Applications

Learning Outcomes:

1. Calculate total revenue, average revenue, total cost and average cost.
2. Find derivative of the given function using rules of derivatives.
3. Apply derivatives to find marginal cost, marginal revenue, elasticity of demand, maxima and minima for given functions.

Content of the Unit:

- a. **Concept of real functions:** constant function, linear function, x^n , e^x , a^x , $\log x$. Demand, Supply, Total Revenue, Average Revenue, Total cost, Average cost and Profit function. Equilibrium Point, Break-even point.
- b. **Derivative of functions:**
 - i. Derivative as rate measure, Derivative of x^n , e^x , a^x , $\log x$.
 - ii. Rules of derivatives: Scalar multiplication, sum, difference, product, quotient (Statements only), Simple problems. Second order derivatives.
 - iii. Applications: Marginal Cost, Marginal Revenue, Elasticity of Demand. Maxima and Minima for functions in Economics and Commerce.

(Examination Questions on this unit should be application oriented only.)

Unit II: Shares and Mutual Funds

Learning Outcomes:

1. Define shares and its types. Solve examples on it.
2. Identify and describe the terms and concepts associated with mutual fund investment.
3. Solve examples on mutual fund.

Content of the Unit:

- a. **Shares:** Concept of share, face value, market value, dividend, equity shares, preferential shares, bonus shares. Simple examples.
- b. **Mutual Funds:** Simple problems on calculation of Net income after considering entry load, dividend, change in Net Asset Value (N.A.V.) and exit load. Averaging of price under the Systematic Investment Plan (S.I.P.)

[B] STATISTICS: (36 marks)

Unit III: Bivariate Linear Correlation and Regression

Learning Outcomes:

1. Determine correlation using various methods such as Scatter diagram, Karl Pearson's method, Spearman's rank correlation.
2. Find regression coefficient.
3. Find the equation of regression line by method of least squares.
4. Identify regression lines.

Content of the Unit:

- a. **Correlation Analysis:** Meaning, Types of Correlation and Determination of Correlation: Scatter diagram, Karl Pearson's method of Correlation Coefficient (excluding Bivariate Frequency Distribution Table) and Spearman's Rank Correlation Coefficient.
- b. **Regression Analysis:** Meaning, Concept of Regression equations, Slope of the Regression Line and its interpretation. Regression Coefficients (excluding Bivariate Frequency Distribution Table), Relationship between Coefficient of Correlation and Regression Coefficients, Finding the equations of Regression lines by method of Least Squares.

Unit IV: Time series and Index Numbers

Learning Outcomes:

1. Define time series and its components.
2. Represent trend by Freehand curve method.
3. Estimate trend using moving average method and least square method.
4. Find index number by using different methods and cost of living index number.

Content of the Unit:

- a. **Time series:** Concepts and components of a time series. Representation of trend by Freehand Curve Method, Estimation of Trend using Moving Average Method and Least Squares Method (Linear Trend only). Estimation of Seasonal Component using Simple Arithmetic Mean for Additive Model only (For Trend free data only). Concept of Forecasting using Least Squares Method.
- b. **Index Numbers:** Concept and usage of Index numbers, Types of Index numbers, Aggregate and Relative Index Numbers, Lasperye's, Paasche's, Dorbisch-Bowley's, Marshall-Edgeworth and Fisher's ideal index numbers, Test of Consistency: Time Reversal Test and Factor Reversal Test. Chain Base Index Nos. Shifting of Base year. Cost of Living Index Numbers, Concept of Real Income, Concept of Wholesale Price Index Number. (Examples on missing values should not be taken)

Unit V: Elementary Probability Distributions

Learning Outcomes:

1. Solve examples based on binomial, Poisson and normal distribution.

Content of the Unit:

Binomial, Poisson (Properties and applications only, no derivations are expected), Normal Distribution. (Properties and applications only, no derivations are expected).

Tutorial:

1. Two tutorials to be conducted on each unit i.e., 10 tutorials per semester.
2. One tutorial per week per batch (per batch 25 students) should be conducted.

Assignment:

At the end of each semester one assignment of 10 marks should be given.

Reference Books:

1. Business Mathematics by D. C. Sancheti and V. K. Kapoor, Sultan Chand & Sons, 2006, Chapter 1, 5, 7, 9 & 10.
2. Quantitative Methods, Part-I by S. Saha and S. Mukerji, New Central Book Agency, 1996, Chapters 7 & 12.
3. Mathematical Basis of Life Insurance by S.P. Dixit, C.S. Modi and R.V. Joshi, Insurance Institute of India, Chapters 2: units 2.6, 2.9, 2.20 & 2.21.

4. Indian Mutual Funds Handbook: by Sundar Shankaran, Vision Books, 2006, sections 1.7, 1.8.1, 6.5 & Annexure 1.1 to 1.3.
5. STATISTICS by Schaum Series.
6. Modern Business Statistics - (Revised)-B. Pearles & C. Sullivan –Prentice Hall of India.
7. Business Mathematics & Statistics: B Aggarwal, Ane Book Pvt. Limited
8. Business Mathematics: D C Sancheti & V K Kapoor, Sultan Chand & Sons
9. Business Mathematics: A P Verma, Asian Books Pvt.: Limited.

Scheme of Examination

For Semester I & II

A. There will be a **Semester end examination** of **60 marks**.

1. The examinations shall be of **2 Hours** duration.

2. Question Paper Pattern

- a) In **Section I (based on Mathematics)**, two questions carrying 12 marks each. First question should be on Unit I and Second question should be from Unit II.
- b) In each question there should be four sub-questions carrying 6 marks each. Students should be asked to answer any two sub questions from each question.
- c) In **Section II (based on Statistics)**, three questions carrying 12 marks each. First question should be on Unit III, second question should be from Unit IV and third question should be from Unit V.
- d) In each question there should be four sub-questions carrying 6 marks each. Students should be asked to answer any two sub questions from each question.
- e) All the questions shall be compulsory with internal choices within the questions. Including the choices, the marks for each question shall be 24.

B. There will be a **Continuous Internal Assessment** for 40 marks.

Unit Test	Assignment	Tutorial	Total
20	10	10	40

Question paper pattern for Unit Test of 20 marks:

The unit test for 20 marks will be conducted online. There shall be 20 compulsory multiple-choice questions with single correct answer, each carrying one mark.