



**Janardan Bhagat Shikshan Prasarak Sanstha's  
CHANGU KANA THAKUR  
ARTS, COMMERCE & SCIENCE COLLEGE,  
NEW PANVEL (AUTONOMOUS)**

**Re-accredited 'A+' Grade by NAAC  
'College with Potential for Excellence' Status Awarded by UGC  
'Best College Award' by University of Mumbai**

**Program: B.Com.**

**Revised Syllabus of F.Y.B.Com. Mathematical & Statistical  
Techniques**

**Choice Based Credit & Grading System (75:25)  
w.e.f. Academic Year 2019-20**

<b>Sr. No.</b>	<b>Heading</b>	<b>Particulars</b>
1	Title of Course	Mathematical & Statistical Techniques
2	Eligibility for Admission	12 <sup>th</sup> Science & Commerce of all recognised Board
3	Passing marks	40%
4	Ordinances/Regulations (if any)	
5	No. of Semesters	Two
6	Level	U.G.
7	Pattern	Semester (75:25)
8	Status	Revised
9	To be implemented from Academic year	2019-2020

**Introduction:**

There is a rapid expansion of knowledge in subject matter areas and improved instructional method during last decade. There are considerable curricular revisions happening at the high school level. Applications of Mathematics and Statistics are widely used in industry and business. Keeping this in mind, a revision required in accordance with the growth of subject of at the high school level and emerging needs of industry and its application.

**Objectives:**

1. The main objective of this course is to introduce Mathematics and Statistics to undergraduate students of commerce, so that they can use them in the field of commerce and industry to solve the real life problems.
2. To familiarize students with the concept of Shares and Mutual Funds.
3. To familiarize students with the concept of permutation combinations, index number, time value of money, mathematical operations etc.
4. To understand the tools and techniques like measures of central tendencies, dispersion, Correlation and regression.
5. To equip the students with the ability to analysis Interpret data by using statistical techniques.
6. To motivate the students to apply statistical techniques for critical decision making and for research studies.
7. To enrich students for application of modern Statistical tools and techniques.

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**Learning Outcomes:**

This course will help students to learn about the theoretical concept relating Mathematics and Statistics , Shares and Mutual Funds, Permutation Combinations, Index Number , Measures of central tendencies, Dispersion, Correlation and Regression, sources of data, classification of data, Probability, Probability Distribution etc. It will further help to apply the statistical tools and techniques for decision making and for research studies.

### **Teaching Pattern for Semester-I & II**

1. Five lectures per week for course. Each lecture is of 48 minutes duration.
2. One tutorial (1L) per week per batch for course. (The batches to be formed as pre scribed by the University).



**B) Semester End Examination: 75 %**

**75 Marks**

- Duration: The examination shall be of  $2\frac{1}{2}$  hour's duration.

***Question Paper Pattern***

**Theory question paper pattern**

1. There shall be five questions each of 15 marks.
2. All questions shall be compulsory with internal options.
3. Question may be subdivided into sub-questions a, b, c... and the allocation of marks depends on the weightage of the unit.

**❖ Passing Standard**

The learners to pass a course shall have to obtain a minimum of 40% marks in aggregate for each course where the course consists of Internal Assessment and Semester End Examination. The learners shall obtain minimum of 40% marks (i.e. 10 out of 25) in the Internal Assessment and 40% marks in Semester End Examination (i.e. 30 Out of 75) separately, to pass the course and minimum of Grade D, wherever applicable, to pass a particular semester. A learner will be said to have passed the course if the learner passes the Internal Assessment and Semester End Examination together.

**Revised Syllabus of Courses of B.Com. Programme at Semester I  
with Effect from the Academic Year 2019-2020**

**Core Courses (CC)**

**UCM1MST: Mathematical and Statistical Techniques I**

**Modules at a Glance**

Sr. No.	Modules	No. of Lectures
<b>A) Mathematics: (30 Marks)</b>		
1	Shares and Mutual Funds	15
2	Permutation, Combination and Linear Programming Problems	15
<b>B) Statistics: (45 Marks)</b>		
3	Summarization Measures	15
4	Elementary Probability Theory	15
5	Decision Theory	15
<b>Total</b>		<b>75</b>

**Note:**

*One tutorial per batch per week in addition to number of lectures stated above  
(Batch size as per the University norms)*

Sr. No.	Modules / Units
<b>A) Mathematics: (30 Marks)</b>	
<b>1</b>	<b>Shares and Mutual Funds</b>
	<ul style="list-style-type: none"> <li>• <b>Shares:</b> Concept of share, face value, market value, dividend, equity shares, preferential shares, bonus shares. Simple examples.</li> <li>• <b>Mutual Funds:</b> 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.)</li> </ul>
<b>2</b>	<b>Permutation, Combination and Linear Programming Problems</b>
	<ul style="list-style-type: none"> <li>• <b>Permutation and Combination:</b> Factorial Notation, Fundamental principle of counting, Permutation as arrangement, Simple examples, combination as selection, Simple examples, Relation between <math>{}^n C_r</math> and <math>{}^n P_r</math> Examples on commercial application of permutation and combination</li> <li>• <b>Linear Programming Problem:</b> Sketching of graphs of (i) linear equation <math>Ax + By + C = 0</math> (ii) linear inequalities. Mathematical Formulation of Linear Programming Problems upto 3 variables. Solution of Linear Programming Problems using graphical method up to two variables.</li> </ul>
<b>B) Statistics: (45 Marks)</b>	
<b>3</b>	<b>Summarization Measures</b>
	<ul style="list-style-type: none"> <li>• <b>Measures of Central Tendencies:</b> 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.</li> <li>• <b>Measures of Dispersions:</b> Concept and idea of dispersion. Various measures Range, Quartile Deviation, Mean Deviation, Standard Deviation, Variance, Combined Variance.</li> </ul>
<b>4</b>	<b>Elementary Probability Theory</b>
	<ul style="list-style-type: none"> <li>• <b>Probability Theory:</b> 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 (without proof), conditional probability. Independence of Events: <math>P(A \cap B) = P(A) P(B)</math>. Simple examples.</li> <li>• <b>Random Variable:</b> Probability distribution of a discrete random variable; Expectation and Variance of random variable, simple examples on probability distributions.</li> </ul>
<b>5</b>	<b>Decision Theory</b>
	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.



**Revised Syllabus of Courses of B.Com. Programme at Semester II  
with Effect from the Academic Year 2019-2020**

**Core Courses (CC)**

**UCM2MST: Mathematical and Statistical Techniques II**

**Modules at a Glance**

Sr. No.	Modules	No. of Lectures
<b>A) Mathematics: (30 Marks)</b>		
1	Functions, Derivatives and Their Applications	15
2	Interest and Annuity	15
<b>B) Statistics: (45 Marks)</b>		
3	Bivariate Linear Correlation and Regression	15
4	Time series and Index Numbers	15
5	Elementary Probability Distributions	15
<b>Total</b>		<b>75</b>

**Note:**

*One tutorial per batch per week in addition to number of lectures stated above  
(Batch size as per the University norms)*

Sr. No.	Modules / Units
<b>A) Mathematics: (30 Marks)</b>	
<b>1</b>	<b>Functions, Derivatives and Their Applications</b>
	<p><b>Concept of real functions:</b> Constant function, linear function, <math>x^n</math>, <math>e^x</math>, <math>a^x</math>, <math>\log x</math>. Demand, Supply, Total Revenue, Average Revenue, Total cost, Average cost and Profit function. Equilibrium Point, Break-even point.</p> <p><b>Derivative of functions:</b></p> <ul style="list-style-type: none"> <li>Derivative as rate measure, Derivative of <math>x^n</math>, <math>e^x</math>, <math>a^x</math>, <math>\log x</math>.</li> <li>Rules of derivatives: Scalar multiplication, sum, difference, product, quotient (Statements only), Simple problems. Second order derivatives.</li> <li>Applications: Marginal Cost, Marginal Revenue, Elasticity of Demand. Maxima and Minima for functions in Economics and Commerce.</li> </ul> <p>(Examination Questions on this unit should be application oriented only.)</p>
<b>2</b>	<b>Interest and Annuity</b>
	<p><b>Interest:</b> Simple Interest, Compound Interest (Nominal &amp; Effective Rate of Interest), Calculations involving upto 4 time periods.</p> <p><b>Annuity:</b> Annuity Immediate and its Present value, Future value. Equated Monthly Installments (EMI) using reducing balance method &amp; amortization of loans. Stated Annual Rate &amp; Affective Annual Rate Perpetuity and its present value. Simple problems involving up to 4 time periods.</p>
<b>B) Statistics: (45 Marks)</b>	
<b>3</b>	<b>Bivariate Linear Correlation and Regression</b>
	<p><b>Correlation Analysis:</b> Meaning, Types of Correlation, Determination of Correlation: Scatter diagram, Karl Pearson's method of Correlation Coefficient (excluding Bivariate Frequency Distribution Table) and Spearman's Rank Correlation Coefficient.</p> <p><b>Regression Analysis:</b> 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.</p>
Sr. No.	Modules / Units
<b>4</b>	<b>Time series and Index Numbers</b>
	<p><b>Time series:</b> 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.</p> <p><b>Index Numbers:</b> Concept and usage of Index numbers, Types of Index numbers, Aggregate and Relative Index Numbers, Lasperye's, Paasche's, Dorbisich-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)</p>

5	Elementary Probability Distributions
	<b>Probability Distributions:</b> <ul style="list-style-type: none"> <li>Discrete Probability Distribution: Binomial, Poisson (Properties and applications only, no derivations are expected)</li> <li>Continuous Probability distribution: Normal Distribution. (Properties and applications only, no derivations are expected)</li> </ul>

**Tutorial:**

Two tutorials to be conducted on each unit i.e. 10 tutorials per semester. At the end of each semester one Tutorial assignment of 10 marks should be given.

## **Reference Books**

### **Mathematical and Statistical Techniques**

- *Mathematics for Economics and Finance Methods and Modelling* by Martin Anthony and Norman Biggs, Cambridge University Press, Cambridge low-priced edition, 2000, Chapters 1, 2, 4, 6 to 9 & 10.
- *Applied Calculus: By Stephen Waner and Steven Constenoble*, Brooks/Cole Thomson Learning, second edition, Chapter 1 to 5.
- *Business Mathematics* By D. C. Sancheti and V. K. Kapoor, Sultan Chand & Sons, 2006, Chapter 1, 5, 7, 9 & 10.
- *Mathematics for Business Economics: By J. D. Gupta, P. K. Gupta and Man Mohan*, Tata Mc- Graw Hill Publishing Co. Ltd., 1987, Chapters 9 to 11 & 16.
- *Quantitative Methods-Part-I* By S. Saha and S. Mukerji, New Central Book Agency, 1996, Chapters 7 & 12.
- *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.
- *Securities Laws & Regulation of Financial Market : Intermediate Course Paper 8*, Institute of Company Secretaries of India, Chapter 11.
- *Investments* By J.C. Francis & R.W. Taylor, Schaum's Outlines, Tata Mc-Graw Hill Edition 2000, Chapters 2,4 & section 25.1.
- *Indian Mutual Funds Handbook : By Sundar Shankaran*, Vision Books, 2006, Sections 1.7,1.8.1, 6.5 & Annexures 1.1to 1.3.
- *STATISTICS by Schaum Series.*
- *Operations Research by Gupta and Kapoor*
- *Operations Research by Schaum Series*
- *Fundamentals of Statistics - D. N. Elhance.*
- *Statistical Methods - S.G. Gupta (S. Chand & Co.*
- *Statistics for Management - Lovin R. Rubin D.S. (Prentice Hall of India)*
- *Statistics - Theory, Method & Applications D.S.Sancheti & V. K. Kapoor.*
- *Modern Business Statistics - (Revised)-B. Pearles & C. Sullivan –Prentice Hall of India.*
- *Business Mathematics & Statistics: B Aggarwal, Ane Book Pvt. Limited*
- *Business Mathematics: D C Sancheti & V K Kapoor, Sultan Chand & Sons*
- *Business Mathematics: A P Verma, Asian Books Pvt. :Limited.*