

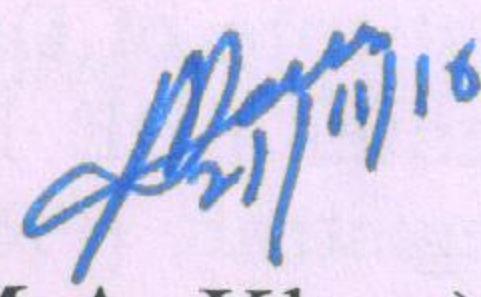
UNIVERSITY OF MUMBAI

No. UG/178 of 2016-17

CIRCULAR:-

A reference is invited to the Syllabi relating to the B.Com degree course **vide** this office Circular No. UG/140 of 2011 dated 14th June, 2011 and the Principals of affiliated Colleges in Commerce are hereby informed that the recommendation made by Board of Studies in Commerce at its meeting held on 21st June, 2016 has been accepted by the Academic Council at its meeting held on 14th July, 2016 **vide** item No. 4.79 and that in accordance therewith, the revised syllabus as per Choice Based Credit System for F.Y.B.Com. in Mathematical and Statistical Techniques (Sem. I & II), which is available on the University's web site (www.mu.ac.in) and that the same has been brought into force with effect from the academic year 2016-17.

MUMBAI - 400 032
22 November, 2016


(Dr.M.A. Khan)
REGISTRAR

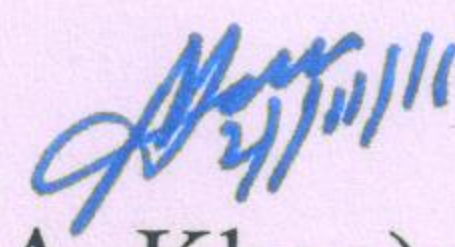
To,
The Principals of affiliated Colleges in Commerce.

A.C/4.79 /14/07/2016

No. UG/178 -A of 2016-17 MUMBAI-400 032 22 November, 2016

Copy forwarded with compliments for information to:-

- 1) The Co-ordinator, Faculty of Commerce,
- 2) The Director, Board of College and University Development,
- 3) The Controller of Examinations,
- 4) The Professor-cum- Director, Institute of Distance and Open Learning (IDOL),
- 5) The Co-Ordinator, University Computerization Centre.


(Dr.M.A. Khan)
REGISTRAR

PTO..

SYLLABUS FOR MATHEMATICAL AND STATISTICAL TECHNIQUES AT
F.Y.B.Com. EXAMINATION
Revised Course
(WITH EFFECT FROM THE ACADEMIC YEAR 2016-2017)

Why Revision?

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. Application of Mathematics and Statistics are widely used in industry and business. Keeping this in mind, a revision of syllabus required in accordance with the growth of subject of at the high school level and emerging needs of industry and its application.

Objective:

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.

Distribution of topics and lectures

a. Workload :

Theory: 5 lectures per week of which 2 lectures are for Mathematics and 3 lectures for Statistics.

Tutorial: 1 lecture per week per batch. Batch size is as prescribed by the University.

No. of working weeks in a semester: 15

Total no. of lectures in a semester: $15 * 5 = 75$

- b. Introductory lecture of about 120 minutes may be arranged for students who did not offer general mathematics in the 9th & 10th Standard and/or Mathematics at the XIth and XIIth to familiarize the students with the concept of Tabulation, Graphical Representation of the data (basically Histogram and Ogives)

Semester I

Course	Topic	No. of lectures
UBCOMFSI.6 Mathematical and Statistical Techniques-I	Unit I	15
	Unit II	15
	Unit III	15
	Unit IV	15
	Unit V	15
	Total	75

Total number of lectures 75 +Notional75=**150** lectures = **3 CREDITS**

Semester II

Course	Topic	No. of lectures
UBCOMFSII.6 Mathematical	Unit I	15
	Unit II	15

and Statistical Techniques-II	Unit III	15
	Unit IV	15
	Unit V	15
	Total	75

Total number of lectures 75 +Notional **75=150** lectures = **3 CREDITS**

MATHEMATICAL AND STATISTICAL TECHNIQUES

WORKLOAD: MATHEMATICS : 2 lectures per week

STATISTICS : 3 lectures per week

TUTORIAL : 1 per week

Tutorial batch size : 25 Students

Semester I

Course: UBCOMFSI.6

Mathematical and Statistical Techniques-I

[A] MATHEMATICS: (40 marks)

Unit I: Shares and Mutual Funds

- Shares:** Concept of share, face value, market value, dividend, equity shares, preferential shares, bonus shares. Simple examples.
- 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.)

Unit II: Permutation, Combination and Linear Programming Problems:

- Permutation and Combination:** Factorial Notation, Fundamental principle of counting, Permutation as arrangement, Simple examples, combination as selection, Simple examples, Relation between ${}^n C_r$ and ${}^n P_r$ Examples on commercial application of permutation and combination.
- Linear Programming Problem:** Sketching of graphs of (i) linear equation $Ax + By + C = 0$ (ii) linear inequalities. Mathematical Formulation of Linear Programming Problems upto 3 variables. Solution of Linear Programming Problems using graphical method up to two variables.

[B] STATISTICS: (60 marks)

Unit III: Summarization Measures:

- 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.
- Measures of Dispersions:** Concept and idea of dispersion. Various measures Range, Quartile Deviation, Mean Deviation, Standard Deviation, Variance, Combined Variance.

Unit IV: Elementary Probability Theory:

- a. **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 (without proof), conditional probability.
Independence of Events: $P(A \cap B) = P(A)P(B)$. Simple examples.
- b. **Random Variable:** Probability distribution of a discrete random variable; Expectation and Variance of random variable, simple examples on probability distributions.

Unit V: Decision Theory:

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: UBCOMFSII.6

Mathematical and Statistical Techniques-II

[A] MATHEMATICS : (40 marks)

Unit I : Functions, Derivatives and Their Applications

- 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: Interest and Annuity:

- a. **Interest:** Simple Interest, Compound Interest (Nominal & Effective Rate of Interest), Calculations involving upto 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.

[B] STATISTICS: (60 marks)

Unit III: Bivariate Linear Correlation and Regression

- a. **Correlation Analysis:** 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.
- 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

- 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

Probability Distributions:

- i. Discrete Probability Distribution: Binomial, Poisson (Properties and applications only, no derivations are expected)
- ii. Continuous Probability distribution: Normal Distribution. (Properties and applications only, no derivations are expected)

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.

Examination:

Semester End Examination: 100 marks

At the end of each semester, there will be a Semester End Examination of 100 marks , 3 hours duration and question paper pattern as shown below.

Question Paper Pattern :(Course: UBCOMFSI.6 and Course: UBCOMFSII.6)

1. In **Section I (based on Mathematics)**, Two questions carrying 20 marks each. First question should be on Unit I and Second question should be from Unit II.
2. In each question there should be five sub-questions carrying 5 marks each. Students should be asked to answer any 4 sub questions from each question.
3. In **Section II (based on Statistics)**, Three questions carrying 20 marks each. First question should be on Unit III, Second question should be from Unit IV and third question should be from Unit V.
4. In each question there should be five sub-questions carrying 5 marks each. Students should be asked to answer any 4 sub questions from each question.

Reference Books:

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

18. Business Mathematics & Statistics : B Aggarwal, Ane Book Pvt. Limited
19. Business Mathematics : D C Sancheti & V K Kapoor, Sultan Chand & Sons
20. Business Mathematics : A P Verma, Asian Books Pvt. :Limited.

QUESTION PAPER – SET I

MARKS:- 100 TIME:- 3 HRS

- N.B :** (1) ALL QUESTION ARE COMPALSORY
(2) ALL QUESTION CARRY EQUAL MARKS
(3) FIGURES TO THE RIGHT INDICATES MARKS TO A SUB-QUESTION.
(4)GRAPGH PAPER WILL BE SUPPLIED ON REQUEST.
(5)USE OF NON-PROGRAMMABLE CALCULATOR IS ALLOWED.

SECTION-I

Q.1 ATTEMPT ANY FOUR OF THE FOLLOWING

(a) 5 Marks (b) 5 Marks (c) 5 Marks (d) 5 Marks (e) 5 Marks 20 Marks

Q.2 ATTEMPT ANY FOUR OF THE FOLLOWING

(a) 5 Marks (b) 5 Marks (c) 5 Marks (d) 5 Marks (e) 5 Marks 20 Marks

SECTION-II

Q.3 ATTEMPT ANY FOUR OF THE FOLLOWING

(a) 5 Marks (b) 5 Marks (c) 5 Marks (d) 5 Marks (e) 5 Marks 20 Marks

Q.4 ATTEMPT ANY FOUR OF THE FOLLOWING

(a) 5 Marks (b) 5 Marks (c) 5 Marks (d) 5 Marks (e) 5 Marks 20 Marks

Q.5 ATTEMPT ANY FOUR OF THE FOLLOWING

(a) 5 Marks (b) 5 Marks (c) 5 Marks (d) 5 Marks (e) 5 Marks 20 Marks