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

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 XI and XII to familiarize the students with the concept of Tabulation, Graphical Representation of the data (basically Histogram and Ogives) **Semester I** Course **UBCOMFSI.6**

Mathematical and Statistical Techniques-I

Topic No. of lectures

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 **UBCOMFSII.6 Mathematical and Statistical Techniques-II**

Topic No. of lectures

Unit I 15
Unit II 15
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

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.)

Unit II: Permutation, Combination and Linear Programming Problems:

a. **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 Pr Examples on commercial application of permutation and combination.

b. **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:

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: 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, xn , ex, ax, 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 xn, x, e, a, 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 up to 4 time periods.

b. **Annuity:** Annuity Immediate and its Present value, Future value. Equated Monthly Instalments (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)

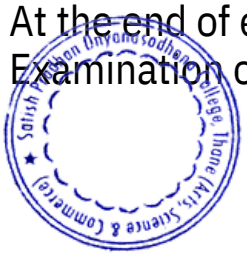
Tutorial:

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