

**UNIVERSITY OF MUMBAI**  
**No. UG/140 of 2011**

**CIRCULAR:-**

A reference is invited to the Ordinances, Regulations and syllabi relating to the B.Com. degree course vide this office Circular No. UG/69 of 2011, dated 18<sup>th</sup> April, 2011, and the Principals of the affiliated colleges in Commerce are hereby informed that the recommendation made by the Faculty of Commerce at its meeting held on 19<sup>th</sup> May, 2011, has been accepted by the Academic Council at its meeting held on 25<sup>th</sup> May, 2011 vide item No. 4.63 and that, in accordance therewith, the syllabus as per the Credit Based Semester and Grading System for First Year of B.Com. Programme in Mathematical and Statistical Techniques is as per Appendix and that the same has been brought into force with effect from the academic year 2011-2012.

MUMBAI – 400 032  
14<sup>th</sup> June, 2011

(Prin. (Dr.) M.S.Kurhade)  
I/c. Registrar

**Enclosure to Item No. 4.63**

**A.C. 25/05/2011**

**UNIVERSITY OF MUMBAI**



**Syllabus for the F.Y.B.Com.**

**Program : B.Com**

**Course : Mathematical & Statistical  
Techniques**

(Credit Based Semester and Grading System with  
effect from the academic year 2011-2012)

1. Syllabus as per Credit Based Semester and Grading System.

- i. Name of the Programme - B.Com
  - ii. Course Code - \*\*\*\*\*
  - iii. Course Title - Mathematical & Statistical  
Techniques
  - iv. Semester wise Course Contents - As per Syllabus
  - v. References and additional references - As per Syllabus
  - vi. Credit structure - Semester wise
  - vii. No. of lectures per Unit - 15
  - viii. No. of lectures per week / semester - 3 L & 3 L for Practicals  
per paper
2. Scheme of Examination - As per University Norms
  3. Special notes, if any - As per University Norms
  4. Eligibility, if any - As per University Norms
  5. Free Structure - As per University Norms
  6. Special Ordinances / Resolutions, if any -

## **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**

#### **MATHEMATICS: (24 marks)**

##### **Unit I**

##### **Commission, Brokerage, Discount and Partnership:**

Commission and Brokerage: Simple examples on calculation of commission and brokerage.

Discounts: Trade discount, Cash discount. Profit and loss. Sharing of profit in Partnership.

Problems involving mixture of discount, commission and profit are expected.

##### **Unit II**

##### **Shares and Mutual Funds:**

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.)

### **Linear Programming Problems:**

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 by graphical method upto 2 variables.

### **STATISTICS: (36 marks)**

#### **Unit III**

##### **Introduction:**

Meaning, Scope and Limitations of Statistics.

Basic Statistical Concepts: Population, Sample, Variable, attribute, parameter, statistic.

##### **Collection of data:**

Primary and Secondary, Sample and Census Survey (concept only), Tabulation of data upto 3 characteristics (Simple examples)

##### **Diagrams and graphs:**

Given a diagram, interpretation of it. Simple bar diagram, Multiple bar diagram, Percentage bar diagram, Pie diagram (Construction of diagram not to be asked). Drawing of frequency curve, frequency polygon, Histogram(class intervals of equal lengths only) and ogives.

#### **Unit IV**

##### **Measures of Central Tendency:**

Arithmetic mean, Weighted mean, Median, Mode without grouping, Quartiles( Examples on one missing frequency to be done only in case of Arithmetic mean, Weighted mean and Mode)

##### **Measures of Dispersion:**

Range, Quartile deviation, Mean deviation from mean, Standard deviation and their coefficients( Concepts of shift of origin and change of scale are not to be done)

## **Unit V**

### **Elementary 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; working knowledge of  ${}^n C_r$  and  ${}^n P_r$ .

Classical definition of Probability, Addition theorem(without proof),

Independence of Events :  $P(A \cap B) = P(A)P(B)$  Simple examples. Random Variable: Probability distribution of a discrete random variable; Expectation and Variance; Simple examples on probability distributions; Concept of Normal distribution and Standard Normal Variate(SNV), simple examples.

## **Semester II**

**Course: UBCOMFSI.6**

### **Mathematical and Statistical Techniques-II**

#### **MATHEMATICS : (24 marks)**

## **Unit VI**

### **Functions, Derivatives and Their Applications**

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.

Derivative as rate measure.

Derivatives of functions: Constant function,  $x^n$ ,  $e^x$ ,  $a^x$ ,  $\log x$ .

Rules of derivatives: Scalar multiplication, sum, difference, product, quotient, simple problems.

Second Order derivatives

Applications: Marginal Cost, Marginal Revenue, Elasticity of Demand. Maxima and Minima for functions in Economics and Commerce.

## **Unit VII**

### **Interest and Annuity**

Simple Interest and Compound Interest

Interest compounded more than once a year. Calculations involving upto 4 time periods.

Equated Monthly Instalments(EMI) using reducing and flat interest system. Present value, Future value.

Annuity Immediate and due: Simple problems with  $(1 + \frac{r}{100})^n$  with  $n \leq 4$ .

### **STATISTICS: (36 marks)**

#### **Unit VIII**

**Bivariate Linear Correlation:** Scatter Diagram, Computation of Karl Pearson's Coefficient of Correlation(Case of Bivariate Frequency Table to be excluded), Computation of Spearman's Rank Correlation Coefficient (case of repeated ranks upto 2 repetitions only)

**Bivariate Linear Regression:** Finding Regression lines by method of least squares.

Properties of Regression Coefficients- i)  $r = \sqrt{b_{yx}b_{xy}}$  ii)  $(\bar{x}, \bar{y})$  is the point of intersection of two regression lines.

#### **Unit IX**

**Time series:** Concepts and components of a time series. Estimation of Trend using Moving Average Method and Least Squares Method(only Linear Trend)

Estimation of Seasonal Component using Simple Arithmetic Mean (For Trend free data only)

Concept of Forecasting using Least Squares Method.

**Index Numbers:** Concept and uses. Simple and Composite Index Nos. (unweighted, weighted), Laspeyre's Price Index No, Paasche's Price Index No, Fisher's Price Index No., Cost of living Index No., Real Income, Simple Examples.

Concept of Wholesale Price Index No .(Examples on missing values should not be done)

## **Unit X**

**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.

Decision making under Risk, Expected Monetary Value(EMV); Decision tree; simple Examples based on EMV, Expected Opportunity Loss(EOL), simple Examples based on EOL.

## **Tutorial:**

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

## **Examination:**

Internal Assessment 40% (40 marks)

- |       |  |           |
|-------|--|-----------|
| (i)   | Two periodical class tests -                               | 20 marks  |
| (ii)  | One Tutorial Assignment -                                  | 10 marks  |
| (iii) | Active participation in class instructional deliveries -   | 05 marks  |
| (iv)  | Overall conduct as a responsible student, mannerism etc. - | 05 marks. |

## **Semester End Assessment 60% (60 marks)**

At the end of each semester there will be a Semester End Examination of 60 marks.

## **Question Paper Pattern:**

- 1) In **Section I (based on Mathematics)**, answer any **two** out of **four** questions.
- 2) In **Section II (based on Statistics)**, answer any **three** out of **six** questions.
- 3) All questions carry equal marks i.e. 12 marks.
- 4) Sub-questions should be based on different units.



## 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