K. J. SOMAIYA COLLEGE OF ARTS AND COMMERCE

VIDYAVIHAR, MUMBAI-77

(Autonomous)

Re-accredited by NAAC with 'A' grade and CGPA: 3.33

College with Potential for Excellence by UGC

(Affiliated to University of Mumbai)

SYLLABUS

AND

SCHEME OF EXAMINATION

Program: B.Com

Course:

Mathematical and Statistical Techniques

SEM II

As per

CHOICE BASED CREDIT AND GRADING SYSTEM

(75-25 Marks Pattern)

(With effect from the Academic Year: 2022-2023)

Preamble

Mathematical and Statistical Techniques is a compulsory paper at FYBCOM. In the syllabus more emphasis is given on application than theory as Commerce students are expected to solve commercial, economic and managerial problems.

SEM II

1. Name of the Programme	:	B.Com
2. Course Title	:	Mathematical and Statistical Techniques
3. Code of the Course	:	UBCOMFSII.6
4. No. of Credits	:	03
5. No. of lectures	:	75 + 15 tutorials
6. No. of lectures per week	:	05 + 01 tutorial

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a)No of Lectures
MATHEMATICS: 2 lectures per week
STATISTICS : 3 lectures per week
b)TUTORIAL : 1 per week
c) Tutorial batch size : 25 Students

Objectives of the Course:

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.

Course Outcomes:

CO-1) Understanding the concepts of functions and Derivatives, Interest and annuity, Correlation, Regression, Index Numbers, Time Series and Discrete and Continuous probability distribution(Remember and Understand)

CO-2) Solving application based derivatives problems, calculating correlation coefficient, Interest and annuity (Apply and Analyze)

CO-3) To estimate future values in Time Series and regression and identifying the regression lines, solving Binomial, Poisson and Normal probability problems, identifying type of correlation, Testing of hypothesis (Apply, Analyze and Evaluate)

CO-4) Construction of regression and trend lines, construction of EMI-Amortization table, construction of standard normal variable(Z), Testing of hypothesis , construction of Index number (Create)

[A] MATHEMATICS : (24 marks)

Unit I : Functions, Derivatives and Their Applications (15 Lectures)

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: (15 Lectures)

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. Types of loans. 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: (36 marks)

Unit III: Bivariate Linear Correlation and Regression (15 Lectures)

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, Examples

b. **Regression Analysis:** Meaning, Concept of Regression equations, Slope of the Regression Line and its interpretation. Regression Coefficients (excluding Bivariate Frequency Distribution Table), Identifying dependent and independent variable. Relationship between Coefficient of Correlation and Regression Coefficients , Finding the equations of Regression lines by method of Least Squares, Examples.

Unit IV : Time series and Index Numbers (15 Lectures)

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, Examples.

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.

Unit V: Elementary Probability Distributions and Testing of Hypothesis: (15 Lectures)

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)

iii. Testing of hypothesis: Null Hypothesis, Alternative Hypothesis, Type I and Type II Error , level of significance , Decision Criterion, Critical Region, , Test based on large sample for Mean (with population standard deviation σ known).

Scheme of Examination:

C. Internal Examination: 25 Marks

Sr. No	Evaluation type	Marks	Duration
1	Class Test	20	40 minutes
2	Active participation in routine class instructional deliveries	05	

D. External Examination: 75 marks, Duration: 2 hours 30 minutes

SEMESTER II

External Examination Paper Pattern

Question No.	Unit No.	Marks	Marks with internal option
Q.1	I	15	20
Q.2	II	15	20
Q.3	III	15	20
Q.4	IV	15	20
Q.5	V	15	20

Reference Books

1. Martin Anthony and Norman Biggs(2000) ,Mathematics for Economics and Finance Methods and Modelling by, Cambridge University Press, Cambridge low-priced edition, 2000, Chapters 1, 2, 4, 6 to 9 & 10.
2. Stephen Waner and Steven Constenoble , Applied Calculus: , Brooks/Cole Thomson Learning, second edition, Chapter 1 to 5.
3. D. C. Sancheti and V. K. Kapoor(2006) , Business Mathematics , Sultan Chand & Sons, Chapter 1, 5, 7, 9 &10.
4. J. D. Gupta, P. K. Gupta and Man Mohan (1987), Mathematics for Business Economics: , Tata Mc-Graw Hill Publishing Co. Ltd., 1987, Chapters 9 to 11 & 16.
5. By S. Saha and S. Mukerji (1996), Quantitative Methods-Part-I , New Central Book Agency, Chapters 7 & 12.
6. S.P. Dixit, C.S. Modi and R.V. Joshi , Mathematical Basis of Life Insurance ,

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. J.C. Francis & R.W. Taylor (2000), Investments, Schaum's Outlines, Tata Mc-Graw Hill Edition, Chapters 2,4 & section 25.1.
9. Sundar Shankaran (2006), Indian Mutual Funds Handbook : Vision Books, Sections 1.7,1.8.1, 6.5 & Annexures 1.1to 1.3.
10. Schaum Series(2017) ,STATISTICS .
11. Schaum's Outline(2017): Introduction to Probability and Statistics Paperback
12. S.C.Gupta and V.K. Kapoor(2012), Operations Research , Sultan Chand & Sons
13. Schaum Series (1997),Operations Research
14. D. N. Elhance (2014), Fundamentals of Statistics , Kitab Mahal
15. S.G. Gupta(2014) , Statistical Methods , Himalaya Publishing House
16. Levin R. Rubin D.S. (2016), Statistics for Management, Prentice Hall of India
17. D.S.Sancheti & V. K. Kapoor(2010), Statistics - Theory, Method & Applications , Sultan Chand & Sons.
18. B. Pearles & C. Sullivan , Modern Business Statistics - Revised, Prentice Hall of India.
19. B. M.Aggarwal (2009), Business Mathematics & Statistics, Ane Book Pvt. Limited.
20. D C Sancheti & V K Kapoor(2014) ,Business Mathematics , Sultan Chand & Sons.
21 A P Verma (2007), Business Mathematics , Asian Books Pvt. Limited.

Webliography:

https://www.cuemath.com/calculus/applications-of-derivatives/

https://sphweb.bumc.bu.edu/otlt/mph-modules/bs/bs704_correlation-regression/bs704_correlation-regression2.html

https://www.statisticshowto.com/probability-and-statistics/hypothesis-testing/

Names of members involved in the syllabus revision:

Smt Tejaswini Nadgauda VC Nominee, K G Joshi College of Arts and N G Bedekar College of Commerce, Thane

Shri Subhash Shende Subject Expert, Fergusson College, Pune

Dr. S.S. Kulkarni Subject Expert , Willingdon College, Sangli

CA Uday Shetty Alumnus, RADAV College Bhandup(East), Mumbai

Ms. Priyal Ashar, Industry Expert, HDFC Bank

Dr. Mangala S. Deshpande, HOD and Faculty

Shri Udayraj Tambe , Faculty

Shri Mahesh Dravid , Faculty

Dr. Sangeeta Bhat, Faculty

Shri Rajesh K., Faculty

Smt. Debadatta Roy Chaudhuri, Faculty

Ms. Pratima Kadu, Faculty.