Agenda No. in AC and Date

Vidya Prasarak Mandal's

K.G. Joshi College of Arts & N.G. Bedekar College of Commerce, Thane

(Autonomous)

(Affiliated to University of Mumbai)

Program: B.COM.

Specific Programme: Mathematics and Statistics

(JBCUCMST)

Syllabus for FYBCOM

Specific Programme: Mathematics and Statistics – JBCUCMST

PREAMBLE

In today's world, the applications of mathematics and statistics are not restricted in the field of science. But it also contributes in direct and fundamental ways to different sectors like business, finance, health, defence etc. The topics like shares and mutual funds, interest and annuities, commission, brokerage and discount will create the base for the further study of finance related courses. The topics like central tendency, dispersion, correlation, regression, time series and decision theory will help in business planning. The various topics covered in this subject are also helpful for different competitive examinations.

The proper study of the subject develops logical thinking and reasoning, critical mind and imagination. It helps the students in proper planning to achieve their goals with the help of available resources.

Eligibility: A student must have successfully cleared the HSC (12th) examination from Science or Commerce.

Duration: One year (First Year BCOM Course)

Mode of Delivery: Offline (Online, in case of emergency)

DISTRIBUTION OF TOPICS AND CREDITS

Paper No	Paper Name	Semester	Course Nomenclature	Course Code	Credits
1	Mathematical and Statistical Techniques	I	Mathematical and Statistical Techniques -I	JBCUCMST101	3
		II	Mathematical and Statistical Techniques - II	JBCUCMST201	3

(Credit Based Semester and Grading System with effect from the academic year 2021–2022)

Specific Programme: Mathematical and Statistical Techniques– JBCUCMST

PROGRAMME - SPECIFIC OUTCOMES

PSO	PSO Description
PSO1	To impart knowledge about commercial and managerial aspects of business along with social and ethical issues.
PSO2	To acquaint the learners about basic concepts of business communication, mathematical and statistical tools, environmental and other social issues related to commerce and management.
PSO3	To make the learners aware about basic concepts of marketing management, production management human resource management, export marketing and financial management along with the recent trends and developments in it.
PSO4	To give a working knowledge in respect of cost accounting, management accounting, financial accounting, auditing and taxation.
PSO5	To make the learners aware about various aspects of micro and macroeconomics and also about Indian financial system and recent development in it.
PSO6	To acquaint the learners about business law, company secretarial practices and computer systems, its applications and network infrastructure.

(Credit Based Semester and Grading System with effect from the academic year 2021–2022)

COURSE OUTCOMES

Semester I

Course Nomenclature: Mathematical and statistical techniques-I

Course Code: JBCUCMST101

1. To familiarize students with basic mathematical toolswith emphasis on applications to business and economic situations.
2. To create base for financial analysis required for finance related courses.
3. To familiarize students with basic statistical tools to summarize and analyze quantitative information for decision making.
4. To increase the capability of students in making inferences and predictions from past records.
5. To improve in quantitative aptitude required for various competitive examinations.

Semester II

Course Nomenclature: Mathematical and statistical techniques-II

Course Code: JBCUCMST201

1. To familiarize students with basic mathematical tools with emphasis on applications to business and economic situations.
2. To create base for financial analysis required for finance related courses.
3. To determine the nature and strength of relationship between two variables.
4. To understand concepts of time series and its applications in different areas.
5. To study economic data reflecting price or quantity compared with a standard or base value.

SYLLABUS

FYBCOM
MATHEMATICS AND STATISTICS

SEMESTER I
TITLE: MATHEMATICAL AND STATISTICAL TECHNIQUES - I

COURSE CODE: JBCUCMST101	**COURSE TITLE:** Mathematical and statistical techniques	**CREDITS: 3**	**NO OF LECTURES**
Unit I	**Commission, Brokerage, Discount, Partnership:** **Commission**: Types of commission agents: commission agent, broker, Del Credere agent and auctioneer. Simple examples. **Discount**: Trade discount and cash discount, profit and loss. Simple examples. **Partnership**: Distribution of profits and losses among the partners, Goodwill.		15
Unit-II	**(A) Shares and Mutual Funds:** **Shares: -** Concept of share, face value, market price, dividend, brokerage, total gain, rate of return on investment. Simple Examples. **Mutual Funds: -** Concept of mutual fund, N.A.V., entry load, exit load, dividend, change in N.A.V., total gain, rate of return, averaging of price under Systematic Investment Plan S.I.P. **(B) Linear Programming Problem:** Sketching of graphs of linear equations and linear inequalities, mathematical formulation of linear programming problem up to 3 variables, graphical solution of linear programming problem up to 2 variables.		15
Unit-III	**Introduction to Statistics:** • Meaning, scope and limitations of statistics. • Basic statistical concepts like data, population, sample, variable, attribute etc. • Collection of data • Frequency distribution **Summarization measures:** • **Measures of central tendency: -** Definition of average, types of averages,		15

	arithmetic mean, median and mode for ungrouped as well as grouped data. Quartiles, deciles and percentiles. Locating median and quartiles using ogives and mode using histogram. Combined and weighted mean. • **Measures of dispersion: -** Concept and idea of dispersion, various measures range, Quartile deviation, Mean deviation, standard deviation, Variance, Combined Variance.	
Unit-IV	**Elementary probability theory:** • Factorial notation, Fundamental principles of counting, Permutation as arrangement(Only concepts), Combination as selection (In detail) • Concept of random experiment/ trial and possible outcomes, sample space, events and their types, mutually exclusive and exhaustive events, complimentary events. Classical definition of probability, Axiomatic definition of probability addition theorem, conditional probability, independent events, multiplication theorem. Simple examples. • Random variable, probability distribution of discrete random variable, expectation and variance of discrete random variable. Simple examples on probability distribution.	15
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. Formulation of pay-off matrix; simple examples. Decision making under risk: EMV criterion, EOL criterion, Decision tree; simple examples.	15
Total		**75**

SEMESTER II
TITLE: MATHEMATICAL AND STATISTICAL TECHNIQUES - II

COURSE CODE: JBCUCMST201	**COURSE TITLE:** Mathematical and statistical techniques	**CREDITS: 3**	**NO OF LECTURES**
Unit I	**Functions and their applications:** Concept of real functions, Standard functions like constant function, linear function, power function, polynomial function, exponential function, logarithmic function. **Applications of functions**: Demand and supply functions, total cost, total revenue and profit functions, equilibrium point and break-even point. **Derivatives of functions:** Derivative as rate of change, derivative of x^n, a^x. e^x, logx. Rules of derivatives: scalar multiplication, addition, difference, product, quotient, simple examples. Second order derivative. **Applications of derivatives:** Rate of change, marginal cost and marginal revenue, price elasticity of demand, maxima and minima for functions in Economics and Commerce.		15
Unit-II	**Interest and Annuity:** **(A) Interest:** Simple interest, compound interest (Nominal and Effective rate). Calculations involving up to 4 time periods. **(B) Annuity:** Accumulated value and present value of both annuity regular and annuity due. EMI using reducing balance method and amortization of loans. Perpetuity and its present value. Simple problems with calculations involving up to 4 time periods.		15
Unit-III	**Bivariate Linear Correlation and Regression:** **Correlation Analysis:** Meaning, Types of correlation, Methods of determining correlation: Scatter diagram, Karl Pearson's Correlation Coefficient (Excluding Bivariate frequency distribution table), Spearman's Rank Correlation Coefficient. **Regression Analysis:** Meaning, Concepts of regression equations, Slope of regression line and its interpretation, Regression coefficients (Excluding bivariate frequency distribution table), Relation between coefficient of correlation and regression coefficients, Finding the regression equations using the method of Least squares.		15
Unit-IV	**(A) Time Series and Index Numbers:**		15

	Time series: Concept and components of 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). **(B) Index Numbers:** Concept and uses of index numbers, Types of index numbers, Aggregate and Relative Index numbers, Laspeyre's, Passche's, Dorbish-Bowley's, Marshall-Edgeworth's and Fisher's index numbers, Cost of living index number, Concept of Real Income, concept of wholesale price index number. Applications and interpretation of index numbers.	
Unit-V	**Elementary Probability Distributions:** **Discrete probability distribution:**Bernoulli trials Binomial and Poisson – Properties and applications only. (Derivations are not expected). Limiting distributions – Binomial approximated to Poisson distribution **Continuous probability distribution:** Normal distribution – properties and applications only. (Derivations are not expected).	15
Total		**75**

Semester I

Mathematical and statistical techniques

Course Nomenclature: Mathematical and statistical techniques - I

Course Code: JBCUCMST101

COURSE CODE: JBCUCMST101	**COURSE TITLE:** Mathematical and statistical techniques	**CREDITS: 3**	**NO OF LECTURES**
Unit I	**Commission, Brokerage, Discount, Partnership:** **Commission**: Types of commission agents: commission agent, broker, Del Credere agent and auctioneer. Simple examples.		15

	Discount: Trade discount and cash discount, profit and loss. Simple examples. **Partnership**: Distribution of profits and losses among the partners, Goodwill.	
Unit-II	**(A) Shares and Mutual Funds:** **Shares: -** Concept of share, face value, market price, dividend, brokerage, total gain, rate of return on investment. Simple Examples. **Mutual Funds: -** Concept of mutual fund, N.A.V., entry load, exit load, dividend, change in N.A.V., total gain, rate of return, averaging of price under Systematic Investment Plan S.I.P. **(B) Linear Programming Problem:** Sketching of graphs of linear equations and linear inequalities, mathematical formulation of linear programming problem up to 3 variables, graphical solution of linear programming problem up to 2 variables.	15
Unit-III	**Introduction to Statistics:** • Meaning, scope and limitations of statistics. • Basic statistical concepts like data, population, sample, variable, attribute etc. • Collection of data • Frequency distribution **Summarization measures:** • **Measures of central tendency: -** Definition of average, types of averages, arithmetic mean, median and mode for ungrouped as well as grouped data. Quartiles, deciles and percentiles. Locating median and quartiles using ogives and mode using histogram. Combined and weighted mean. • **Measures of dispersion: -** Concept and idea of dispersion, various measures range, Quartile deviation, Mean deviation, standard deviation, Variance, Combined Variance.	15
Unit-IV	**Elementary probability theory:** • Factorial notation, Fundamental principles of counting, Permutation as arrangement(Only concepts), Combination as selection (In detail)	15

	• Concept of random experiment/ trial and possible outcomes, sample space, events and their types, mutually exclusive and exhaustive events, complimentary events. Classical definition of probability, Axiomatic definition of probability addition theorem, conditional probability, independent events, multiplication theorem. Simple examples. • Random variable, probability distribution of discrete random variable, expectation and variance of discrete random variable. Simple examples on probability distribution.	
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. Formulation of pay-off matrix; simple examples. Decision making under risk: EMV criterion, EOL criterion, Decision tree; simple examples.	15
Total		**75**

Semester II

Mathematical and statistical techniques

Course Nomenclature: Mathematical and statistical techniques - II

Course Code: JBCUCMST201

COURSE CODE: JBCUCMST201	COURSE TITLE: Mathematical and statistical techniques	CREDITS: 3	NO OF LECTURES
Unit I	**Functions and their applications:** Concept of real functions, Standard functions like constant function, linear function, power function, polynomial function, exponential function, logarithmic function. **Applications of functions**: Demand and supply functions, total cost, total revenue and profit functions, equilibrium point and break-even point. **Derivatives of functions:** Derivative as rate of change, derivative of x^n, a^x. e^x, logx. Rules of derivatives: scalar multiplication, addition, difference, product, quotient, simple examples. Second order derivative. **Applications of derivatives:** Rate of change, marginal cost and marginal revenue, price elasticity of demand, maxima and minima for functions in Economics and Commerce.		15
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Unit-IV	**(A) Time Series and Index Numbers:** **Time series:** Concept and components of 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). **(B) Index Numbers:** Concept and uses of index numbers, Types of index numbers, Aggregate and Relative Index numbers, Laspeyre's, Passche's, Dorbish-Bowley's, Marshall-Edgeworth's and Fisher's index numbers, Cost of living index number, Concept of Real Income, concept of wholesale price index number. Applications and interpretation of index numbers.	15
Unit-V	**Elementary Probability Distributions:** **Discrete probability distribution:**Bernoulli trials Binomial and Poisson – Properties and applications only. (Derivations are not expected). Limiting distributions – Binomial approximated to Poisson distribution **Continuous probability distribution:** Normal distribution – properties and applications only. (Derivations are not expected).	15
Total		**75**

REFERENCES

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.

21. Basic Business Mathematics by Schaum Series.

Modality of Assessment

A. Internal Assessment : 40% - 40 Marks

Serial No.	Evaluation Type	Marks
1	Written Test	20
2	Tutorial worksheets/ Assignment	15
3	Class Participation	05
Total		40

B. External Examination: 60%- 60 Marks

Semester End Theory Examination Time: 2 hours

Question paper pattern: -

1. All questions are compulsory.
2. In all, there will be 5 questions, one on each unit. (i.e. Q. 1 on Unit I, Q. 2 on Unit II and so on)
3. In every question, there will be 5 sub-questions, each of 4 marks, out of which attempt any 3 sub-questions.
   In each question – one concept based question
4. Use of simple non-programmable calculator is allowed.