Semester I

Course : Mathematical and Statistical Techniques – I

(A) MATHEMATICS : (30 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 ${}^{n}Cr$ 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 : (45 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 Probablity, Addition theorem (without proof)), conditional probability.
Independence of evente: P(AB)=P(A) P(B). Simple examples.

b) Random Variable: Probablity distribution of a discrete random variable; Expection and variance of random variable, simple examples on probability distributions.

Unit V : Decision Theory :

Pay-off matrix; Decision making under uncertainty, 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: Mathematical and Statistical Techniques-II

(A) MATHEMATICS: (30 MARKS)

Unit-1: 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 & profit function.

Equilibrium point, Break-even point

(b) Derivatives of Functions:

Derivative as rate measure, Derivative of $X^n e^x$,a^x,log x.

Rules of derivatives: Scalar multiplication, sum, differences, product, quotient (Statements only), Simple problem. Second order derivative

Applications: Marginal cost, Marginal Revenue, Elasticity of demand. Maxima & minima for function in economics and commerce.

(Examination Questions on this unit should be application oriented only)

Unit-2: 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 it present value, Future value. Equated monthly installment(EMI) using reducing balance method and amortization of loans. Stated annual rate & affective annual rate, perpetuity and its present value. Simple Problems involving upto 4 time periods.

(B) STATISTICS: (45 marks)

Unit-3: Bivariate linear Correlation and Regression

(a) Correlation analysis: Meaning, Types of correlation, Determination of correlation: scattered diagram, karl pearson's Method of correlation coefficient(excluding bivariate frequency distribution table) and spearman rank correlation coefficient.

(b) Regression Analysis: Meaning , concept of Regression equation, slope of regression line and its interpretation. Regression Coefficient (excluding bivariate frequency distribution table), relationship between coefficient of correlation & regression coefficients, finding the equation of regression lines by method of least squares.

Unit-4: Time Series and Index numbers

(a) Time Series : Concepts and componants 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). Concept of forccasting using least square method.

(b) Index Number: 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 based index numbers. Shifting of base year. Cost of living index numbers, concept of real income, concept of wholesale price index numbers. (examples of missing values should not be taken)

Unit-5: Elementary probability distribution

probability distributions:

Discrete probability distribution: Binomial, poisson(properties & applications only, no derivations are expected)

Continuous probability distributions: Normal distribution. ((properties & applications only, no derivations are expected)

Examination :

Internal Assessment 25% (25 marks):

1. One midterm class test of 20 marks.
2. One group project/assignments/presentation
3. Active participation in tutorial or lecture periods carry the maximum 5 marks.

Semester end Examination 75 % (75 marks)

At the end of each semester, there will be a semester end examination of 75 marks, 21/2 hrs. duration and question paper pattern as shown below.

Question paper pattern:

1. In Section I (based on mathematics), two question carrying 15 marks each. First question should be on unit I and second question should be Unit II.
2. In each question there should be 4 sub-questions carrying 5 marks each. Studens should be asked to answer any three sub-question from each question.
3. In Section II (based on statistic), 3 question carrying 15 marks each.first question should be on unit III, second question should be from unit IV and 3rd question should be from unit V.
4. In each question there should be four sub-questions carrying 5 marks each. Students should be asked to answer any 3 sub questions from each question.

Reference Books:

1. Mathematics for Economics and Finance Methods and Modeling 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 & V. K. Kapoor , Sultanchand & sons, 2006, chapter 1, 5, 7, 9 & 10
4. Mathematics for Business Economics: by J. D. Gupta, P. k> Gupta & Manmohan, Tata Mc-Graw Hill Publishing Co. Ltd 1987, chapters 9 to 11 & 16.
5. Quantitative methods-part-I by S Saha & S. Mukharji, New Central Book Agency, 19996, chapters 7 & 12.
6. Mathematical Basis of Life insurance by s.p Dixit, C.S. Modi , R.V. Joshi, insurance institute of India, Chapters: 2 : units 2.9, 2.6, 2.20 & 2.21
7. Securities Laws & Regulation of financial market: intermediate course paper 8, institute company secretary of India, chapter 11.
8. Investment by J.Fransis & R.W. Tailor, Shom's outline, Tata Mc-Graw Hill adition 2000, Chapter 2,4& Section 25.1
9. Indian mutual fund handbook: by Sunder Shankaran, vision books, 2006, section 1.7, 1.8.1, 6.5 & Annexure 1.1 to 1.3
10. STATISTIC by Schaum Series.

11. Operations research by Gupta & Kapoor
12. Operations research by Schaum Series
13. Fundamental of statistic - D. N. Elhens
14. Statistical methods – S. G. Gupta
15. Statistics for management – lovin R. Rubin D. S. (Prentice hall of India)
16. Statistic – theory , method & application D S Sancheti & V. K. Kapoor
17. Modern business statistic – (Revised) – B. Perarles & C. Sulivan – Prentice hall of India
18. Business mathematics & statistic : B Aggarwal, Ane book private limited.
19. Business Mathematic D. C. Sancheti & V. K. Kapoor, Sultan Chand & Sons
20. Business ,mathematics: A P Verma, Asian books private limited.