

**SRI SANKARA ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)**

ENATHUR, KANCHIPURAM – 631 561

CHOICE BASED CREDIT SYSTEM

DEPARTMENT OF MATHEMATICS

ALLIED SYLLABUS

(With effect from the academic year 2015-2016)

Other Mathematics Papers

Semester-I

Sl. No	Course Component	Class	Title of the paper
1	Allied Paper	I B.Sc Physics, I.B.Sc Computer Science I BCA	Allied Mathematics-I
2	Allied Paper	I M.Sc CST	Mathematics-I
3	Non-Major	I B.Sc Mathematics	Functional Mathematics-I
4	Core paper	I MBA	Quantitative and Research Methods in Business
5	Elective	II M.Sc Bio Tech	Bio statistics

Semester-II

S.No	Course Component	Class	Title of the paper
1	Allied Paper	I B.Sc Physics, I.B.Sc Computer Science I BCA	Allied Mathematics-II
2	Allied Paper	I M.Sc CST	Mathematics-II
3	Non-Major	I B.Sc Mathematics	Functional Mathematics-II
4	Core paper	I M.Com	Quantitative Techniques for Business
5	Core paper	I MBA	Applied Operations Research

Semester-III

S.No	Course Component	Class	Title of the paper
1	Allied Paper	II.B.Sc Computer Science	Statistical Methods & Their Application-I
2	Core Paper	II BCA	Numerical Method & Statistics
3	Allied Paper	II M.Sc CST	Computer oriented Mathematics
4	Allied paper	II Mathematics B.Sc	Mathematical Statistics-I
5	Elective	II M.Sc Bio Chemistry	Bio Statistics

Semester-IV

S.No	Course Component	Class	Title of the paper
1	Allied Paper	II.B.Sc Computer Science	Statistical Methods & Their Application-II
2	Allied paper	II B.Sc Mathematics	Mathematical Statistics-II
3	Allied Paper	II B.Sc Micro Biology	Bio Statistics
4	Allied paper	II B.Sc Bio Tech	Bio Statistics & Bio Physics
5	Soft Skill	II B.Sc CS, II BCA, II M.Sc CST, II MA English II M.Sc CS	Quantitative Aptitude

Semester-V

S.No	Course Component	Class	Title of the paper
1	Allied Paper	III.BCA	Resource management techniques

SYLLABUS
SEMESTER I - ALLIED PAPER –I - MATHEMATICS –I

UNIT – I: ALGEBRA and NUMERICAL METHODS

- **Algebra:** Summation of series – simple problems.
- **Numerical Methods:** Operators E, Δ, ∇ , difference tables; Newton-Raphson method; Newton's forward and backward interpolation formulae for equal intervals, Lagrange's interpolation formula.

UNIT- II: MATRICES

Symmetric, Skew-Symmetric, Orthogonal, Hermitian, Skew-Hermitian and Unitary matrices. Eigen values and Eigen-vectors, Cayley-Hamilton theorem (without proof) – verification- Computation of inverse of matrix using Cayley - Hamilton theorem.

UNIT- III: THEORY OF EQUATIONS

Polynomial equations with real coefficients, irrational roots, complex roots, symmetric functions of roots, transformation of equation by increasing or decreasing roots by a constant, reciprocal equation.

Newton's method to find a root approximately- simple problems.

UNIT IV: TRIGONOMETRY

Expansions of $\sin(n\theta)$ and $\cos(n\theta)$ in a series of powers of $\sin\theta$ and $\cos\theta$ - Expansions of $\sin^n\theta$, $\cos^n\theta$, $\tan^n\theta$ in a series of sines, cosines and tangents of multiples of " θ " - Expansions of $\sin\theta$, $\cos\theta$ and $\tan\theta$ in a series of powers of " θ " – Hyperbolic and inverse hyperbolic functions - Logarithms of complex numbers.

UNIT V: DIFFERENTIAL CALCULUS

Successive differentiation, n^{th} derivatives, Leibnitz theorem (without proof) and applications, Jacobians, Curvature and radius of curvature in Cartesian co-ordinates, maxima and minima of functions of two variables, Lagrange's multipliers - Simple problems.

RECOMMENDED TEXT

Allied Mathematics by Dr. A. Singaravelu.

SEMESTER II - ALLIED PAPER – II - MATHEMATICS -II

UNIT-I: INTEGRAL CALCULUS:

Bernoulli's formula. Reduction formulae $\int_0^{\frac{\pi}{2}} \sin^n x dx$, $\int_0^{\frac{\pi}{2}} \cos^n x dx$, $\int_0^{\frac{\pi}{2}} \sin^m x \cos^n x dx$ (m, n being positive integers), Fourier series for functions in $(\alpha, \alpha + 2\pi)$, Half range sine and cosine series.

UNIT-II: DIFFERENTIAL EQUATIONS

Ordinary Differential Equations: second order non-homogeneous differential equations with constant coefficients of the form $ay'' + by' + cy = X$ where X is of the form $e^{\alpha x} \cos \beta x$ and $e^{\alpha x} \sin \beta x$

Partial Differential Equations: Formation, complete integrals and general integrals, four standard types and solving Lagrange's linear equation $Pp + Qq = R$

UNIT-III: LAPLACE TRANSFORMS:

Laplace transformations of standard functions and simple properties, inverse Laplace transforms, Application to solution of linear differential equations up to 2nd order- simple problems.

UNIT – IV: VECTOR DIFFERENTIATION

Introduction, Scalar point functions, Vector point functions, Vector differential operator ∇ , Gradient, Divergence, Curl, Solenoidal, irrotational.

UNIT – V: VECTOR INTEGRATION

Simple problems on Line, surface and volume integrals.

RECOMMENDED TEXT

Allied Mathematics by Dr. A. Singaravelu.

SEMESTER-I- MATHEMATICS
I M.Sc CST

UNIT 1: ALGEBRA: Binomial, exponential and Logarithmic series (without proof of theorems) - Problems on summation, approximations and finding coefficients using binomial, exponential and logarithmic series.

UNIT 2: TRIGNOMETRY : Expansion of $\sin nx$, $\cos nx$ in terms of $\sin x$, $\cos x$ - expansion of $\tan t$ Expansion of $\sin hx$, $\cos hx$ in terms of sines or cosines of multiples of x .

UNIT 3: Power series expansion of $\sin x$, $\cos x$, $\tan x$ - Hyperbolic and inverse hyperbolic functions - Logarithmic of complex numbers.

UNIT 4: APPLICATIONS OF DIFFERENTIAL CALCULUS: Curvature in Cartesian and polar co-ordinates, circle of curvature - evolute, involute and envelopes.

UNIT 5: Taylor's expansion for a function of two variables - Maxima and minima of a function of two variables - constrained maxima and minima - Lagrange's method of undetermined multipliers.

REFERENCE BOOKS

1. Venkatraman M.K., 1981, Engineering Mathematics, (For Unit 5)
2. P.R.Vittal , "Allied Mathematics" (Unit 1,2,3,4)

SEMESTER-II- MATHEMATICS
I -M.SC CST

UNIT 1: THEORY OF EQUATIONS: Relations between roots and coefficient of polynomials - formation of equations - decreasing and increasing the roots - reciprocal equation, Horner's methods to find the roots of polynomial equation.

UNIT 2: Evaluation of multiple integrals - Double and Triple integrals - geometrical meaning of double integrals - change of order of integration - double integrals in polar co ordinates-problems.

UNIT 3: Application of multiple integrals to find area and volume of solid.

UNIT 4: VECTOR CALCULUS: Differential of vectors - gradient, divergence and curl - Directional derivative - irrotational and solenoidal fields.

UNIT 5 : VECTOR INTEGRATION: Line, surface and volume integrals - Green's theorem in a plane, Gauss divergence theorem and stoke's theorem (without proof) - simple applications

RECOMMENDED TEXTS

Allied Mathematics by Dr. A. Singaravelu.

SEMESTER-III-MATHEMATICS

II- M.SC CST

UNIT-I:

Propositions and Compound Propositions - Logical Operations - Truth tables - Tautologies and Contradictions - Logical Equivalence - Algebra of propositions - Conditional and Biconditional Statements - Arguments - Logical Implications - Quantifiers - Negation of Quantified Statements - Basic Counting Principles - Factorial - Binomial Coefficients - Permutations - Combinations - Pigeonhole Principle - Ordered and Unordered partitions.

UNIT-II:

Order and Inequalities - Mathematical Induction - Division Algorithm - Divisibility - Euclidean Algorithm - Fundamental theorem of Arithmetic - Congruence relation - Congruence Equations - Semigroups - Groups - Subgroups - Normal subgroups - Homomorphisms - rings - Integral Domains - Fields - Polynomials over a Field.

UNIT-III:

Roots of Equations: Graphical Methods - Bisection Methods - False-Position Method - Newton-Raphson Method - Secant Method - System of Nonlinear Equations - Roots of Polynomials: Mueller's Method - Bairstow's Method.

UNIT-IV:

Algebraic Equations: Gauss Elimination - Non-linear system of Equations - Gauss-Jordan - LU Decomposition - Matrix Inverse - Error Analysis - Gauss-Seidel.

UNIT-V:

Differentiation and Integration: Trapezoidal Rule - Simpson's Rule - Romberg Integration - Derivatives and Integrals for Data with Errors.

RECOMMENDED TEXT

1. S.S.Sastry, 2005, Introductory Methods of Numerical Analysis, 4th Edition, Prentice-Hall of India Pvt. Ltd. (For Unit 3,4,5)
2. Dr.M.K Venkatraman, "A Text Book on discrete Mathematics" (For Unit 1,2)

II BCA

NUMERICAL AND STATISTICAL METHODS

UNIT-1: Introduction- Mathematical Preliminaries- Errors: Computations, Formula - Errors in a Series Approximation- Roots of Equations- Linear Equations: Bisection , False Position Methods- Newton-Raphson Method- Secant Method - Simultaneous Linear Equations: Gauss Elimination, Gauss-Jordan, LU Decomposition Methods- Gauss-Seidel Method.

UNIT-2: Numerical Differentiation- Errors in Numerical Differentiation- Cubic Spline Method- Numerical Integration- Trapezoidal Rule- Simpson's 1/3 and 3/8 Rules- Romberg Integration- Ordinary Differential Equations- Taylor's Series Method- Euler's Method- Runge-Kutta 2nd and 4th Order Methods.

UNIT-3: Sampling- Frequency Distribution- Cumulative Frequency Function- Grouped Sample- Measures of Central Tendency: Mean, Median and Mode- Geometric Mean- Harmonic Mean – Dispersion: Range, Mean Deviation, Variance and Standard Deviation- Moments- Computation of Moments

UNIT-4: Probability- Characteristics: Addition, Multiplication and Conditional Probability Laws- Discrete Distributions: Random Variable- Density and Distribution Functions.- Binomial Distribution- Poisson Distribution- Hypergeometric Distribution- Mathematical Expectation.

UNIT-5 : Correlation and Regression Analysis: Linear Least Squares Fit- Nonlinear Fit- Fitting a Polynomial Function- Coefficient of Correlation- Properties- Multiple Correlation – Partial Correlation- Rank Correlation- Tests of Significance- Chi square Test- Goodness of Fit, Algorithm and Analysis of Contingency Tables- *t*-Test and F-Test.

RECOMMENDED TEXTS

- i. S.S.Sastry, 2005, Introductory Methods of Numerical Analysis, 4th Edition, Prentice- Hall of India Pvt. Ltd..(For Unit 1,2)
- ii. SC.Gupta, Fundamental of Mathematical Statistics (For Unit3,4,5)

SEMESTER-III- II B. SC. MATHEMATICS

MATHEMATICAL STATISTICS – I

UNIT – 1: Statistics – Definition – functions – applications – complete enumeration – sampling methods – measures of central tendency – measures of dispersion – skewness – kurtosis.

UNIT – 2: Sample space – Events, Definition of probability (Classical, Statistical & Axiomatic) – Addition and multiplication laws of probability – Independence – Conditional probability – Bayes theorem – simple problems.

UNIT – 3: Random Variables (Discrete and continuous), Distribution function – Expected values & moments – Moment generating function – probability generating function – Examples. Characteristic function – Uniqueness and inversion theorems (Statements and applications only) – Cumulants, Chebychev's inequality – Simple problems.

UNIT – 4: Concepts of bivariate distribution – Correlation : Rank correlation coefficient – Concepts of partial and multiple correlation coefficients – Regression : Method of Least squares for fitting Linear, Quadratic and exponential curves - simple problems.

UNIT – 5: Standard distributions – Binomial, Hyper geometric, Poisson, Normal and Uniform distributions – Geometric, Exponential, Gamma and Beta distributions, Inter-relationship among distributions.

Recommended Text

1. P.R. Vital, "Mathematical statistics"

MATHEMATICAL STATISTICS – II

UNIT – 1: Sampling Theory – sampling distributions – concept of standard error-sampling distribution based on Normal distribution: t, chi-square and F distribution.

UNIT – 2: Point estimation-concepts of unbiasedness, consistency, efficiency and sufficiency-Cramer Rao inequality-methods of estimation: Maximum likelihood, moments and minimum chi-square and their properties. (Statement only)

UNIT – 3: Test of Significance-standard error-large sample tests. Exact tests based on Normal, t, chi-square and F distributions with respect to population mean/means, proportion/proportions variances and correlation co-efficient. Theory of attributes – tests of independence of attributes based on contingency tables – goodness of fit tests based on Chi-square.

UNIT – 4: Analysis of variance : One way, two-way classification – Concepts and problems, interval estimation – confidence intervals for population mean/means, proportion/proportions and variances based on Normal, t, chi-square and F.

UNIT – 5: Tests of hypothesis : Type I and Type II errors – power of test-Neyman Pearson Lemma – Likelihood ratio tests – concepts of most powerful test – (statements and results only) simple problems

Recommended Texts

1. P.R. Vital, “Mathematical statistics”

PRACTICALS BASED ON MATHEMATICAL STATISTICS I AND II

Construction of univariate and bivariate frequency distributions with samples of size not exceeding 200.

Diagrammatic and Graphical Representation of data and frequency distribution.

Cumulative frequency distribution-Ogives-Lorenz curve.

Measure of location and dispersion(absolute and relative), Skewness and Kurtosis.

Numerical Problem involving derivation of marginal and conditional distributions and related measures of Moments.

Fitting of Binomial, Poisson and Normal distributions and tests of goodness of fit.

Curve fitting by the method of least squares. (i) $y=ax+b$;(ii) $y=ax^2 +bx+c$;(iii) $y=ae^{bx}$;(iv) $y=ax^b$

Computation of correlation coefficients and regression lines for raw and grouped data. Rank correlation coefficient.

Asymptotic and exact test of significance with regard to population mean, proportion, variance and coefficient of correlation.

Test for independence of attributes based on contingency table.

Confidence Interval based on Normal,t,Chi-square statistics.

NOTE:

Use of scientific calculator may be permitted for Mathematical Statistics Practical Examination.

Statistical and Mathematical tables are to be provided to students at the examination hall.

SEMESTER –III
II B.SC COMPUTER SCIENCE
STATISTICAL METHODS AND THEIR APPLICATIONS –I

UNIT 1: Nature and scope of statistical methods and their limitations – Classification, tabulation and diagrammatic representation of various types of statistical data –Frequency curves and Ogives – Graphical determination of percentiles, quantiles and their uses, Lorenz curve.

UNIT-2: Sampling from finite population-sample random sampling, stratified and systematic random sampling procedures- estimation mean and total and their standard errors. Concepts of sampling and non-sampling errors.

UNIT-3: Measures of location- arithmetic mean, median, mode, geometric mean, harmonic mean and their properties-merits and demerits. Measures of dispersion-range, mean deviation, quartile deviation, standard deviation, coefficient of variation, skewness and kurtosis and their properties.

UNIT-4: Probability of an event-finitely additive probability space addition and multiplication theorems-independence of events-conditional probability-bayes' theorem.

UNIT-5: Bivariate frequency table and its uses-scatter diagram-correlation and regression lines linear prediction-rank correlation coefficient-curve fitting by the method of least squares-partial and multiple correlation coefficients.

RECOMMENDED TEXT

1. P.R. Vital, "Mathematical statistics"

II B.Sc MICRO BIOLOGY

BIOSTATISTICS

UNIT I: INTRODUCTION

Types of biological data; frequency distributions; cumulative frequency distributions.

Populations and samples:

Populations; samples from populations; random sampling; parameters and statistics.

UNIT II: MEASURES OF CENTRAL TENDENCY

Mean; median; mode; geometric mean; harmonic mean.

Measures of Dispersion:

Range; variance; standard deviation, coefficient of variation; standard error.

UNIT III: PROBABILITY

Mathematical probability and statistical probability; Laws of probability; addition law and multiplication law; conditional probability.

Probability Distribution:

Normal distribution; binomial distribution and poisson distribution.

UNIT IV:

Testing for goodness of fit:

Chi-square test for goodness of fit; statistical significance; statistical errors in hypothesis testing; chi-square test for contingency tables; heterogeneity chi-square test.

Test of hypothesis:

Normal deviation test, tests for proportions, t-test.

UNIT V

Simple linear regression and correlations:

Simple linear regression; testing the significance of a regression; comparison of two slopes; correlation coefficient – hypothesis testing about correlation coefficients; comparison of two correlation co-efficients; rank correlation; intraclass correlation.

Analysis of variance:

One-way classification; two-way classification.

Recommended Text

1. P.R. Vital, “Mathematical statistics”

**II B.Sc MICRO BIOLOGY
BIOSTATISTICS
PRACTICAL**

UNIT I

Frequency distribution – Univariate – Bivariate; Measure of central tendency

UNIT II

Measure of dispersion; Correlation, Regression

UNIT III

Fitting distribution – Binomial – Poisson – Method of least squares

UNIT IV

Tests of significance – T – F; Tests of significance – Chi-square – Attributes

UNIT V

ANOVA; Design of experiments – CRO, RBD, LSD

II B.SC COMPUTER SCIENCE
STATISTICAL METHODS AND THEIR APPLICATIONS –II

UNIT-I

Concepts of random variable- mathematical expectation- moment of random variable (raw and central moments) - moment generating function – chebycheff's inequality- simple problems.

UNIT-II

Standard distributions - Binomial, Poisson and normal distributions – fitting of distributions.

UNIT-III

Concepts of sampling distributions- standard error-test of significance based on t, chi square and F- distributions with respect to mean, variance and correlation coefficient. Theory of attributes and test of independence in contingency table.

UNIT-IV

Principle of scientific experiments – Randomization, replication and local control analysis of variance – One way and two way classification analysis of CRD and RBD – Latin square designs. Concepts of factorial experiments(without confounding).

UNIT – V

Non parametric tests- comparison between parametric and non-parametric tests – sign test – Runs test for one and two sample problems – Wilcoxon signed rank test – Mann Whitney U test.

Recommended Texts

1. P.R. Vital, "Mathematical statistics"

II B.SC COMPUTER SCIENCE

STATISTICAL METHODS AND THEIR APPLICATIONS – I& II PRACTICAL

1. Construction of univariate and bivariate frequency distribution with samples of size not exceeding 200.
2. Diagrammatic and graphical representation of various statistical data and frequency distributions.
3. Cumulative frequency curve and Lorenz curves.
4. Computation of various measures of location, dispersion, moments, skewness and kurtosis.
5. Curve fitting by the method of least squares.
(i) $y = ax + b$; (ii) $y = ax^2 + bx + c$; (iii) $y = ae^{bx}$; (iv) $y = ax^b$
6. Computation of correlation coefficients – regression lines (raw data and grouped data) – correlation coefficients.
7. Fitting of Binomial, Poisson and Normal distributions and testing goodness of fit.
8. Large sample test – tests for proportions.
9. Exact test based on t, Chi-square, and F distributions with regard to mean, variance and correlation coefficients.
10. Estimation of mean and r total and their standard errors in simple, stratified and systematic random sampling procedure.
11. Analysis of variance – one-way and two-way classifications.
10. Estimation of mean and r total and their standard errors in simple, stratified and systematic random sampling procedure.
11. Analysis of variance – one-way and two-way classifications.
12. Analysis of CRD, RBD and Latin square designs.

I M.COM
QUANTITATIVE TECHNIQUES FOR BUSINESS DECISIONS

Unit 1:

Theory of probability -probability rules -Baye's theorem -Probability distribution - Binomial, Poisson and Normal. Statistical decision theory -Decision environment -decision making under certainty and uncertainty and risk conditions -EMV, EOL and marginal analysis -value of perfect information - decision tree analysis.

Unit 2:

Sampling-Meaning of random sample -sampling methods -sampling error and standard error relationship between sample size and standard error
Sampling distribution -characteristics- central limit theorem -estimating population parameters - point and interval estimates -estimating proportion, percentage and mean of population from large sample and small sample.

Unit 3:

Testing hypothesis -testing of proportions and means -large samples -small samples - one tailed and two tailed tests -testing differences between mean and proportions -errors in hypothesis testing -chi square distribution -characteristics -applications -test of independence and tests of goodness of fit - inferences -F distribution- testing of population variance-analysis of variance -one way and two way.

Unit 4:

Correlation and regression -Simple, partial and multiple correlation -simple, partial and multiple regressions -estimation using regression line -standard error of estimate -testing significance of correlation and regression coefficients -interpreting correlation -explained variation and unexplained variation - coefficient of determination- multivariate analysis - factor, cluster and discriminant analysis.

Unit 5:

Linear programming graphic and simplex models -maximization and minimization - transportation -Assignment.

NOTE:

The proportion between theory and problems shall be 20: 80

I MBA

QUANTITATIVE AND RESEARCH METHODS IN BUSINESS

UNIT - I

Probability – Rules of probability, Binomial, Poisson and Normal Distribution – their applications in business and industrial problems – Baye’s theorem and its applications
Risk and uncertainty in decision making – minimax, maximin and regret criteria – Hurwitz and Laplace criteria in business decision making – Decision tree

UNIT – II

Research meaning, scope and objectives – types of research and research design – Methods of data collection - Questionnaire design, interview, Scheduling – Scaling techniques – Nominal, Ordinal, ratio, interval -Sampling techniques and sample size determination for survey research Formulation of hypothesis – hypothesis testing

UNIT III

Data analysis - Editing and coding of data- Univariate, bivariate - Chi-Square test – Correlation and regression analysis – Single and two factor analysis of variance- Application of statistical tests – Parametric and non-parametric and interpretation of test results. Multivariate analysis - Elementary Concepts of factor analysis, Multiple regression analysis, Discriminant analysis, Cluster analysis and Conjoint analysis in marketing problems – Stastical packages.

UNIT IV

Application of Differentiation and Integration, Maxima, minima, average cost, total cost, marginal revenue, average revenue, total revenue – Consumer Surplus and producer surplus

UNIT V

Research in business – Conducting investigation – Report writing – Academic and Business research reports – research format.

I MBA
APPLIED OPERATIONS RESEARCH

UNIT – I

Background, Concept, Methodology and scope of Operations Research.
Linear programming – Graphical method, Simplex method, Distribution method,
MODI method, Assignment Method.

UNIT – II

PERT & CPM
PERT – Determination Slack, Critical Path, etc.,
CPM: Time Cost Optimization.

UNIT – III

Queuing Theory by simulation method and by application of standard formulations.

UNIT – IV

Application of quantitative methods in Marketing, Purchasing, Production Planning,
Inventory Control Replacement, Sequencing etc. – Use of models.

UNIT – V

Theory of Games – Strategies.

REFERENCES BOOK

Sharma J.K., Operations Research: Theory and Application, New Delhi, Macmillan
India 2001.

QUANTITATIVE APTITUDE

UNIT-1

Divisibility – HCF and LCM – Decimal Fractions – Square roots and Cube Roots.

UNIT-II

Averages – Percentage – profit and loss - Ratio and Proposition,

UNIT-III

Time and work – Time and Distance – Boats and Streams.

UNIT-IV

Simple Interest – Compound Interest – Stocks and Shares.

UNIT-V

Area – Volume and surface Areas – Heights and Distances – Data Interpretation :
Tabulation – Bar Graphs – Pie Charts – Line Graphs.

REFERENCES:

Aggarwal,R.S. *Objective Arithmetic*. New Delhi: S. Chand & Company, 2005.

Notes: Questions only from solved problems for 80% and questions from exercise for 20%

**V SEMESTER
III BCA
RESOURCE MANAGEMENT TECHNIQUESE**

UNIT-1:

Basics of Operations Research (OR): Characteristics of O.R - Necessity of O.R in Industry -OR and Decision making - Role of computers in O.R. Linear programming: Formulations and Graphical solution (of 2 variables) canonical & standard terms of Linear programming problem. Algebraic solution: Simplex method.

UNIT-2:

Algebraic solution: Charnes method of penalties - two phase simplex method - concept of Duality - properties of duality - Dual simplex method.

UNIT-3:

Transportation model: Definition - formulation and solution of transportation models - the row - minima, column - minima, matrix minima and vogel's approximation methods. Assignment model: Definition of Assignment model - comparison with transportation model - formulation and solution of Assignment model - variations of Assignment problem.

UNIT-4:

Sequencing problem: Processing each of n jobs through m machines - processing n jobs through 2 machines - processing n jobs through 3 machines - processing 2 jobs through m machines - processing n jobs through m machines - travelling salesman problem. Game Theory: Characteristics of games -Maximin, Minimax criteria of optimality - Dominance property - algebraic and graphical method of solution of solving 2 x 2 games.

UNIT-5:

Pert - CPM: Networks - Fulkerson's Rule - measure of activity - PERT computation - CPM computation - resource scheduling. Simulation: Various methods of obtaining random numbers for use in computer simulation - Additive, multiplicative and mixed types of congruence random number generators - Monte Carlo method of simulation - its advantages and disadvantages.

RECOMMENDED TEXTS

1. Hamdy A. Taha: ,1996,Operation Research - An Introduction, 5th edition, Prentice Hall of India, Pvt. Ltd., New Delhi .

FUNCTIONAL MATHEMATICS-I

UNIT-I: Ratio and Proportions

UNIT-II: Percentages

UNIT-III: Profit and loss discounts

UNIT-IV: Simple interest and compound interest

UNIT-V: Solutions of simultaneous equations problems on ages and two digit number.

Reference book:

Quantitative aptitude, R.S. Aggarwal

Notes: Questions only from solved problems for 80% and questions from exercise for 20% .

FUNCTIONAL MATHEMATICS-II

UNIT-I: Time and work – problems.

UNIT-II: Time and distance, problems on trains, boats and stream.

UNIT-III: Mensuration- problems

UNIT-IV: Probability.

UNIT-V: Stocks and shares – problems.

REFERENCE BOOK:

Quantitative aptitude, R.S. Aggarwal

Notes: Questions only from solved problems for 80% and questions from exercise for 20%

II M. Sc., BIO TECH

Biophysics, Biostatistics and Computer applications

UNIT-I:

Macromolecules and supra molecular assemblies in biological systems, molecular assemblies like membranes, ribosomes, extracellular matrix. Analysis of Protein interaction – proteins nucleic acid interaction -Structure and Chemical nature of polysaccharides. Association of the biomolecules with lipids in the biological membranes.

UNIT-II:

Physical techniques in protein, nucleic acids and polysaccharide structural analysis (UV-IR NMR-LASER Raman Spectroscopy MASS Spectroscopy- Fluorescence Spectroscopy) - Differential calorimetry-X-ray-Crystallography- Ultra-centrifugation, Electron Cryomicroscopy – Scanning Tunneling microscopy. Sequencing of proteins and nucleic acids-Protein-protein and protein-ligand interactions.

UNIT-III:

Conformational properties of polynucleotides and polysaccharides-secondary and tertiary structural features and their analysis-theoretical and experimental; protein folding-biophysical and cellular aspects. Protein and nucleic acid databases; structural comparison at secondary and tertiary levels. Physical and chemical methods for immobilization of small and macromolecules. Glyco- and lipo-proteins – structure and function.- Nucleic acid hybridization – structural analysis and biological studies. Ribozymes and catalytic antibodies – functional proteins – structure and drug targets (enzymes and receptors)-Computer aided drug designing, computational techniques in structural analysis; nanoparticles.

UNIT-IV:

Digital computers: organization; low-level and high-level languages; binary number system Flow charts and programming techniques. Programming in Q Basic and C -data structures and database concepts, Internet and its applications. MS-OFFICE software, covering Word Processing, Spreadsheets and presentation software [Haward Graphics] Corel Draw- Computer-oriented Statistical Techniques – Frequency table of single discrete variable, Bubble sort, Computation of mean, variance and standard deviation; t-test, correlation coefficient.

UNIT-V:

Advances in understanding of the information theory and biology -Internet Basics - Submitting DNA sequences to the Databases- Sequence Databases (GeneBank, EMBL, Swiss-port, PIR) Significance of Alignment FASTA-BLAST-CLUSTAL W, CLUSTALX, Mul Align, ALCHEMY, NCBI Database; Structural Databases. PDB, MMDB search and Analysis Tools- Sequence and other Biological Data output from different methods and machines, data curation and analysis.

RECOMMENDED TEXTS:

1. Cotterill Rodney. M.J., 2002, Biophysics: an introduction. John Willey, New York. Harbor Laboratory Press, New York.
2. Lubertstryer, 2001, Biochemisry, Fifth edition, W.H Freeman & company, New York.
3. Mount David.W., 2001, Bioinformatics: sequence and genome analysis. Cold Spring C
4. T.E. Creighton, 1996. Proteins-structure and Molecular properties, Second Edition, WH Freeman and Company.

II B.Sc BIO TECH BIOPHYSICS AND BIOSTATISTICS

UNIT I

Scope and methods and biophysics – levels of molecular organization – detailed structure of protein molecules at primary, secondary, tertiary and quaternary levels.

UNIT II

Analysis of protein, protein interaction and protein – nucleic acid interaction. Structure and chemical nature of polysaccharides.

UNIT III

Statistics – collection, classification, tabulations of Statistical Data – Diagrammatic representation – graphs – plotted curve – Sampling method and standard errors – random sampling – means – confidence limits – standard errors – variance.

UNIT IV

Measures of central tendency – measures of dispersion – Skew ness, kurtosis, moments – Correlations and regression.

UNIT V

Probability distributions – Binomial and negative binomial, compound and multinomial distributions – Tests of significance – t tests – F tests – Analysis of variance – Spread sheets – Data entry – Graphics display – word processes.

BOOKS FOR STUDY

1. Creighton, T.E. 2002. Protein structure and molecular properties. W.H. Freeman and Company.
2. Micklos, D.A. and Freyes, G.A. 2002. DNA Science. Cold Spring harbor laboratory Press.
3. Sundar Rao P.S.S., Jesudian G. and Richard J. 1987. An introduction to Bio-Statistics (2nd Ed). Prestographik, Vellore, India.
4. Gupta, S.P. 1997. Biostatistical Methods, S.Chand and Sons.
5. Elhance, d.n. 1972. Fundamentals of Statistics, KitabMhal, Allahabad.
6. Sokal, P.R and Rohlf, F.R. 1969. Biometry: The Principles and Practice of Statistics, in Biological Research, Freeman and company, San Francisco.
7. Snedecor, George, W.Cochran and William, G. 1967. Statistical Methods, Sixth edition, Oxford and IBH Publishing Co., Oxford Federer W.R 1955. Experimental Design: Theory and Applications, Oxford Publishing Co. Pvt. Ltd., New Delhi.