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1.About the Department

DEPARTMENT OF MATHEMATICS AND STATISTICS

Chaitanya Degree College, Hanamakonda was established as a private Degree college in the year 1991-92 to fulfill the growing educational needs of the students of Telangana districts, in particular Warangal district. The Department of Mathematics was also established in the college during same year to teach B.Sc. MPC(TM) and MPCS(EM) courses. Sri.G.Prabhaker Rao was In charge of the department of Mathematics. The other lecturers are K.Venugopal and Divijender Reddy. In 1994, Mr.K.Venugopal became the Incharge of the department. Students from rural background with meager financial resources were admitted.

We are pleased to inform you that on the advice of UGC the Central Government, in exercises of the powers conferred by section 3 of UGC Act, 1956, declared Chaitanya degree college (Autonomous), Hanamkonda, Warangal, Telangana has an institution Deemed to be University in the name of Chaitanya (Deemed to be University), Warangal, Telangana., MHRD, Government of India, due to Covid-19 pandemic situation online classes for the academic year 2020-2021, blended mode in the academic year 2021-2022, Offline classes started in the academic year 2022-2023.

At present the Mathematics Department has 12 faculty members under the headship of Dr.M.Sunder Ram.

The Department is enriched with highly qualified and experienced faculty members to provide excellent teaching in Mathematics at undergraduate level and also extends its service to the other departments like Computer Science, Management and Life Sciences.

In the beginning, the Department had B.Sc. MPC (TM) and MPCS (EM) courses. Subsequently many restructured courses were also introduced to bring more number of students into its fold.

Apart from teaching, the Department is also engaged in assessing the student's progress from time to time conducting periodical tests. The students, whose performance is poor, are counseled to overcome their deficiencies. The students are given assignments to improve their conceptual

understanding. The departments also organize group discussions under the supervision of faculty members to improve their perception of the subject.

Students are encouraged to deliver seminar lectures in class rooms by choosing a topic of their interest under the guidance of a faculty member. The level of improvement in students is constantly monitored by the above said methods and if necessary, group counseling is done to enhance the standards of students.

The department has constant touch with institutions like University of Hyderabad, National Institute of Technology, Warangal, Kakatiya University, and Osmania University upgrading itself for the benefit of student community. The faculty members are interested in adapting themselves to modern methods of teaching by attending to various refresher courses , seminars, workshops and pursuing the latest changes in the subjects through scientific journals and internet explorer .

The department meetings are held very frequently during which latest trends in the subject are discussed thoroughly and elaborately. The department is enriched by advanced teaching aids like Charts, Overhead Projector, LCD and other aids for teaching purpose.

Presently the department has two Professors, two Associate Professors; four faculty members are pursuing their Ph.D in our University, At present 28 research scholars are pursuing the research in department of Mathematics & Statistics.

2.Courses Offered/Syllabus

BSC(MPCS)

BSC(MSTCS)

BCA

BPHARM

PHARM D

BTECH(CSE/ECE/EEE/MECHANICAL/CIVIL/AI/DS)

MCA

MSC(CS), MSC(DS)

B. Sc. MATHEMATICS

SEMESTER - I

Core Subject: Mathematics-I

Title: **Differential Calculus**

No. of Teaching Hours: 60

No. of Credits: 4

Max. Marks: 70

Objective:

Achieving basic knowledge about Differential Calculus and to gain proficiency in Calculus computations. Practical Knowledge of computing limits, continuity and geometrical applications of Differential Calculus.

Outcome:

Upon successful completion of this course, students will be able to compute limits, derivatives, and analyze functions using limits, derivatives, recognize the appropriate tools of calculus to solve applied problems

Unit – I (Limits and Continuity)

[15 Hours]

Limit and Continuity (ϵ and δ definition), Types of discontinuities, Differentiability of functions,
(Product rule, Quotient rule, Chain rule and logarithmic differentiation for all standard functions)

Unit – II (Successive Differentiation)

[15 Hours]

Successive differentiation, Leibnitz's theorem, Partial differentiation, Euler's theorem on homogeneous functions.

Unit – III (Tangents and Normals)

[15 Hours]

Tangents and Normals, Curvature, Asymptotes, Singular points.

Unit – IV (Curve Tracing)

[15 Hours]

Tracing of curves. Parametric representation of curves and tracing of parametric curves, Polarcoordinates and tracing of curves in polar coordinates.

Scope as in Shanti Narayan and P. K. Mittal, *Differential Calculus*, S. Chand & Co. Reference Books

- H. Anton, I. Birens and S. Davis, *Calculus*, John Wiley and Sons, Inc., 2002.
- G.B. Thomas and R.L. Finney, *Calculus*, Pearson Education, 2007.
- Shanti Narayan, *Differential Calculus*, S. Chand & Co.

Syllabus for Practical

Core Subject:	Mathematics-I
Title:	Differential Calculus
No. of Teaching Hours:	45No. of Credits: 2
Max. Marks:	50

UNIT – I

Limits and Continuity

Problems on quotient rule, chain rule and logarithm differentiation

UNIT – II

Problems on Successive differentiation

Problems on Partial differentiation

UNIT – III

Tangents and Normals

Curvature

Asymptotes and Singular points

UNIT – IV

Tracing of curves

Polar coordinates

Note: A student has to practice 3 to 4 exercise problems on each of the above topics during the practical classes, and same may be recorded in practical record book.

B. Sc. MATHEMATICS

SEMESTER - II

Core Subject: Mathematics -II

No. of Teaching Hours: 60

No. of Credits: 4

Title: **Differential Equations**

Max. Marks: 70

Objective:

Solving different order and different types of Differential Equations

Outcome:

Upon successful completion of the course, the student will be able to classify differential equations into linear and nonlinear equations, solve first order linear differential equations and exact equations, find the general solution of second order linear homogeneous equations with constant coefficients, use the method of variation of parameters, recognize the order and degree of partial differential equations

Unit – I

[15 Hours]

First order exact differential equations. Integrating factors, rules to find an integrating factor. First order higher degree equations solvable for x , y , p .

Unit – II

[15 Hours]

Linear homogenous equations with constant coefficients, Linear non-homogenous equations, The method of variation of parameters, The Cauchy-Euler equation.

Unit – III

[15 Hours]

Methods for solving higher-order differential equations. Basic theory of linear differential equations, Wronskian, and its properties. Solving a differential equation by reducing its order.

Unit – IV

[15 Hours]

Order and degree of partial differential equations, Formation of first order partial differential equations. Lagrange's Method, Homogenous linear partial differential equations with constant coefficients. General solution of $f \square D, D^2 \square z \square F(x, y)$ (Simple Problems).

Books Recommended

- Shepley L. Ross, *Differential Equations*, 3rd Ed., John Wiley and Sons, 1984.
- I. Sneddon, *Elements of Partial Differential Equations*, McGraw-Hill, International Edition, 1967.
- Zafar Ahsan, *Differential Equations and Their Applications*, Prentice-Hall of India Pvt.Ltd., New Delhi.

Syllabus for Practical

Core Subject:	Mathematics-II
Title:	Differential Equations
No. of Teaching Hours:	45
No. of Credits:	2
Max. Marks:	50

UNIT – I

- Exact Differential Equations
- Integrating Factors

Equation of the first Degree in p , x and

y

UNIT – II

- Solution of the Non-homogenous Linear Differential Equations with Constant coefficients by means of polynomial operations
When $Q(x) = bx^K$ and $P(D) = D - a$, $a \neq 0$
 - When $Q(x) = bx^K$ and $P(D) = a_n D^n + a^{n-1} + \dots + a_1 D$
 - When $Q(x) = be^{ax}$
 - When $Q(x) = b \sin ax$ or $b \cos ax$
 - When $Q(x) = e^{ax} V$, where V is a function of x
 - When $Q(x) = be^{ax} V$, and $P(a) = 0$When $Q(x) = xV$, where V is an function of x

- UNIT – III

- Higher order differential equations
- Solving differential equation by reducing its

order UNIT – IV

- Formation of partial differential equations
- Problems on partial differential equations

Note: A student has to practice 3 to 4 exercise problems on each of the above topics during the practical classes, and same may be recorded in practical record book.

B. Sc. MATHEMATICS SEMESTER - III

Core Subject: Mathematics-III Title: REAL ANALYSIS No. of Teaching Hours: 60
Max. Marks: 70

No. of Credits: 4

Objective:

Understanding about Finite and infinite sets, Suprema and infima, Sequences, Series, Convergence and Uniform convergence, differentiation and Riemann integral.

Outcome:

After completion of the course, the student will be able to understand about Finite and infinite sets, Suprema and infima, Sequences, Series, convergence and Uniform convergence, Differentiation and Riemann integral.

Unit –I: The Real Numbers:

Sets, finite & infinite sets Review of Algebraic and ordered properties of \mathbb{R} , δ -neighborhood of a point in \mathbb{R} , Bounded above sets, Bounded below sets, Unbounded sets, Supremum and infimum. The completeness property of \mathbb{R} , The Archimedean property, Density of Rational (and Irrational) numbers in \mathbb{R} , Intervals, Nested interval property, The Uncountability of \mathbb{R} .
(No question should be set from this part)

Sequences:

Sequences, Bounded sequences, Convergent Sequences, Limit of a Sequence, Tail of a sequence (definition), Squeeze theorem, Limit theorem, Monotone Sequences, Monotone Convergence theorem, Sub sequences, monotone-Subsequence theorem (statement only), Bolzano-weierstrass theorem, The Cauchy criterion, Cauchy Convergence criteria.

UNIT-II

Series: Infinite series, Convergence and divergence of infinite Series, Tests for Convergence: G.P test, P-test, Comparison test, Limit Comparison test (statement only) Limits of functions

Continuous functions:

Continuous functions, Sequential criteria for Continuity and discontinuity, Combination of Continuous functions (theorem statements only) Location of roots theorem, Bolzano-Intermediate mean value theorem)

For UNIT-I and UNIT-II, Scope as in introduction of Real Analysis by Robert. G. Bartle and Donald

R. Sherbert

Published by John Wiley and Sons, Inc 3rd Edition

Chap [2,3(3.1-3.5),3.7, 3.7.2, 3.7.7, 3.7.8, 4.1, 5.1, 5.2, 5.3, 5.3.2, 5.3.3, 5.3.4, 5.3.5, 5.3.7, 5.4, 5.4.3]

UNIT-III: Differentiability

The Derivative, sign of the derivative, Rolle's theorem, Lagrange mean value theorem, Cauchy's mean value theorem, Statements of Taylor's theorem and Maclaurin's theorem, Maxima and minima. L-Hospital Rule

UNIT-IV: Riemann Integral

Existence of the integrals, Inequality for integrals, Conditions of integral, Integrability of the sum and difference of integral functions, Definition as limit of Riemann Sum, Some integrable functions, Integration and Differentiation theorem of Calculus.

For UNIT-III & UNIT-IV, Scope as in mathematical analysis by

S. C. Malik, Savita Arora, Chap6(1.1, 1.2, 5,5.1,6,7,8.1,8.2) 7, 9(1.1,1.3,4,4.1,5,6.1,7,8,9)]

Reference Books

- D. Somasundaram and B. Choudary, A First Course in Mathematical Analysis, Narosa Publishing House, New Delhi, 1997
- P. K. Jain and S. K. Kaushik, An Introduction to Real Analysis, S. Chand & Co., New Delhi, 2000
- Shanti Narayan and Mittal, Mathematical Analysis

Syllabus for Practical

**Core Subject:
Mathematics-III**

Title : REAL ANALYSIS

No. of Teaching Hours	:	45
No. of Credits	:	2
Max. Marks	:	5

Objective:

Understanding about Finite and infinite sets, Suprema and infima, Sequences, Series, Convergence and Uniform convergence, differentiation and Riemann integral.

Outcome:

After completion of the course, the student will be able to understand about Finite and infinite sets, Suprema and infima, Sequences, Series, convergence and Uniform convergence, Differentiation and Riemann integral.

Unit –I: The Real Numbers:

Problems on Sequences, Bounded sequences,
Problems on Convergent Sequences, Limit of a
Sequence, Problems on Monotone Sequences,
Problems on Monotone Sub
sequences, Problems on Cauchy
Convergence criteria. **UNIT-II**

Series & Continuity

Problems on Infinite series,
Problems on Convergence and divergence of infinite Series,
Problems on Tests for Convergence (G.P test, P-test, Comparison test, Limit
comparison test) Problems on Continuous functions by Sequential criteria .

UNIT-III: Differentiability

Problems on Rolle's theorem,

Problems on Lagrange mean value theorem,

Problems on Taylor's theorem and Maclaurin's theorem, Problems on L-Hospital Rule

UNIT-IV: Riemann Integral

Problems on integrals.

B. Sc. MATHEMATICS SEMESTER - III

Core Subject: OPEN ELEVTIVE Title: General /Basic Mathematics

No. of Teaching Hours: 60

Max. Marks: 70

No. of Credits: 4

Unit – I

L.C.M and H.C.F of numbers, Ratio and proportion, Percentages, Partnership.

Unit – II

Profit and loss, Time&distance ,Time &work problems.

Unit – III

Sets, Relations and functions, Statements, implication converse and inverse.

Unit – IV

Frequency distributions, Mean, Median, Mode, Standard Deviations.Probabilty(simple problemsonly).

Reference Books:

Quantitative Aptitude for Competitive Exam - R. S.

AggarwalQuantitative Aptitude Quantum - Sarvesh

Sharma

B. Sc. MATHEMATICS SEMESTER - IV

Core Subject: Mathematics-IV

Title: ALGEBRA

No. of Teaching Hours: 60

Max. Marks: 70

No. of Credits: 4

Objective: The Course is aimed at exposing the students to learn some basic algebraic structures like groups, rings, and Fields and Ideals and Factor rings etc.

Outcome: On successful completion of the course Students will be able to recognize algebraic structures that arise in matrix algebra, linear algebra and will be able to apply the skills learnt in understanding various such subjects.

Unit -1

Groups: Binary operations, Definition & examples of groups, infinite groups, sub groups, cyclic groups, cosets, Lagrange's theorem and its converse, groups of permutations, orbits, cycles.

Unit -2

Rings & fields, sub-rings, Integral domains, Divisors of zeroes and cancellation & the characteristics of a ring.

Unit-3

Introduction to linear algebra, vector spaces, Definition & problems on vector spaces, subspaces, linear combination, linear span, linear sum, linearly dependent & independent sets of vectors.

Unit-4

Bases & dimensions, problems unit, Linear Transformation, problems on it, Range & null spaces (theorems & problems), Quotient space, matrix of linear transformation, introduction to eigen values & eigen vectors.

Textbook:

Scope as in a 1st Course IN ABSTRACT Algebra

-- By John B. Farleigh

Published by Pearson Education (Seventh Edition) [In Section 2, 4, 5, 6, 10 Unit - I]

UNIT-II Section 8, 9, 13, 14

UNIT-III Section 18, 19

UNIT-IV Section 26, 27

Reference books

- Bhattacharya, P.B Jain, S.K: and Nagpal S.R, Basic Abstract Algebra
- Joseph Galliano, Contemporary abstract Algebra (9th Edition)
- Herstein, I. N, Topics in Algebra

Syllabus for Practical

Core Subject : **Mathematics-IV**

Title : **ALGEBRA**
No. of Teaching Hours : **45**
No. of Credits : **2**
Max. Marks : **50**

Objective: The Course is aimed at exposing the students to learn some basic algebraic structures like groups, rings, and Fields and Ideals and Factor rings etc.

Outcome: On successful completion of the course Students will be able to recognize algebraic structures that arise in matrix algebra, linear algebra and will be able to apply the skills learnt in understanding various such subjects.

Unit -1

Problems on groups, problems on finite groups, sub groups, cyclic groups, cosets, Problems on Lagrange's theorem, groups of permutations, orbits, cycles.

Unit -2

Problems on Rings & fields, Problems on sub-rings, Integral domains, characteristics of a ring.

Unit-3

Problems on vector spaces, Definition problems on subspaces, linear combination, Problems on linear span, linearly dependent & independent sets of vectors.

Unit-4

Problems on Bases & dimensions, problems on Linear Transformation, problems on it, Problems on matrix of linear transformation, Problems on eigen values & eigen vectors.

B. Sc. MATHEMATICS

SEMESTER - IV

Core Subject: SEC-II Title: VECTOR CALCULUS No. of Teaching Hours: 60
Max. Marks: 70

No. of Credits: 4

Objective: The Course is aimed at exposing the students to learn some basic derivatives and integrals etc.

Outcome: On successful completion of the course Students will be able to solve applications of integrals and derivatives.

Unit -I

Differential operator, Gradient, Divergence, curl & vector identities, related problems.

Unit -II

Vector differential geometry, frenet -serret formulae and related problems.

Unit-III

Line integrals, surface integrals and volume integrals and problem related to them.

Unit-IV

Greens theorem, Gauss divergence theorem, stokes theorem(only statement)and problems related to them.

[Unit-1:8.9,8.10,8.11;Unit-2:2.5,2.6,2.7;Unit-3:9.1,9.6,9.7;Unit-4:9.4,9.7,9.9]

Text books:

- A book on vector calculus by P.K.Mittal &Shanthi Narayan(For unit-2)
- An advanced engineering book by Erwin Kareysigz.(for unit -1,3,4)

Reference books:

A vector calculus book by PC.Mathews.

Semester-IVSEC-2

Core Subject: MATHEMATICS

Title: LAPLACE TRANSFORMS

No. of Teaching Hours: 60

No. of Credits: 4

Max. Marks: 70

UNIT-I

Laplace transforms-Definition-Laplace transforms of derivatives.UNIT-II

Laplace transforms of integrals, Laplace transforms of Unit-step function (or) Heaviside's unitfunction.

UNIT-III

Inverse Laplace transforms-Introduction, Inverse Laplace transforms of derivatives.UNIT-IV

Inverse Laplace transforms of integrals, Convolution theorem (statement only), Solutions of OrdinaryDifferential Equations by Laplace transforms.

SEMESTER-V

Core Subject: Mathematics-V

Title: ANALYTICAL SOLID

GEOMETRY No. of Teaching Hours: 60

No. of Credits: 4 Max. Marks: 70

Objective:

Students learn to describe some of the surface by using Analytical

Geometry. Outcome:

Student understand the beautiful interplay between Algebra and

Geometry. UNIT-I – PLANES

Definition of plane, Normal form, Angle between two Planes, Determination of a plane under given conditions, Plane through three points, System of planes, Bisectors of angle between two planes.

UNIT-II – LINES

Definition of Line, Representation of Line, Angle between a Line and a Plane, Conditions for a line to lie in a Plane, Coplanar Lines, Condition for the coplanarity of Lines, Shortest distance between two lines.

UNIT-III – SPHERES

Definition of sphere, the Sphere through four given points, Equation of the Circle, Intersection of a Sphere and a Line, Equation of a Tangent Plane, Angle of intersection of two Spheres, Condition for the Orthogonality of two Spheres.

UNIT-IV – CONES

Definition of Cone, Mutually perpendicular generators of a cone, Intersection of a Line with a Cone, Intersection points, Reciprocal cone, Right Circular Cone.

TEXT BOOK:

- Analytical Solid Geometry (17e) by Shanti Narayan and P.

K. Mittal. REFERENCE BOOKS:

- Analytical Solid Geometry by Khaleel Ahmed.
- S L Loney, Solid Geometry Smith and Minton, Calculus.

Semester-V Syllabus for Practical

Paper-V

Title: ANALYTICAL SOLID GEOMETRY

No. of Hours per week: 03 No. of credits: 02

UNIT-I

- Plane through three points
 - System of planes
- Bisectors of angle between two planes.

- UNIT-II
- Angle between a Line and a Plane
- Condition for the Coplanarity of Lines

Shortest distance between two lines

- UNIT-III
- Sphere through four given points
- Angle of Intersection of two Spheres
-

Orthogonality of two Spheres

- UNIT-IV
- Mutually perpendicular generators of a Cone
- Reciprocal Cone

Right Circular Cone.

Note:

A student has to practice 3 to 4 exercise problems on each of the above topics during the practical classes and same may be recorded in practical record book.

SEMESTER-VI

Core Subject: Mathematics-VI

Title: NUMERICAL ANALYSIS No. of

Teaching Hours: 60

No. of Credits: 4 Max. Marks: 70

Objective:

The students are exposed to various concepts of Numerical Analysis like Solutions of equations, Interpolation and Polynomials Approximation, Numerical Differentiation and Integration.

Outcome:

Students will realize the importance of the subject in solving some problems of algebra and calculus. After completion of this course. The students appreciate its interdisciplinary nature.

UNIT-I

INTERPOL

ATION

Equal intervals-Operators: E, Δ, ∇ , Forward and backward differences, Newton-Gregory forward and backward difference interpolation formulae.

UNIT-II

NUMERICAL DIFFERENTIATION AND INTEGRATION

Numerical differentiation using Newton's forward and backward formulae, a general Quadrature formula for equidistance ordinates, The Trapezoidal rule, Simpson's ¹rd rule, Simpson's ³th rule

UNIT-III

SOLUTIONS OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS IN ONE VARIABLE

The Bisection method, Newton Raphson's method, Iteration method, Regula Falsy method, Order and rate of convergence, rate of convergence for Newton Raphson's method, Newton Raphson's method for finding P^{th} root of a number N.

UNIT-IV

NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS

Definitions of single step method, multistep method, initial value problem, boundary value problem, Euler's method, Euler's modified method, Picard's method, Taylor's

series method, Runge- Kutta^{2nd} and ^{4th} order methods, Milne predictor –corrector formula.

Scope as in FINITE DIFFERENCES & NUMERICAL ANALYSIS by H.C.SAXENA, published by

S. Chand &

company Ltd.

Reference Books:

- Introductory Methods of Numerical Analysis by S.S.Sastry, Prentice –Hall of India.
- Calculus of Finite Differences and Numerical Analysis by Gupta-Malik, KrishnaPrakasanMandir, Meerut.
- Numerical Methods, Problems and Solutions by M.K.Jain, S.R.K.Iyengar and R.K.Jain, Wiley Eastern Ltd.

B.Sc. Mathematics Semester-VI Syllabus for Practical Paper-VI

Title: NUMERICAL ANALYSIS

No. of Hours per week: 03 No. of credits: 02

UNIT-I

- Newton-Gregory forward difference interpolation formula
- Newton-Gregory backward difference

interpolation formula

- UNIT-II
- Numerical differentiation using Newton's forward and backward formulae
- The Trapezoidal rule
- Simpson's 1^{rd} rule
3
- Simpson's 3^{th} rule
8

UNIT-III

- The Bisection method
- Newton Raphson's method
- Iteration method

Regula Falsy method

- UNIT-IV
- Euler's method
- Euler's modified method
- Picard's method
- Tailor's series method
- Runge-Kutta 2^{nd} and 4^{th} order methods
- Milne predictor –corrector

method

- Note:

A student has to practice 3 to 4 exercise problems on each of the above topics during the practical classes and same may be recorded in practical record book.

B. Sc. STATISTICS

SEMESTER - I

Core Subject:	Statistics
Title:	Descriptive Statistics and Probability Theory
No. of Teaching Hours:	60
No. of Credits:	4
Max. Marks:	70

Objective:

To gain the fundamental knowledge of basic statistics

Outcome:

Upon successful completion of this course, students will be able to understand the quantitative data, fitting of curves, basic idea of correlation, regression, probability and random experiment.

Unit – I (Introduction and Analysis of Quantitative Data) [15 Hours]

Concepts of a statistical population and sample from a population, quantitative and qualitative data, nominal, ordinal and time-series data, discrete and continuous data. Presentation of data by tables and by diagrams, frequency distributions for discrete and continuous data, graphical representation of a frequency distribution by histogram and frequency polygon, cumulative frequency distributions (inclusive and exclusive methods). Measures of location (or central tendency) and dispersion, moments, measures of skewness and kurtosis,

Unit – II (Curve Fitting) [15 Hours]

Principle of least-squares and fitting of polynomials and exponential curves. (Straight line, parabola, power and exponential curves).

Unit – III (Correlation and Regression) [15 Hours]

Bivariate data: Scatter diagram, Correlation and regression. Karl Pearson coefficient of correlation, Lines of regression, Spearman's rank correlation coefficient, multiple and partial correlations (for 3 variates only).

Unit – IV (Probability and Random Experiment) [15 Hours]

Random experiment, sample point and sample space, event, algebra of events, Definition of Probability - classical, relative frequency and axiomatic approaches to probability, merits and demerits of these approaches (only general ideas to be given). Theorem on probability, conditional probability, independent events. Baye's theorem and its applications.

Books Recommended

- J.E. Freund, *Mathematical Statistics with Applications*, 7th Ed., Pearson Education, 2009.

- A.M. Goon, M.K. Gupta and B. Dasgupta, *Fundamentals of Statistics*, Vol. I, 8th Ed., World Press, Kolkatta, 2005.
- S.C. Gupta and V.K. Kapoor, *Fundamentals of Mathematical Statistics*, 11th Ed., SultanChand and Sons, 2007.

- R.V. Hogg, A.T. Craig and J.W. Mckean, *Introduction to Mathematical Statistics*, 6th Ed., Pearson Education, 2005.
- A.M. Mood, F.A. Graybill and D.C. Boes, *Introduction to the Theory of Statistics*, 3rd Ed., Tata McGraw Hill Publication, 2007.

Syllabus for Practical

Core Subject: Statistics

Title: Descriptive Statistics and Probability Theory

No. of Teaching Hours: 45 No. of Credits: 2

Max. Marks: 50

- Graphical representation of data (Histogram and Frequency Polygon)
- Diagrammatic representation of data (Bar and Pie diagrams)
- Computation of Central Moments
- Computation of Coefficient of Skewness and Kurtosis (Karl Pearson's and Bowley's)
- Fitting of Straight Line and Parabola by the Principle of Least Squares
- Fitting of Power Curve and Exponential Curve by the Principle of Least Squares
- Computation of Karl Pearson coefficient of correlation
- Computation of Rank correlation coefficient
- Computation of Regression Lines
- Problems on Probability and Conditional Probability
- Problems on Bayes Theorem

Note: A student has to practice 3 to 4 exercise problems on each of the above topics during the practical classes, and same may be recorded in practical record book.

B. Sc. STATISTICS

SEMESTER - II

Core Subject:	Statistics
Title:	Probability and Distributions
No. of Teaching Hours:	60No. of Credits: 4
Max. Marks:	70

Objective:

To achieve the knowledge of random variables, Mathematical Expectation and Distributions

Outcome:

Upon successful completion of this course, students will be able to understand the discrete and continuous random variables and their properties, mathematical expectation of random variables and its properties, discrete and continuous distributions.

Unit – I (Random Variables) [15 Hours]

Random variables: Discrete and continuous random variables, p.m.f., p.d.f. and c.d.f., illustrations of random variables and its properties,

Unit – II (Mathematical Expectation) [15 Hours]

Expectation of random variable and its properties. Moments and cumulants, moment generating function, cumulants generating function and characteristic function. Bivariate probability distributions; marginal and conditional distributions; independence of variates (only general idea to be given). Statement and application of Chebychev's inequality, Cauchy Schwarz's inequality, WLLN and SLLN, Central limit theorem (CLT) for i. i. d. variates, and its applications.

Unit – III (Discrete Distributions) [15 Hours]

Point (or degenerate), binomial, Poisson, Geometric, negative binomial, Hypergeometric distributions.

Unit – IV (Continuous Distributions) [15 Hours]

Normal, Uniform, Exponential, Beta and Gama distributions.

Books Recommended

- A.M. Goon, M.K. Gupta and B. Dasgupta, *An outline of Statistical Theory* (Vol. I), 4thEd., World Press, Kolkata, 2003.
- S.C. Gupta and V.K. Kapoor, *Fundamentals of Mathematical Statistics*, 11th Ed., SultanChand and Sons, 2007.
- R.V. Hogg, A.T. Craig, and J.W. Mckean, *Introduction to Mathematical Statistics*, 6th Ed. Pearson Education, 2005.
- A.M. Mood, F.A. Graybill and D.C. Boes, *Introduction to the Theory of Statistics*, 3rd Ed., Tata McGraw Hill Publication, 2007.
- V.K. Rohtagi and A.K. Md. E. Saleh, *An Introduction to Probablity and Statistics*, 2nd Edition, John Wiley and Sons, 2009.
- S.A. Ross, *Introduction to Probability Models*, 9th Ed., Academic Press, 2007.

Syllabus for Practical

Core Subject:	Statistics
<i>Title:</i>	<i>Probability and Distributions</i>
No. of Teaching Hours:	45No. of Credits: 2
Max. Marks:	50

- Computation of p. m. f and p. d. f
- Computation of Chebychev's inequality
- Fitting of Binomial distribution – Direct Method
- Fitting of Binomial distribution- Recurrence relation Method
- Fitting of Poisson distribution- Direct Method
- Fitting of Poisson distribution- Recurrence relation Method
- Fitting of Negative Binomial distribution
- Fitting of Normal Distribution – Areas Method
- Fitting of Normal Distribution-Ordinates Method
- Fitting of Exponential distribution

Note: A student has to practice 3 to 4 exercise problems on each of the above topics during the practical classes, and same may be recorded in practical record book.

B. Sc. STATISTICS SEMESTER - III

Core Subject: STATISTICS Title: STATISTICAL METHODS

No. of Teaching Hours: 60 Max. Marks: 70

No. of Credits: 4

Objective:

To achieve the knowledge of theory of attributes, exact sampling distributions and maximum likelihood estimation.

Outcome:

Upon successful completion of this course, students will be able to understand the basic idea of attributes, Chi-square, t and F distributions, Criteria of a good estimator and properties of MLE.

Unit – I

[15

Hours]

Theory of attributes, Consistency of data, conditions of consistency, Analysis of categorical data, their independence, Association and partial association of attributes. Various measures of association: (Yule's) for two way data and coefficient of contingency and coefficient of colligation.

Unit – II

[15

Hours]

Concepts of Population, Parameter, Random sample, Statistic, Sampling distribution and Standard error. Standard error of sample mean(s) and sample proportion(s), basic definitions of testing of hypothesis. Exact sampling distributions - Chi-square, t and F distributions and their moments, moment generating function, characteristic function, cumulant generating function, additive property, interrelationships.

Unit – III

[15

Hours]

Theory of estimation, Point estimation and interval estimation of a parameter, concept of bias and mean square error of an estimate. Criteria of a good estimator- consistency, unbiasedness, efficiency and sufficiency with examples. Statement of Neyman's Factorization theorem, derivations of sufficient statistics in case of Binomial, Poisson, Normal and Exponential (one parameter only) distributions

Unit – IV

[15

Hours]

Estimation by the method of moments, Maximum likelihood estimation of the parameters of Binomial, Poisson, Exponential and Normal distributions by these methods, statements of asymptotic properties of MLE. Concept of interval estimation. Confidence intervals of the parameters of normal population.

Text Book: Fundamentals of mathematical statistics by V.K. Kapoor and S.C.Gupta.

Published by SULTAN CHAND & SONS (Eighth Edition)

[In Unit – I- 11.1,11.2,11.3,11.4,11.5,11.6,11.8,11.9,11.13,11.14,11.15,11.17,11.18,11.19

UNIT-II -12.3,12.4,12.6,12.7,13.1,13.5,13.7,14.1,14.44,14.48,14.64,14.65

UNIT-III -15.1,15.2,15.5,15.9,15.10,15.18,
UNIT-IV-15.52,15.56,15.57,15.69]

Reference Books:

- Fundamentals of statistics Vol II, Goon AM, Gupta MK, Das Gupta B, World press Calcutta.
- Fundamentals of mathematical statistics by Hoel. PG.
- Introduction to estimation by Hogg and Criag.
- Statistical Inference by Surendran and Saxena, S.Chand and Company.

Syllabus for Practical

Core Subject : **Statistics**

Title : **Statistical**

Methods : **45**

No. of Credits : **2**

Max. Marks : **50**

- Computation of Yule's coefficient of association
- Computation of Yule's coefficient of colligation
- Computation of coefficient of association
- Computation of coefficient of contingency
- Problems on Positive, Negative and independent of attributes
- Problems on consistency
- Problems on Standard error of sample mean(s)
- Problems on standard error of sample proportion(s)
- Maximum likelihood estimation of the parameters of Binomial, Poisson, Exponential and Normal distributions
- Problems on method of moments

Note: A student has to practice 3 to 4 exercise problems on each of the above topics during the practical classes, and same may be recorded in practical record book.

B. Sc. STATISTICS SEMESTER - IV

Core Subject: **STATISTICS** Title: STATISTICAL INFERENCE

No. of Teaching Hours: 60 Max. Marks: 70

No. of Credits: 4

Objective:

To achieve the knowledge of large sample, small sample and non-parametric tests

Outcome:

Upon successful completion of this course, students will be able to understand the Z-test, Student's t -test, F-test, Chi-square test and non-parametric tests.

Unit – I [15 Hours]

Concepts of statistical hypotheses, Null and Alternative hypothesis, Critical region, two types of errors, Level of significance and Power of a test. One and two tailed tests, Statement and Proof of Neyman-Pearson's fundamental lemma for Randomized tests. Examples in case of Binomial, Poisson, Exponential and Normal distributions and their power of the test functions.

Unit – II [15 Hours]

Large sample tests for single sample mean, difference of means, single sample proportion, difference of proportions and difference of standard deviations. Fisher's Z-transformation for population correlation coefficient(s) and testing the same in case of one sample and two samples.

Unit – III [15 Hours]

Tests of significance based on Chi-square test for specified variance, goodness of fit and test for independence of attributes ($r \times s$, $2 \times k$ and 2×2 contingency tables). Tests of significance based on student's t -test for single sample specified mean, difference of means for independent and paired t -test for difference of means. F-test for equality of population variances.

Unit – IV [15 Hours]

Non-parametric tests - their advantages and disadvantages, comparison with parametric tests. One sample runs test, sign test and Wilcoxon-signed rank tests (single and paired samples). Two independent sample tests: Median test, Wilcoxon –Mann-Whitney U test, Wald Wolf witz's runs test.

Text Book: Fundamentals of mathematical statistics by V.K. Kapoor and S.C.Gupta.
Published by SULTAN CHAND & SONS (Eighth

Edition)[In Unit – I-

16.1,16.2,16.3,16.4,16.5,16.6,16.7,16.11,16.12,

Unit-II-12.10, 12.12, 12.15, 12.16, 12.17, 12.18, 12.19, 12.20, 12.23, 12.31, 12.32, 12.37, 12.39,

12.40, 12.42, 12.43, 14.71, 14.73

Unit-III -13.38,13.39,13.41,13.42,13.43,13.49,14.57,14.59,14.60,
Unit-IV-16.59,16.60,16.61,16.64,16.65,16.66,16.67]

Reference Books:

- Fundamentals of statistics Vol II, Goon AM, Gupta MK, Das Gupta B, World press Calcutta.
- Non parametric statistics for behavioral sciences by sidney and filed.
- Mathematical statistics, freund JE, prentice Hall of India.
- Introduction to the theory of statistics mood AM, Graybill FA and Boss DC, MCG Raw Hill
- An introduction to protability theory and mathematical statistics Rohatgi VK John Wiley & Sons.

Syllabus for Practical

Core Subject : **Statistics**

Title : **Statistical Inference**

No. of Teaching Hours : **45**

No. of Credits : **2**

Max. Marks : **50**

- Problems on Neyman – Pearson lemma
- Tests for proportions (large sample)
- Tests for means, variances and standard deviations (large sample)
- Tests for means (Single mean, difference of means, paired-t test)
- Chi square – test (Test for independence of attributes , test for goodness of fit)
- F – test for equality of population variance
- NP – Tests for one sample test – Sign test and Wilcoxon Signed rank test.
- NP – tests for two samples Sign test and Wilcoxon Signed rank test.
- NP – Tests for two independent sample – Median, Mann – Whitney U-test.
- Run test, Wald Wolf witz run test.

Note: A student has to practice 3 to 4 exercise problems on each of the above topics during the practical classes, and same may be recorded in practical record book.

B. Sc. STATISTICS SEMESTER - V

Core Subject: **STATISTICS**

Title: APPLIED STATISTICS-I

No. of Teaching Hours: 60

Max. Marks: 70

No. of Credits: 4

Objective:

Students learn to evaluate the data using ANOVA, understand the issues and principles of Design of Experiments (DOE) and analyse the data collected based on the design used and its underlying assumptions. Students are taught how statistical techniques fit in to the general process of science and how the charts are fitted in to the data. Quality Control is very important for a every company. Quality control includes service quality given to customer. It gives an idea of using index numbers in a range of practical situations, limitations and uses

UNIT-I: ANOVA

[15 Hours]

ANOVA of one-way and two-way classifications, advantages and disadvantages. Expectation of various sums of squares. Importance and applications of designs of experiments. Principles of experimentation.

UNIT-II: Design of Experiments

[15 Hours]

Layout, Construction, Analysis of (i) Completely Randomized Design (ii) Randomized Block Design and (iii) Latin Square Design. Comparison of their efficiencies, Estimation of single missing value in RBD and LSD. Merits and Demerits of all three Designs.

UNIT-III: Statistical Quality Control

[15 Hours]

Importance of SQC in industries, Concepts of control charts, 3σ - limits of control charts, Statistical basis of control charts, control charts for variables (\bar{X} , R, $\bar{X} - R$ Charts), control charts for attributes with fixed and varying sample size (p , np , c and u charts), their construction and uses.

UNIT – IV: Index Numbers

[15 Hours]

Concept of Index Numbers. Construction of Index number, criteria of good Index Number, Simple and Weighted Index Numbers, Various Index Number formulae. Fixed base and chain base Index Number, Wholesale Price Index and Cost of Living Index Number, Base Shifting, Splicing and Deflating of Index Numbers.

Text Book: Fundamental of Applied Statistics – S.C. Gupta & V.K. Kapoor.

Reference Books:

- Fundamental of Statistics – AM Goon, B. Gupta and Das Gupta.
- Statistical Methods – S.P. Gupta (for NSSO and CSO).

Syllabus for Practical

Core Subject	:	Statistics
Title	:	APPLIED STATISTICS-I
No. Of Teaching Hours	:	:45
No. Of Credits	:	2
Max. Marks	:	50

- ANOVA of one-way and two-way classifications
- ANOVA of Completely Randomized Design.
- ANOVA of Randomized Block Design and Estimation of one missing value in RBD.
- ANOVA of Latin Square design and Estimation of one missing value in LSD.
- a. Construction of \bar{X} , R and σ^2 - charts.
 - Construction of \bar{X} , R and σ^2 - charts using MS-Excel.
- a. Construction of p, np-charts with fixed and varying sample sizes.
 - Construction of p, np-charts with fixed and varying sample sizes using MS-Excel.
- a. Construction of c charts.
 - Construction of c charts using MS-Excel.
- a. Computation of Laspeyer's, Paasche's and Fisher's Price and Quantity Index numbers.
 - Computation of Laspeyer's, Paasche's and Fisher's Price and Quantity Index numbers using MS-Excel.
- a. Construction of Cost of Living Index Numbers.
 - Construction of Cost of Living Index Numbers using MS-Excel.
- a. Base shifting and Splicing of Index Numbers.
 - Base shifting and Splicing of Index Numbers using MS-Excel.

Note: A student has to practice 3 to 4 exercise problems on each of the above topics during the practical classes, and same may be recorded in practical record book.

B. Sc. STATISTICSSEC-3

SEMESTER - V

Core Subject: **STATISTICS**

Title: **OPERATIONS RESEARCH – I**

No. of Teaching Hours: 60

Max. Marks: 70

No. of Credits: 4

Objective:

The primary objective of operations research is optimization. Student learns optimization techniques, solution of Linear programming problems, study Transportation and assignment problems, sequencing problem.

UNIT-I:

[15 Hours]

Definition of LPP. Formulation of Linear Programming Problems solving by graphical method. Statement of Fundamental theorem of LPP, Simplex algorithm, Big M-Method and Two Phase method using artificial variables, Degeneracy in LPP..

UNIT-II:

[15 Hours]

Concept of Dual and Primal LPP – Duality and Dual Simplex Algorithm
Transportation Problem Matrix form, Mathematical formulation of TP, Feasible Solution to TP, IBFS by North-West corner, matrix minimum method, Vogel's Approximation Methods, OBFS by Modi method, unbalanced transportation problem

UNIT-III:

[15 Hours]

Concepts of Assignment Problem, its Matrix form, AP as a special case of TP and LPP, Obtaining optimum solution using Hungarian's algorithm, Unbalanced AP, travelling salesman problem.

UNIT-IV: Sequencing Problem:

[15 Hours]

Concept of sequencing problem, Definitions of Terminology, Determination of Optimum sequence of 'n' jobs on two and three machines without passing, Johnson's method, Calculation of idle times of machines and verification of Total Elapsed Time

Text Book: Operations Research – S.D. Sharma.

References :

- Operations Research – KantiSwaroop, P.K. Gupta, Man Mohan.
- Problems in Operations Research – S.P. Gupta.

Core Subject: **STATISTICS**

B. Sc. STATISTICS SEMESTER - VI

Title: APPLIED STATISTICS-II No. of Credits: 4

No. of Teaching Hours: 60

Max. Marks: 70

Objective:

Students learn the time series on simple description methods of data, explains the variation, forecasting the future values, control procedures. it aids in forecasting sales and revenues the steps to be taken in a sample survey, sampling over complete enumeration and types of sampling. Sampling theory helps the students in estimating the unknown population parameters from the knowledge of statistical measures based on studies.

UNIT-I: Time Series Analysis

[15 Hours]

Concepts and definition of Time Series. Components of TS, Analysis of TS, Determination of trend by graphical, semi-averages, principle of least squares and moving average methods. Measurement of seasonal fluctuations by Simple Averages, Ratio to Trend, Ratio to moving average and Link Relative Methods.

UNIT-II: Demand Analysis

[15 Hours]

Introduction – Demand and Supply – Price Elasticity of demand – Price Elasticity of Supply – Types of data required for estimating Elasticities – Leontief’s method, Pigou’s method from Time Series data, Pareto’s Law of Income distribution. (Problems from only Leontief’s method, Pigou’s method), Curve of concentration [Lorenz curve], Gini’s co-efficient of concentration.

UNIT-III: Sampling Theory

[15 Hours]

Random Numbers, drawing random samples, sample surveys v/s census surveys, planning and execution of large scale sample surveys, notion of sampling and non sampling errors, advantages and limitations of sampling, estimation of population mean, population total and population proportions, their variances and estimates of variances in SRSWOR and SRSWR and comparisons.

UNIT-IV:

[15 Hours]

Estimation of population mean, population total and their variances in Stratified Random Sampling with proportional and Neyman’s optimum allocations, Systematic Sampling with $N = nk$, comparison of their Efficiencies.

Text Book: Fundamental of Applied Statistics – S.C. Gupta & V.K. Kapoor.

Reference Books:

1. Fundamental of Statistics – AM Goon, B. Gupta and
Das Gupta. 2. Statistical Methods – S.P. Gupta (for
NSSO and CSO).

- Basic Statistics – B. L Aggarwal, New Age Publications.
- Sampling Techniques – W. C. Cochran

Syllabus for Practical

Core Subject	:	Statistics
Title	:	APPLIED STATISTICS-II
No. Of Teaching Hours	:	45
No. Of Credits	:	2
Max. Marks	:	50

1. a. Measurement of trend by principle of least squares.
(Straight line, 2nd degree parabola, exponential and power curve)
- b. Measurement of trend by principle of least squares using MS-Excel.
(Straightline, 2nd degree parabola) (St
2. a. Measurement of trend by moving averages method.
- b. Measurement of trend by moving averages method using MS-Excel.
3. a. Measurement seasonal indices by ratio to trend, ratio to moving averages and LinkRelative Methods.
- b. Measurement seasonal indices by ratio to trend, ratio to moving averages using MS-Excel.
6. a. Fitting of demand curve of the form
- Estimation of Population mean, Population Total, variance of these estimates by SimpleRandom Sampling with and without replacement and their comparison.
- Stratified random sampling with Proportional and Optimum allocations, Comparison betweenProportional and Optimum allocation with SRSWOR.
- Systematic sampling with $N=nk$, Comparisons of systematic sampling with stratifiedsampling and SRSWOR.

Note: A student has to practice 3 to 4 exercise problems on each of the above topics during thepractical classes, and same may be recorded in practical record book.

B.Tech

MATHEMATICS-I

(CALCULUS AND LINEAR ALGEBRA)

COURSE CODE	BSC103	
Category	BASIC SCIENCE COURSE	
Course Title	MATHEMATICS-I	
Scheme and Credits	L T P C	SEMESTER-1
	3 1 0 4	

UNIT-1

Matrix Theory: Definition of a matrix, Rank of a matrix, Consistency of the system of linear equations, Eigen values and Eigen vectors of a matrix; Cayley-Hamilton theorem (without proof) simple problems, Definitions of symmetric, skew-symmetric matrix, Hermitian, skew-Hermitian

UNIT-II

Differential calculus : Definition of limit, continuity, derivative, Rolle's theorem , Mean value theorems(without proofs,) simple problems , Taylor's theorem, Maclaurin's expansions (statements only) simple problems, partial differentiation(two variables) , Jacobians

UNIT-III

FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS:

Differential equation-variable separable, homogeneous, non-homogeneous, linear, Bernoulli's, exact and non-exact equations,

UNIT-IV

HIGER ORDER DIFFERENTIAL EQUATION

Higher order linear differential equations with constant coefficients with complimentary functions, particular integration of primitive function $Q(x) = -$ homogeneous linear Differential Equations (Cauchy's equation), second order linear differential equation(only Method of variation of parameters).

Text Book/reference books:

- 1.B.S.Grewal, Higer Order Engineering Mathematics, Khanna Publications
- 2.Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley and Sons
- 3.R.K.Jain and S.r.k.iyenger, Advanced Engineering Mathematics

Mathematics-II

(CALCULUS-II)

COURSE CODE	BSC104
Category	BASIC SCIENCE COURSE
Course Title	MATHEMATICS-II
Scheme and Credits	L T P C 3 1 0 4

UNIT-I

Integral Calculus: Definition of improper integrals- Beta and Gamma integrals-simple problems ; Double Integral.

UNIT-II

Vector Calculus: Scalar and vector fields; vector differentiation, directional derivative ,gradient of a scalar field; divergence and curl of a vector field, Line and Surface integrals;

UNIT-III

Fourier series: Expansion of a function as Fourier series for a given range- Fourier series of even and odd functions- Half range cosine and sine series expansions.

UNIT-IV

LAPLACE TRANSFORMS: Laplace transforms-Properties of Laplace transforms ,multiplication by t, division by t, Laplace transforms of derivatives, Laplace transforms of unit step function, - inverse Laplace transforms –properties, inverse Laplace transform of multiplication by s and division by s ,applications of Laplace transforms .

Text Book/reference books:

- 1.B.S.Grewal, Higer Order Engineering Mathematics, Khanna Publications
- 2.Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley and Sons
- 3.R.K.Jain and S.r.k.Iyenger, Advanced Engineering Mathematics

MATHEMATICS-III

NUMERICAL TECHNIQUES

COURSE CODE	BSC	
Category	BASIC SCIENCE COURSE	
Course Title	MATHEMATICS-III	
Scheme and Credits	L T P C	SEMESTER-III
	3 1 0 4	

UNIT-1

Solution Of Ordinary Differential Equations-Picard's Method, Taylor's Method, Euler's Method

UNIT-II

Solution of Algebraic and Transcendental Equations, Bisection method, Regular falsi method, Newton-Raphson method, Iteration method

UNIT-III

Finite Differences, Forward Differences, Backward Differences,

Newton's forward and backward Interpolation Formulae, Numerical Differentiation.(forward and backward derivatives)

UNIT-IV;

Numerical Integration-Trapezoidal Rule, Simpson's one-third Rule, Simpson's three-eight Rule.

Text Book/reference books:

1. B. S. Grewal, "*Higher Engineering Mathematics*", Khanna Publications
2. Erwin Kreyszig, "*Advanced Engineering Mathematics*", Eighth Edition, John Wiley and Sons
3. R. K. Jain and S. R. K. Iyengar, "*Advanced Engineering Mathematics*", Fifth Edition, Narosa Publishing House

B. Tech. SEMESTER-III

DISCRETE MATHEMATICS

No. Of credits: 4

Max. Marks: 70

No. Of Hours: 60

UNIT-I

FUNDAMENTALS

Sets, relations and functions, problem solving strategies, Fundamentals of Logic, Logic inferences, first order logic, Quantifier propositions, Mathematical induction

UNIT-II

ELEMENTARY COMBINATORICS

Combinations and permutations, Enumerations with repetitions with constrained repetitions, principle of inclusion-exclusion

UNIT-III GRAPHS

Basic concepts, isomorphism, Trees, spanning trees, Binary trees, Planer graphs, Euler Circuits, Hamilton graphs, Chromatic numbers

UNIT-IV

BOOLEAN ALGEBRA

Introduction to Boolean Algebraic functions, switching Mechanism, Minimization of Boolean functions, Applications to Boolean, scale diagrams

TEXT BOOKS:

- Discrete Mathematics for Computer Scientists and Mathematicians by **J.L.MOTT, A.CANDEL & T. P BAKER (PHI)**

REFERENCE BOOKS:

- Discrete Mathematics by **TREMBELY AND MANOHAR (TMH)**
- Elements of Discrete Mathematics by **C. L. LIU (TMH)**

B.Tech.(CSE)-VI - SEMESTER OPERATIONS RESEARCH

UNIT-I

LINEAR PROGRAMMING PROBLEM

Definition of LPP , formulation of linear programming problems solving by Graphical method, simplex method, Big-M method, two phase simplex method.

UNIT-II

TRANSPORTATION PROBLEM

Transportation problem matrix form, feasible solution to TP, IBFS by north west corner, matrix minimum method, Vogels approximation methods, OBFS by Modi method.

UNIT-III

ASSIGNMENT PROBLEM

Concepts of assignment problem, its matrix form, obtaining optimum solution using Hungarians algorithm, Unbalanced AP, travelling sales man problem.

UNIT-IV

SEQUENCING PROBLEM

Concept of sequencing problem, determination of optimum sequence of n jobs on two or three machines without passing, calculation of idle times of machines .

TEXTBOOKS:

1. Operation research- S.D.Sharma

REFERENCES:

1. Operation research- Kanti swaroop, P.K.Gupta, Manmohan.
2. Problems in Operation research- S.P.Gupta.

B.Tech(ECE)-VII - SEMESTER OPERATIONS RESEARCH

UNIT-I

LINEAR PROGRAMMING PROBLEM

Definition of LPP , formulation of linear programming problems solving by Graphical method, simplex method, Big-M method, two phase simplex method

UNIT-II

TRANSPORTATION PROBLEM

Transportation problem matrix form, feasible solution to TP, IBFS by north west corner, matrix minimum method, Vogels approximation methods, OBFS by Modi method.

UNIT-III

ASSIGNMENT PROBLEM

Concepts of assignment problem, its matrix form, obtaining optimum solution using Hungarians algorithm, Unbalanced AP, travelling sales man problem.

UNIT-IV

SEQUENCING PROBLEM

Concept of sequencing problem, determination of optimum sequence of n jobs on two or three machines without passing, calculation of idle times of machines .

TEXTBOOKS:

1. Operation research- S.D.Sharma

REFERENCES:

1. Operation research- Kanti swaroop, P.K.Gupta, Manmohan.
2. Problems in Operation research- S.P.Gupta.

Lecture Based Modules for Bridge Course in Mathematics (B. Tech (I year) I Semester)

Chapter 1: Matrices and Determinants

Definition of matrix, Types of Matrices, Operations on Matrices, Determinants, Minor and Cofactors; Adjoint of a square matrix, Inverse of a Square Matrix.

•

Chapter 2: Set Theory, Relations and Functions

Set Theory-Definition and Representation of sets, Types of Sets, Operation on Sets.

Relations- Definition, Types of Relations, Partial order and Equivalence Relations .

Functions-Definition and classification Types of functions, Composition and Inverse of functions.

•

Chapter 3: Limits, continuity and differentiation:

Preliminary concepts: intervals, neighborhood of a point, function, limit point of a set.

Limit of a function, standard formulae of limits, Continuity of a function and discontinuous function; Problems on limits and continuity, Intermediate value theorem (statement only)

Differentiability of function, Problems on Product rule, Chain Rule, Logarithmic differentiation and Quotient rule

Chapter 4: Differential Equations:

Definition of Differential equation; order and Degree of differential equation; Formation of differential equations of first order.

Prescribed Text book:

Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley and Sons

Reference books:

1.B.S.Grewal, Higher Order Engineering Mathematics, Khanna Publications

2.R.K.Jain and S.r.k.Iyenger, Advanced Engineering Mathematics

3. Discrete Mathematics for Under graduates, Ane Books,2014

4. Textbook of Ordinary Differential Equations, Second Edition, Tata McGrawHill Education Pvt.Ltd Sherbert, Intr. G.B. Thomas, M.D. Weir, J.R. Hass, Thomas' Calculus, Pearson Publication.
5. Differential calculus by Shanti narayan

Lecture Based Modules for Bridge Course in Mathematics

(B. Tech (I year) II Semester)

Chapter 1: Trigonometry

Introduction of trigonometric ratios and relation between them; compound, multiple and sub-multiple angles.

Chapter 2: Integration

Introduction indefinite integral, standard integral, two basic rules of integration
Methods of integration: integration by substitution, integration by parts.
Definite integral, area under a curve.

Chapter 3: Vector differentiation

Differential operators, Gradient, Divergence & curl, vector identities, related problems.

Chapter 4: Vector Integration:

Definition of Line integral ,surface integrals& volume integrals and related problems.

Prescribed Text book:

Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley and Sons

Reference books:

- 1.Plane Trigonometry, by S.L. Loney Part 1
- 2.Modern Approach to Intermediate Trigonometry, by Das Gupta and Prasad
3. B.S.Grewal, Higher Order Engineering Mathematics, Khanna Publications
4. G.B. Thomas, M.D. Weir, J.R. Hass, Thomas' Calculus, Pearson Publication.
5. Differential calculus by Shanti narayan

Course Number: SMCA 101

Course Title: Elementary Mathematics:

Credit Hours: 02

General objectives:

To impart knowledge to the students on elementary mathematics topics required and useful in the study of agriculture courses.

Specific objectives: at the end of the semester the student will be able to

- Understand concepts of geometry of straight lines, circles
- Understand concepts of calculus and matrices and their applications.

UNIT-I:

Coordinates: Distance formula, section formula(Internal and external division),

straight lines- Slope: Intercept form of equation of line, slope-point form of equation of line, normal form of equation line, general form of equation of line, point of intersection of two straight lines and distance between the lines and simple problems on them.

UNIT-II

Differential calculus: Definition of limit and continuity of functions, simple problems on limits and continuity, differentiations using first principle, derivatives of sum, difference, product and coefficient of two functions, differentiation of function of functions, simple problems on them. Logarithmic differentiation (simple problems based on it)

UNIT-III

Integral Calculus: Integration of simple functions, integration of product of two functions, integration by substitution method, simple problems on them.

UNIT-IV

Matrices and determinants: Definition of matrix, types of matrices, addition, subtraction, multiplication of matrices, transpose of matrix, determinant of matrices, transpose of matrices, inverse up to third order matrix and simple problems on them.

REFERENCES:

Text book of Matrix, A.K. Sharma, discovery publishing house 2004.

Essential engineering mathematics, Michael batte, ventus publishing Aps (e-book)

Elements of the differential and integral calculus, William Anthony Granville, percey F smith and William Raymond Longley.

Differential calculus for beginners, joseph Edwards, Macmillan publishing, 1896

MVSL DN raju and Dr.K.V. Ramana-Engineering Mathematics-1

MVSL DN raju and Dr.K.V. Ramana-Engineering Mathematics-2

Mathematics – 2B-Coordinate geometry and calculus – Intermediate telugu Academy.

SMCA 201 STATISTICAL METHODS

UNIT – I

Introduction to statistics ,Advantages , Limitations, Applications in Agriculture, Measures of location (or central tendency),mean ,median mode and dispersion, range ,quartile deviation ,standard deviation .

UNIT – II

Correlation and regression. Karl Pearson coefficient of correlation, Lines of regression, Definition of Probability - classical, relative frequency and axiomatic approaches to probability, Random experiment, sample space, events, addition Theorem on probability.

UNIT – III

Concepts of statistical hypothesis, Null and Alternative hypothesis, Critical region, two types of errors, Level of significance and Power of a test , Large sample tests for single sample mean, difference of means, single sample proportion, difference of proportions

UNIT – IV

Tests of significance based on Chi-square test for goodness of fit and test for independence of attributes (rxs, 2xk and 2x2 contingency tables). Tests of significance based on student's - t-test for single sample specified mean, difference of means for independent and paired t-test for difference of means ,ANOVA One Way Classification.

TEXT BOOK:

- Fundamentals Of Applied Statistics – By -Gupta And Kapoor

REFERENCE BOOKS:

- Fundamental Of Mathematical Statistics By - V K Kapoor And Gupta Sc
- Statistics (Phi) By -Freud
- Probability Statistics And Random Process By –R Veera Rajan(Tmh)
- Introduction To Probability & Statistics By - J.S. Milton & Jc Arnold (Tmh)
- Miller & Ferunds Probability & Statistics Fro Enginner By –Johnson
- Probability & Statistics Fro Engineers & Statisticsts By-Walpose

SMCA 201

**STATISTICAL METHODS
SYLLABUS FOR PRACTICAL**

- Computation of mean, median ,mode .quartile deviation ,standard deviation and cv.
- Computation of Karl Pearson coefficient of correlation
- Computation of Regression Lines
- Problems on Probability
- Tests for proportions (large sample)
- Tests for means, (large sample)
- Tests for means(Single mean, difference of means, paired-t test)
- Chi square – test (Test for independence of attributes , test for goodness of fit)
- ANOVA One Way Classification

B.PHARM-IV-YEAR

BIOSTATISTICS AND RESEARCH METHODOLOGY (Theory)

45 Hours

Scope: To understand the applications of Biostatistics in Pharmacy. This subject deals with descriptive statistics, Correlation, Regression, Probability theory, Parametric tests Non Parametric tests, ANOVA, Introduction to Design of Experiments, Phases of Clinical trials , Observational and Experimental studies.

Objectives: Upon completion of the course the student shall be able to

- Know the DoE (Design of Experiment)
- Know the various statistical techniques to solve statistical problems
- Appreciate statistical techniques in solving the problems.

Course content:

Unit-I

10 Hours

Introduction: Statistics, Biostatistics, Frequency distribution

Measures of central tendency: Mean, Median, Mode- Pharmaceutical examples **Measures of dispersion:** Dispersion, Range, standard deviation.

Correlation: Definition, Karl Pearson's coefficient of correlation.

Unit-II

10 Hours

Regression: regression lines, regression line of x on y and regression line of y on x and their problems

Unit-III

Probability: Definition of probability, Sample, Population, small sample, Null hypothesis, alternative hypothesis, sampling, Error-I type, Error-II type

Parametric test: t-test (Sample, Pooled or Unpaired and Paired) , ANOVA, (One way).

Unit-IV

13 Hours

Non Parametric tests: Wilcoxon Rank Sum Test, Mann-Whitney U test, Run test.

Graphs: Histogram, ogive curves , **Designing the methodology:** Sample size determination .

Unit-V

12Hours

Design and Analysis of experiments:C.R.D,R.B.D

Recommended Books (Latest edition):

- Pharmaceutical statistics- Practical and clinical applications, Sanford Bolton,publisher Marcel Dekker Inc. NewYork.
- Fundamental of Statistics – Himalaya Publishing House- S.C.Guptha
- Design and Analysis of Experiments –PHI Learning Private Limited,R.Pannerselvam,
- Design and Analysis of Experiments –Wiley Students Edition,Douglas and C. Montgomery

B. C. A SEMESTER I

DISCRETE MATHEMATICS

UNIT-I

FUNDAMENTALS

Sets, relations and function , problem solving strategies, Fundamentals of Logic. Logic inferences, First order logic, Quantifier propositions, Mathematical induction

UNIT-II

ELEMENTARY COMBINATORICS

Combinations and permutations, Enumerations with repetitions with constrained repetitions, principle of inclusion exclusion

UNIT-III GRAPHS

Basics concepts, isomorphism, Trees , spanning trees, Binary trees , Planer graphs, Euler Circuits, Hamilton graphs, Chromatic numbers

UNIT-IV

BOOLEAN ALGEBRA

Introduction to Boolean Algebraic functions, switching Mechanism, Minimization of Boolean functions, Applications to Boolean, scale diagrams

TEXT BOOKS:

1. Discrete Mathematics for Computer Scientists and Mathematicians by **J.L.MOTT, A. CANDEL & T. P BAKER (PHI)**

REFERENCE BOOKS:

- Discrete Mathematics by **TREMBELY AND MANOHAR (TMH)**
- Elements of Discrete Mathematics by **C. L. LIU (TMH)**

B. C. A

SEMESTER II PROBABILITY AND STATISTICS

UNIT-I

PROBABILITY

Introduction to probability fundamental Counting principle, Permutations and Combinations, Mutually Exclusive and Independent Events, Dependent Events and Conditional Probability, Random Patterns in Chaos

UNIT-II

DISCRETE PROBABILITY DISTRIBUTIONS

Random variables and probability Distributions, Binominal Distribution, Binominal probabilities. Hyper geometric distribution, Poisson Distribution.

UNIT-III

THE NORMAL DISTRIBUTION

Introduction to the Normal Distribution, Applications of Normal Distribution, the Normal Approximation to the Binominal Distribution.

UNIT-IV

ESTIMATION AND TESTING OF HYPOTHESIS

Confidence Interval for Means, Confidence Intervals for Means Based on Small samples, Confidence Intervals for Proportions, Determining the Sample size.

Hypothesis tests for Means, Hypothesis testing using P-values , Hypothesis tests for Means using small samples, Hypothesis tests for Proportions, differences of Means, Hypothesis Tests and Estimations the paired – Data Test , Difference of Proportions.

TEXT BOOK

Contemporary Statistics – A Computer Approach by S.P GORDON AND F.S. GORDON(Mc Graw Hill 1994)

REFERENCE BOOKS

Fundamentals of Mathematical Statistics by S. C. GUPTA and V. K. KAPOOR
Statistical Methods by S. P. GUPTA

**BBA & BBA AVIATION II-SEM
BUSINESS
MATHEMATICS**

Total hours:4 hours per week Credit: 4 Marks:70

Objective : To understand the concepts of Ratio, proportion and percentage.
To understand the concept and application of profit and loss in business.To use the concept of EMI.

Outcome : To understand applications of matrices in business. **UNIT – I RATIO, PROPORTION AND PERCENTAGE**

Ratio, proportion, Percentage definitions, meaning and computations,

UNIT – II INTEREST

Simple interest, Compound Interest (Reducing balance & Flat interest rate of interest)Equated monthly installments (EMI) Problems.

UNIT – III MATRICES AND DETERMINANTS

Definition of a matrix, Types of Matrices, Algebra Matrices, Determinants, Adjoint of a matrix, inverse of a Matrix Via adjoint Matrix, homogeneous system of linear equations, problems.

UNIT – VI PERMUTATIONS AND COMBINATIONS

Permutations of 'n' dissimilar objects taken 'r' at a time (with or without repetition).ⁿ P r = n! / (n-r)! (without proof). Combinations of 'r' objectives taken from 'n' objectsⁿ C r = n! / r! (n-r)! (without proof) problems, applications.

Suggested Readings:

- Business mathematics by Dr. Amaranth Dikshit & Dr. Jitendra Kumar Jain.
- Business mathematics by VK Kapoor – Sultan Chand & Sons Delhi.
- Business mathematics by New Literature Publishing Company, Mumbai.

TEXT BOOK:

Vasishtha & Gupta, Integral transforms, Krishna Prakashan Media (P), Ltd., Meerut (2e)

B.COM(CA) II-SEMESTER QUANTITATIVE TECHNIQUES

Total hours: 4 hours per week

Credit: 4

Marks:70

Objective : To enable the students to learn mathematics & statistics fundamentals

Outcome : To acquire practical knowledge of matrices ,calculus correlation..

UNIT-I:

Matrices- - Types of Matrices-Addition, Subtraction and Multiplication of matrices- Determinants -Transpose of a Matrix-Inverse of a Matrix Solving system of equations - Cramer's Rule - Matrix Inversion Method .

UNIT-II:

Differential Calculus: Limit of a function, X as differential co-efficient- Function of a Function - Chain rule – Logarithmic Differentiation.second and higher order derivatives- Successive differentiation-Maxima and Minima.

UNIT-III:

INTRODUCTION: Origin and Development of Statistics - Definition - Importance and Scope -. Collection of primary and secondary data Frequency distribution Diagrammatic and graphic presentation of data. Measures of central tendency Arithmetic Mean- Geometric Mean - Harmonic Mean - Mode - Median .

UNIT-IV:

CORRELATION: Meaning - Types - Correlation and Causation - Methods: Scatter Diagram - Karl Person's Coefficient of Correlation - Probable Error and Interpretation of Coefficient of Correlation - Rank Correlation coefficient.

SUGGESTED BOOKS:

- Business Mathematics ForCommerce &Economics P.N. Arora, P.C Bagga Wiley Eastern.
- Statistical Methods: S. P Gupta, Sultan Chand.
- Business Statistics: J. K. Sharma, Vikas Publishers.
- Business Statistics: S. L Aggarwal, S. L. Bhardwaj, Kalyani Publications.
- Statistics-Problems and Solutions: Kapoor V.K, S. Chand.

SMCA 201 STATISTICAL METHODS

UNIT – I

Introduction to statistics ,Advantages , Limitations,Applications inAgriculture, Measures of location (or central tendency),mean ,median mode and dispersion, range ,quartile deviation ,standard deviation , moments, measures of skewnessand kurtosis,

UNIT – II

Correlation and regression. Karl Pearson coefficient ofcorrelation, Lines of regression, Definition of Probability - classical, relative frequency and axiomatic approaches to probability, Random experiment, sample space, events, addition Theorem on probability,conditional probability, independent events, multiplication Theorem on probability,. Baye's theorem .

UNIT – III

Binomial, Poisson Normal distributions and its simple problems. Concepts of statistical hypotheses, Null and Alternative hypothesis, Critical region, two types of errors, Level of significance and Power of a test , Large sample tests for single sample mean, difference of means, single sample proportion, difference of proportions

UNIT – IV

Tests of significance based on Chi-square test for goodness of fit and test for independence of attributes (rxs, 2xk and 2x2 contingency tables). Tests of significance based on student's - t – t- test for single sample specified mean, difference of means for independent and pairedt-test for difference of means ,ANOVA One Way Classification, Two Way Classification, Statistical Analysis of Data.

TEXT BOOK:

- Fundamentals Of Applied Statistics – By -Gupta And Kapoor

REFERENCE BOOKS:

- Fundamental Of Mathematical Statistics By - V K Kapoor And Gupta Sc
- Statistics (Phi) By -Freud
- Probability Statistics And Random Process By –R Veera Rajan(Tmh)
- Introduction To Probability & StatisticsBy - J.S. Milton &Jc Arnold (Tmh)
- Miller &Ferunds Probability &Statistics Fro Enginner By –Johnson
- Probability & Statistics Fro Engineers & Statisticsts By-Walpose

SMCA 201

**STATISTICAL METHODS
SYLLABUS FOR PRACTICAL**

- Computation of Central Moments
- Computation of Coefficient of Skewness and Kurtosis (Karl Pearson's and Bowley's)
- Computation of Karl Pearson coefficient of correlation
- Computation of Regression Lines
- Problems on Probability and Conditional Probability
- Problems on Bayes Theorem
- Tests for proportions (large sample)
- Tests for means, (large sample)
- Tests for means (Single mean, difference of means, paired-t test)
- Chi square – test (Test for independence of attributes , test for goodness of fit)
- ANOVA One Way Classification, Two Way Classification

**B.PHARMACY –I-SEMESTER
REMEDIAL MATHEMATICS (Theory)**

30 Hours

Scope: This is an introductory course in mathematics. This subject deals with the introduction to Partial fraction, Logarithm, matrices and Determinant, Analytical geometry, Calculus, differential equation and Laplace transform.

Objectives: Upon completion of the course the student shall be able to:-

- Know the theory and their application in Pharmacy
- Solve the different types of problems by applying theory
- Appreciate the important application of mathematics in Pharmacy

Course Content:

UNIT – I 06 Hours

Partial fraction

Introduction, Polynomial, Rational fractions, Proper and Improper fractions, Partial fraction, Resolving into Partial fraction, Application of Partial Fraction in Chemical Kinetics and Pharmacokinetics

Logarithms

Introduction, Definition, Theorems/Properties of logarithms, Common logarithms, Characteristic and Mantissa, worked examples, application of logarithm to solve Pharmaceutical problems.

UNIT-II

06 Hours

Matrices and Determinant:

Limits, Introduction matrices, Types of matrices, Operation on matrices, Transpose of a matrix, Matrix Multiplication, Determinants, Properties of determinants, Product of determinants, Minors and co-Factors, Adjoint of a square matrix, Singular and non-singular matrices, Inverse of a matrix, Solution of system of linear of equations using matrix

method, Cramer's rule, Characteristic equation and roots of a square matrix, Cayley–Hamilton theorem, Application of Matrices in solving Pharmacokinetic equations.

UNIT – III

06 Hours

Calculus Differentiation:

Introductions, Derivative of a function, Derivative of a constant, Derivative of a product of a constant and a function, Derivative of the sum or difference of two functions, Derivative of the product of two functions (product formula), Derivative of the quotient of two functions (Quotient formula) – **Without Proof**, Derivative of x^n w.r.to x , where n is any rational number, Derivative of e^x , Derivative of $\log_e x$, Derivative of a^x , Derivative of trigonometric functions from first

principles (**without Proof**), Successive Differentiation, Conditions for a function to be a maximum or a minimum at a point. Application.

UNIT – IV

06 Hours

Analytical Geometry

Introduction: Signs of the Coordinates, Distance formula,

Straight Line : Slope or gradient of a straight line, Conditions for parallelism and perpendicularity of two lines, Slope of a line joining two points, Slope – intercept form of a straight line

Integration:

Introduction, Definition, Standard formulae, Rules of integration, Method of substitution, Method of Partial fractions, Integration by parts, definite integrals, application

UNIT-V

06 Hours

Differential Equations : Some basic definitions, Order and degree, Equations in separable form, Homogeneous equations, Linear Differential equations, Exact equations, **Application in solving Pharmacokinetic equations**

Laplace Transform : Introduction, Definition, Properties of Laplace transform, Laplace Transforms of elementary functions, Inverse Laplace transforms, Laplace transform of derivatives, Application to solve Linear differential equations, **Application in solving Chemical kinetics and Pharmacokinetics equations**

Recommended

Books (Latest Edition)

- Differential Calculus by Shanthinarayan
- Pharmaceutical Mathematics with application to Pharmacy by Panchaksharappa Gowda D.H.
- Integral Calculus by Shanthinarayan
- Higher Engineering Mathematics by Dr.B.S.Grewal

PHARM.D. –I-YEAR

REMEDIAL MATHEMATICS/BIOLOGY (THEORY)

REMEDIAL MATHEMATICS :

Theory : 3 Hrs.

/Week

- **Scope and objectives:** This is an introductory course in mathematics. This subjects deals with the introduction to matrices, determinants, trigonometry, analytical geometry, differential calculus, integral calculus, differential equations, Laplace transform.
- **Upon completion of the course the student shall be able to : –**
 - Know Trigonometry, Analytical geometry, Matrices, Determinant, Integration, Differential equation, Laplace transform and their applications;
 - solve the problems of different types by applying theory; and
 - appreciate the important applications of mathematics in pharmacy.

- **Course materials:**

Text books

- Differential calculus By Shantinakaran
- Text book of Mathematics for second year pre-university by Prof.B.M.Sreenivas

Reference books

- Integral calculus By Shanthinarayan
- Engineering mathematics By B.S.Grewal
- Trigonometry Part-I By S.L.Loney

- **Lecture wise**

program: Topics

Algebra: Determinants, Matrices 2

Trigonometry: Sides and angles of a triangle, . 3

Analytical Geometry: Points, Straight line, circle, parabola.

- **Differential calculus:** Limit of a function, Differential calculus, Differentiation of a sum, Product, Quotient Composite, Parametric, exponential, trigonometric and Logarithmic function. Successive differentiation, Leibnitz's theorem, Partial differentiation, Euler's theorem on homogeneous functions of two variables
- **Integral Calculus:** Definite integrals, integration by substitution and by parts, Properties of definite integrals.

- **Differential equations:** Definition, order, degree, variable separable, homogeneous, Linear, heterogeneous, linear, differential equation with constant coefficient, simultaneous linear equation of second order.
- **Laplace transform:** Definition, Laplace transform of elementary functions, Properties of linearity and shifting.

BP801T. BIOSTATISTICS AND RESEARCH METHODOLOGY (Theory)

45 Hours

Scope: To understand the applications of Biostatistics in Pharmacy. This subject deals with descriptive statistics, Graphics, Correlation, Regression, logistic regression Probability theory, Sampling technique, Parametric tests, Non Parametric tests, ANOVA, Introduction to Design of Experiments, Phases of Clinical trials and Observational and Experimental studies, SPSS, R and MINITAB statistical software's, analyzing the statistical data using Excel.

Objectives: Upon completion of the course the student shall be able to

- Know the operation of M.S. Excel, SPSS, , DoE (Design of Experiment)
- Know the various statistical techniques to solve statistical problems
- Appreciate statistical techniques in solving the problems.

Course content:

Unit-I

10 Hours

Introduction: Statistics, Biostatistics, Frequency distribution

Measures of central tendency: Mean, Median, Mode- Pharmaceutical examples
Measures of dispersion: Dispersion, Range, standard deviation, Pharmaceutical problems

Correlation: Definition, Karl Pearson's coefficient of correlation, Multiple correlation -Pharmaceuticals examples

Unit-II

10 Hours

Regression: Curve fitting by the method of least squares, fitting the lines $y = a + bx$ and $x = a + by$, Multiple regression, standard error of regression- Pharmaceutical Examples

Unit-III

Probability: Definition of probability, Binomial distribution, Normal distribution, Poisson's distribution, properties - problems

Sample, Population, large sample, small sample, Null hypothesis, alternative hypothesis, sampling, Error-I type, Error-II type, - Pharmaceutical examples

Parametric test: t-test(Sample, Pooled or Unpaired and Paired) , ANOVA, (One way and Two way).

Unit-IV

13 Hours

Non Parametric tests: Wilcoxon Rank Sum Test, Mann-Whitney U test, Kruskal-Wallis test.

Graphs: Histogram, Pie Chart, Cubic Graph, response surface plot, Counter Plot
Designing the methodology: Sample size determination and Power of a study, Report writing and presentation of data.

Unit-V

12Hours

Design and Analysis of experiments: CRD, RBD, LSD.

Recommended Books (Latest edition):

- Pharmaceutical statistics- Practical and clinical applications, Sanford Bolton, publisher Marcel Dekker Inc. New York.
- Fundamental of Statistics – Himalaya Publishing House- S.C.Guptha
- Design and Analysis of Experiments – PHI Learning Private Limited, R. Pannarselvam,
- Design and Analysis of Experiments –Wiley Students Edition, Douglas and C. Montgomery

MCA - I Year I Semester

MCA1T3	DISCRETE MATHEMATICS			DM
Lecture: 4	Tutorial: 0	Practical: 0	Internal Marks: 20	External Marks: 70

UNIT – I: FUNDAMENTALS

Sets, Relations and functions, Fundamentals of logic, Logical inferences, First order logic, Quantified propositions, Mathematical induction ELEMENTARY COMBINATORICS: Combinations and Permutations, Enumeration - with repetitions, with constrained repetitions, The Principle of Inclusion -Exclusion.(Chapter1-2)

UNIT –II: RECURRENCE RELATIONS

Generating functions, Coefficients of Generating functions, Recurrence Relations, Inhomogeneous Recurrence Relations.(Chapter-3)

UNIT –III: RELATIONS AND DIAGRAMMS

Relations and diagrams, Binary relations, Equivalence relations, Ordering relations, Lattices, Paths and Closures, Directed graphs, Adjacency matrices- Applications, Sorting and Searching.(Chapter - 4)

UNIT –IV: GRAPHS

Graphs, Isomorphism, Trees, Spanning trees, Binary trees, Planar graphs, Euler Circuits, Hamiltonian graphs, Chromatic numbers, Four-colour problem, Network flows. (Chapter5)

TEXTBOOK:

- 1 Discrete Mathematics for Computer Scientists, (Chapter1-5) by JL MOTT,
KANDELANDT P BAKER

REFERENCE BOOKS:

- Discrete Mathematical Structure- (Tmh) By Trembley And Manohar
- Discrete Mathematics With Algorithms-(John Wiley) By M.O.Albertson
And J.P.Hutchinson
- Elements Of Discrete Mathematics-(Tmh, Second Edition) By C.L.Liu
- Discrete Mathematics - (Phi, Third Edition) By Burnord Kolman

M.Sc. (Computer Science) - I Year I Semester

PMSC1T1	DISCRETE MATHEMATICS			DM
Lecture: 4	Tutorial: 0	Practical: 0	Internal Marks: 20	External Marks: 70

UNIT – I: FUNDAMENTALS

Sets, Relations and functions, Fundamental of logic, Logical inferences, First order logic, Quantified propositions, Mathematical induction.

ELEMENTARY COMBINATORICS: Combinations and Permutations, Enumeration-withRepetitions, with constrained repetitions, The Principle of Inclusion-Exclusion.

(Chapters 1-2)

UNIT –II: RECURRENCE RELATIONS

Generating functions, Coefficients of Generating functions, Recurrence Relations, Inhomogeneous Recurrence Relations. **(Chapter-3)**

UNIT – III: RELATIONS AND DIAGRAMMS

Relations and diagrams, Binary relations, Equivalence relations, Ordering relations, Lattices, Paths and Closures, Directed graphs, Adjacency matrices-Applications, Sorting andSearching. **(Chapter - 4)**

UNIT - IV - GRAPHS:

Graphs, Isomorphism, Trees, Spanning trees, Binary trees, Planar graphs, Euler’sCircuits, Hamiltonian graphs, Chromatic numbers, Four-color problem, Network flows. **(Chapter - 5)**

TEXT-BOOK:

1. Discrete Mathematics For Computer Scientists, By - J L Mott, A Kandel And T Pbaker

REFERENCE BOOKS:

- Discrete Mathematical Structure - (Tmh) By - Trembley And Manohar
- Discrete Mathematics With Algorithms - (John Wiley) By - M.O. Albertson AndJ.P.Hutchinson
- Elements Of Discrete Mathematics-(Tmh, Second Edition) By - C.L.Liu
- Discrete Mathematics - (Phi, Third Edition) By - Burnord Kolman
- Discrete Mathematics By Kh Rossen (Tmh)
- Discrete Mathematics By S Lipschutz And M. Lipson Schaum’s Series (Tmh)
- Discrete &Combinatorial Mathematics By Ralph P Grimaldi(Pearson Education)

- Discrete Mathematical Structures By Ds Mallik & M K Sen (Thomson Press)

STATISTICS SYLLABUS PAPER II

OPERATIONS RESEARCH

Unit I

Operation Research: Review of linear programming and its applications to zero-sum two person game. Separable programming.

Non- linear programming: Convex programming, Kuhn-Tucker conditions, quadratic programming. Wolfe's method.

Unit II

Integer programming: Gomory's solution for all integer programming method. Linear fractional programming and sensitivity analysis on the same. Goal programming, Concepts and method of finding the solution.

Unit III

Inventory models: Introduction to deterministic models: Multi-item deterministic problem. Probabilistic models. Inventory control with certain demand.

Queuing theory: birth and Death Process in queuing theory. $M/G/K$ and $M/E_k/1$ models. Priority queue.

Unit IV

Reliability: Life time distributions. Hazard function-some important models. Type I and Type II concord data. System reliability in terms of component reliability: K out of N "systems" with series and parallel systems as special case. Reliability of M out of N system with repair facilities (Analogous to machine interference problem).

References:

- Nonlinear programming by H.P Kunz and W. Krelle.
- Goal programming by P. Ignizio.
- Mathematical theory of reliability by R.E. Barlow and Proschon.
- Linear programming by S.I. Gass.
- Statistical Models and Methods for life time data by Lawless, J.F.
- Operations Research by Hillier and Liberman.
- Operations Research by Hadley and Wittin.

SEMESTER - I

Title: **STATISTICS FOR DATA SCIENCE**

Teaching Hours: 60

No. of Credits: 4

Max. Marks: 70

Objective: To gain the fundamental knowledge of basic statistics for data science.

Outcome: Upon successful completion of this course, students will be able to understand the quantitative data, probability, random experiment and distributions.

Unit – I

Data Representation, Descriptive Statistics, Measures of Central Tendency, Measures of Dispersion, Moments, Skewness, Kurtosis .

Unit – II

Probability, trial, law of probability, conditional probability ,independence, Baye's law, application of probability to business and economics, one dimensional random variable-Discrete and continuous , Distribution functions,pmf ,pdf and Bivariate random variables – joint probability functions.

Unit – II

Expectation,variance and co-variance of random variables ,MGF,CGF,PGF for discrete and continous cases,conditional expectation conditional variance; Markov and chebychevs inequality ,Weak law of large numbers, strong law of large numbers; central limit theorem(statement only).

Unit – IV

Discrete and continous Distributions :binomial poisson distributions, Normal distribution , exponential distribution.

Books Recommended ;

- 1.S.C. Gupta and V.K. Kapoor, *Fundamentals of Mathematical Statistics*, 11th Ed., Sultan Chand and Sons, 2007.
2. R.V. Hogg, A.T. Craig, and J.W. Mckean, *Introduction to Mathematical Statistics*, 6th Ed. Pearson Education, 2005.
3. A.M. Mood, F.A. Graybill and D.C. Boes, *Introduction to the Theory of Statistics*, 3rd Ed., Tata McGraw Hill Publication, 2007.
4. S. Rohatgi V.K and Saleh E, *An Introduction to Probability and Statistics*, 3rd edition, John Wiley & Sons Inc., New Jersey, 2015.

SEMESTER – II

Title: REGRESSION ANALYSIS AND INFERENCE STATISTICS

Teaching Hours: 60

No. of Credits: 4

Max. Marks: 70

Objective: To gain the fundamental knowledge of basic statistics for Correlation regression and statistical inference.

Outcome: Upon successful completion of this course, students will be able to understand the regression ,theory of estimation, large sample and small sample tests, non-parametric tests.

Unit – I

Bivariate data: Scatter diagram, Correlation and Karl Pearson coefficient of correlation, Spearman's rank correlation coefficient, multiple and partial correlations.

Unit – II

Introduction to regression analysis, applications of regression analysis, regression line of Y on X, and X on Y, properties of regression coefficients, multiple linear regression model, residual analysis, collinearity.

Unit – III

Concept of population, parameter, random sample, statistic ,maximum likelihood estimation of the parameters of Binomial, Poisson, Normal and Exponential distributions by these methods., confidence intervals of parameters of normal distributions. Concepts of null hypothesis alternative hypothesis, critical region, two types of errors, level of significance **large sample test**, Testing of a single mean and a single proportion and difference of two means, difference of two standard deviations and two proportions, Z-test.

Unit-IV

Small sample tests, Test of significance based on t, F-test, Chi Square test for goodness of fit, test for independence of attributes. Non-parametric tests - comparison with parametric tests. One sample runs test, sign test and Wilcoxon-signed rank tests (single and paired samples). Two independent sample tests: Median test, Wilcoxon –Mann-Whitney U test, Wald Wolf witz's runs test.

Reference Books:

1. Fundamentals of mathematical statistics by V.K. Kapoor and S.C. Gupta
2. Fundamentals of statistics Vol II, Goon AM, Gupta MK, Das Gupta B, World press Calcutta.
3. Fundamentals of mathematical statistics by Hoel. PG.
4. Introduction to estimation by Hogg and Criag.
5. Statistical Inference by Surendran and Saxena, S.Chand and Company.
6. An introduction to probability theory and Mathematical statistics, Rohatgi VK, John Wiley & Sons.
7. Introduction to theory of statistics mood AM, Graybill FA and Bose DC M.C.Graw Hill.
8. D.C Montgomery, E. A. Peck and G. G Vining, Introduction to Linear Regression Analysis, John Wiley and Sons, Inc. NY, 2003.
9. S. Chatterjee and A Hadi, Regression Analysis by Example, 4th Ed., John Wiley and Sons, Inc, 2006

Pre-Ph.D. STATISTICS SYLLABUS

PAPER –II-OPERATIONRESEARCH

Unit I

Operation Research: Review of linear programming and its applications to zero-sum two person game. Separable programming.

Non- linear programming: Convex programming, Kuhn-Tucker conditions, quadratic programming. Wolfe's method.

Unit II

Integer programming: Gomory's solution for all integer programming method. Linear fractional programming and sensitivity analysis on the same. Goal programming, Concepts and method of finding the solution.

Unit III

Inventory models: Introduction to deterministic models: Multi-item deterministic problem. Probabilistic models. Inventory control with certain demand.

Queuing theory: birth and Death Process in queuing theory. M/G/K and M/E_k/1 models. Priority queue.

Unit IV

Reliability: Life time distributions. Hazard function-some important models. Type I and Type II concord data. System reliability in terms of component reliability: K out of N "systems" with series and parallel systems as special case. Reliability of M out of N system with repair facilities (Analogous to machine interference problem).

References:

- Nonlinear programming by H.P Kunz and W. Krelle.
- Goal programming by P. Ignizio.
- Mathematical theory of reliability by R.E. Barlow and Proschon.
- Linear programming by S.I. Gass.
- Statistical Models and Methods for life time data by Lawless, J.F.
- Operations Research by Hillier and Liberman.
- Operations Research by Hadley and Wittin.

SEMESTER - I

STATISTICS FOR DATA SCIENCE

Theory

4 Hours/Week

4 credit

Objective:

To gain the fundamental knowledge of basic statistics for data science.

Outcome:

Upon successful completion of this course, students will be able to understand the quantitative data, probability, random experiment and distributions.

Unit – I

Measures of Central tendency and Dispersion, Moments, measures of Skewness and Kurtosis

Unit – II

Random experiment, sample space, event, Definition of Probability - classical, axiomatic approaches to probability, Theorem on probability, conditional probability, independent events. Baye's theorem and its applications

Unit – III

Random variables: Discrete and continuous random variables, p.m.f. p.d.f, Expectation of random variable and its properties. moment generating function, cumulant generating function and characteristic function.

Unit – IV

Binomial, Poisson, Geometric, negative binomial ,Rectangular and normal, distributions.

Books Recommended

- S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11th Ed., Sultan Chand and Sons, 2007.
- A.M. Goon, M.K. Gupta & B. Dasgupta, An outline of Statistical Theory (Vol. I), 4th Ed., World Press, Kolkata, 2003.
- R.V. Hogg, A.T. Craig, and J.W. McKeane, Introduction to Mathematical Statistics, 6th Ed. Pearson Education, 2005.
- A.M. Mood, F.A. Graybill and D.C. Boes, Introduction to the Theory of Statistics, 3rd Ed., Tata McGraw Hill Publication, 2007.

- S. Rohatgi V.K and Saleh E, An Introduction to Probability and Statistics, 3rd edition, John Wiley & Sons Inc., New Jersey, 2015.
- Mukhopadhyay P, Mathematical Statistics, Books and Allied (P) Ltd, Kolkata, 2015.A.
Ross, Introduction to Probability Models, 9th Ed., Academic Press, 2007.

SEMESTER II

REGRESSION ANALYSIS AND INFERENCE STATISTICS

Theory 4 Hours/Week 4 credit

Objective:

To gain the fundamental knowledge of basic statistics for Correlation regression and statistical inference.

Outcome:

Upon successful completion of this course, students will be able to understand the regression theory of estimation, large sample and small sample tests.

UNIT – I

Bivariate data: Scatter diagram, Correlation and regression. Karl Pearson coefficient of correlation, Lines of regression, Spearman's rank correlation coefficient, multiple and partial correlations

UNIT – II

Concept of population, parameter, random sample, statistic Theory of estimation: Criteria of a good estimator – consistency unbiasedness efficiency and sufficiency ; maximum likelihood estimation of the parameters of Binomial, Poisson, Normal and Exponential distributions by these methods. Statement of asymptotic properties of MLE. Concept of interval estimation, confidence intervals of parameters of normal distributions.

UNIT-III

Concepts of null hypothesis alternative hypothesis, critical region, two types of errors, level of significance large sample test, Testing of a single mean and a single proportion and difference of two means, difference of two standard deviations and two proportions, Fisher's Z-transformation and its uses.

UNIT-IV

Small sample tests, Test of significance based on t, F-test, Chi Square test for goodness of fit, test for independence of attributes. (2 X 2, 2 X K, r X S), ANOVA introduction and one -way classification of data , ANOVA two - way classification of data.

Reference Books:

- Fundamentals of mathematical statistics by V.K. Kapoor and S.C.Gupta
- Fundamentals of statistics Vol II, Goon AM, Gupta MK, Das Gupta B, World press Calcutta.
- Fundamentals of mathematical statistics by Hoel. PG.
- Introduction to estimation by Hogg and Criag.
- Statistical Inference by Surendran and Saxena, S.Chand and Company.
- An introduction to probability theory and Mathematical statistics, Rohatgi VK, John Wiley & Sons.
- Introduction to theory of statistics mood AM, Graybill FA and Bose DC M.C.Graw Hill.
- D.C Montgomery, E. A. Peck and G. G Vining, Introduction to Linear Regression Analysis, John Wiley and Sons, Inc. NY, 2003.

3.Program/Course Outcomes

4.HOD/BOS Chairperson:

Prof.M.Sunder Ram

5.BOS MEMBERS:

S.no	Name of the Members
1	Prof. M. Sunder Ram Head & Chairman BOS, Dean of science,Department of Mathematics & Statistics Chaitanya (Deemed to be University) Kishanpura, Hanamkonda, Warangal.
2	Prof. T. Srinivas (Subject Expert) Department of Mathematics, Kakatiya University, Warangal.
3	Prof. D.Srinivasacharya (Subject Expert) Department of Mathematics, NITWarangal.
4	Prof . B. Hari Prasad (Member) Department of Mathematics & Statistics, Chaitanya(Deemed to be University) Kishanpura, Hanamkonda, Warangal.
5	Dr. P. Pranay(Member) Department of Mathematics & Statistics, Chaitanya(Deemed to be University) Kishanpura, Hanamkonda, Warangal.
6	Dr. D. Gopinath(Member) Department of Mathematics & Statistics, Chaitanya(Deemed to be University) Kishanpura, Hanamkonda, Warangal.

6.DRC MEMBERS:

1. Prof. M.Sunder ram (DRC CHAIRMAN)

2. Prof. B. Hariprasad (MEMBER)

3. Dr.P. Pranay (MEMBER)

4. Dr.D. Gopinath (MEMBER)

5. Dr.MD. Shamshuddin (MEMBER)

7.Faculty

Teaching Faculty Details with Qualification

staff:

Name of the Teaching Staff	Highest Qualification	Designation	Specialization	Sex	Experience
Dr.M.Sunder Ram	M.Sc,PGDCA, Ph.D.	Head & Prof.	Fluid Dynamics	M	29
Mr.K.Venugopal	M.Sc,M.Phil,	Asso.Prof.	Pure Mathematics	M	30
Dr.P.Pranay	M.Sc,M.Phil, Ph.D.	Asso.Prof.	Statistics	M	22
Dr.B.Hari Prasad	M.Sc,M.Phil, Ph.D.	Professor	Mathematical Modeling	M	21
Dr.D.Gopinath	M.Sc,M.Phil, B.Ed.,Ph.D.	Asso.Prof.	Statistics	M	16
Mr.B.Vasu	M.Sc.,B.Ed	Asst.Prof.	Mathematics	M	15
Mr.N.Ashok	M.Sc.,PGDCA	Asst.Prof.	Mathematics	M	22
Mrs.K.Spandana	M.Sc	Asst.Prof.	Mathematics	F	09
Mrs.P. Sunitha	M.Sc.,B.Ed.	Asst.Prof.	Mathematics	F	12

8.NON-TEACHING STAFF:

1. Sandeep

9.Facilities:

1.Department Library

2.Internet Facility

3.Wi-Fi

4.Remedial Classes (for slow learners)

10.Workshops/FDP'S/Webinars/Seminars:

No.of Webinars/ Seminars/Conferences/ FDP/Workshops attended: From Jan 2020 to till date

S.No	Name of the Faculty	No. of Webinars/ conferences/ seminars attended
1	Dr. M.SUNDER RAM	9
2	K.VENUGOPAL	3
3	Dr. P.PRANAY	13
4	Dr. B.HARIPRASAD	16
5	Dr. D.GOPINATH	13
6	B.VASU	2
7	N.ASHOK	3
8	K.SPANDANA	13
9	P.SUNITHA	1

11.Publications:

RESEARCH ACTIVITIES:

ARTICLES PUBLISHED- 2020

S. No	Author(s)	Title	Journal	ISSN No.	Impact factor (JCR-2020 / Thomson Reuters-2020)	Year
1	Bitla Hari Prasad, Chillara Soma Shekar and Bangimatam Sandeep Kumar	Stability analysis on three species ecological neutralism with limited resources	Arctic	0004-0843	1.02 2	2020
2	Bitla Hari Prasad	Modelling and Numerical Simulation on Five Species Syn Eco-System with Limited Resources	World Journal of Modelling and Simulation	1746-7233	--	2020
3	Bitla Hari Prasad	Mathematical Study on Covid-19 with SIR Epidemic Model	Science, Technology and Development Journal	0950-0707	--	2020
4	Bitla Hari Prasad	Stability on Three Species Eco-System with Mortality Rates for the First and Third Species	Science, Technology and Development Journal	0950-0707	--	2020
5	Bitla Hari Prasad	A Study on Discrete Model of Two Competitive Interacting Species with Limited-Unlimited Resources and Mortality Rates	Compliance Engineering Journal	0898-3577	--	2020
6	Dr.M.Sunder Ram, Dr.D.Gopinath,	A Study of Tobacco Use and quitting Conduct among Construction Site workers in Delhi,India	The International journal of analytical and experimental model analysis	0886-9367	--	2020
7	Dr.D.Gopinath Dr.M.Sunder Ram,	A Study of the Production, Marketing and Constraints of Paddy in Chhattisgarh,India	The International journal of analytical and experimental model analysis	0886-9367	--	2020

8	Dr.D.Gopinath, Dr.P.Pranay	Production and Marketing of Cotton in Srivilliputtur Taluk: An Overview	The Int.journal of analytical and experimental model analysis	0886-9367	--	2020
9	Dr.D.Gopinath, Dr.P.Pranay	Predicting of Area, Production and Productivity of Rice and Its Growth status in India	The International journal of analytical and experimental model analysis	0886-9367	--	2020
10	E.Aravind Dr.D.Gopinath,	Impact of Computers Technology in the field of Forensic Science and discussion on major problems associated: A Study	Journal of Engineering and Sciences	0377-9254	--	2020

ARTICLES PUBLISHED- 2021-2022

S.No	Name of the Author(s)	Title of the Paper	Name of the Journal	ISSN	I.F (JCR)	Year
•	M. Sunder Ram K.Shravani	Investigation Of Porosity Significance On Oldroyd B Fluid Flow Transport Between Parallel: Closed Form Solution.	Heat Transfer	26884534	5.584	2021
•	M. Sunder Ram K.Shravani	Magneto Oldroyd B Fluid Flow Over An Exponentially Accelerated Vertical Porous Plate With Heat Source And Reaction Agents.	International Journal of Modeling and Simulation.	2286203	2.91	2021
•	M. Sunder Ram K.Spandana	Thermal Solutal Binary Chemical Reaction With Activation Energy Significance In Stagnation Point Flow Of Hydro magnetic Micro polar Fluid Over A Stretchable Surface: Numerical Investigation,	International Communications in Heat and Mass Transfer	0735-1933	6.78	2021
•	M. Sunder Ram K.Spandana	Numerical Simulation And Modeling Of Steady Convective Heimanz Flow Of A Dissipative Micro polar Fluid Through Stretching Sheet	International Journal of Ambient Energy	0143-0750	2.326	2021
•	B. Hari Prasad, G. Uday and A. Rekha	A Brief Ecological Study on Three Species Neutralism with Limited Resources	Informatica	0868-4952	2.688	2021

•	G. Uday and B. Hari Prasad	A Two Species Model of Neutralism with Mortality Rate for the First Species	Bulletin Monumental	0007-473X		2021
•	A. Rekha and B. Hari Prasad	Analytical Study on Neutralism with Mortality Rate for the Second Species	Bulletin Monumental	0007-473X		2021
•	G. Narmada, P. Sunitha and B. Hari Prasad	Stability on Three Typical Syn-Ecology with Limited Resources for the Third Species	Gorteria journal	0017-2294	0.278	2021
•	P. Sunitha, G. Narmada and B. Hari Prasad	Global Stability and Numerical Approach on Three Species Ecology Consisting of Host, Commensal and Neutralism with Limited Resources	Science, Technology and development Journal	1859-0128	1.173	2021
•	B. Hari Prasad and Ch. Naga Anuradha	Discrete Model on Two Species Ammensalism with Limited Resources	Bulletin Monumental	0007-473X		2021
•	D.Gopinath	Meta-heuristic Algorithms for Agro-food Grain Supply Chain Network using Artificial Intelligence	JICR	0022-1945		2021
•	D.Gopinath, P.Pranay, T.V ani Madhavi, Mohammed.S afiya	Study on Meta-Heuristic Algorithms for Solving Multilevel Lot-Sizing Problems	JICR	0022-1945		2021
•	D.Gopinath Mohammed.S afiya , P.Pranay	Modelling an Inventory Model for food grains in Northern Telangana using Metaheuristic Techniques	JuniKhyat	2278-4632		2021
•	D.Gopinath and Muragesh Math	Comparative Study of gender on mental health selected aspects of problematic uses of the mobile phones (pump), stress, self-efficacy and locus of control among college students.	Journal of Xi an University of Architecture & Technology	1006-7930		2022
•	M. Sunder Ram K. Shravani, Md. Shamshud pasha, O. Salawu	Magneto oldroyd B fluid flow over exponentially accelerated vertical porous plate with heat source and reactive agents.	International journal of modeling and simulatio	2286203	2.91	2022
•	M. Sunder Ram N. Ashok	Numerical solution of radiative and dissipative flow on non Newtonian	Journal of Nano fluids American scientific	2169432	1.739	2022

	Md. Shamshud pasha O. Salawu	Casson fluid model via infinite vertical plate with thermo diffusion and Diffusion thermo effects.	publishers			
•	M. Sunder Ram N. Ashok, Md. Shamshud pasha, O. Salawu	Significance of cross diffusion and uneven heat source/sink on the vari reactive 2D Casson flowing through an infi plate with heat and ohmic dissipatio	International journal of modeling and simulatio Taylor and Francis	2286203	2.91	2022
•	M. Sunder Ram K. Spandana, Md. Shamshud pasha, O. Salawu	Mixed convective heat and mass transfer in magnetized micro polar Fluid flow towards a stagnatio point on a porous stretching sheet with heat source/sink and variable species reaction.	International journal of modeling and simulatio Taylor and Francis	2286203	2.91	2022
•	B. Hari Prasad, Ch.Soma Shekar	A Study on Immigration and Migration of Prey-Predator Eco-System with Unlimited Resources for the Predator	Applied Mathematical Modeling	0307-904X	5	Accepted
•	B. Hari Prasad, B. Sandeep Kumar	Stability on Three Species Syn Ecology Consisting of a Prey - Predator and a Super Predator with Limited Resources for the Prey	Applied Mathematics and Computation	0096-3003	4	Accepted
•	B. Hari Prasad	Mathematical Modeling on Gonorrhoea in Heterosexuals and Homosexuals	Journal of Advanced Research	2090-1232	10.479	Accepted

Paper presentation in Seminars/ Webinars/ Workshops /Symposia/ Conferences/full paper in Conference Proceedings (Paper presented in Seminars/Conferences and also published a full paper in Conference Proceedings : From Jan 2020 to till date

Sl.No.	Name of the Faculty	Title of the paper presented	Title of Webinar/ conference/ seminar	Date(s) of the event & year	Organised by	Whether International/ National/State / Regional/ University or college level	Whether Full paper published in Conference Proceedings
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1.	G.UDAY	DISCRETE MODEL OF TWO SPECIES NEUTRALISM WITH LIMITED RESOURCES (ONE PERIOD EQUILIBRIUM STATES)	CONFERENCE	14-15 October 2021	IVC-DIMR	INTERNATIONAL	NO
2	K.Spandana	ANALYTICAL SIMULATIONS FOR THE FLOW OF DISSIPATIVE AND REACTIVE MICROPOLAR FLUID WITH VARIABLE PERMEABILITY OF POROUS MEDIUM ON A SEMI INFINITE PARALLEL PLATE	CONFERENCE	14-15 October 2021	IVC-DIMR	INTERNATIONAL	NO
3	K.Spandana	MICRO POLAR FLUID FLOW THROUGH POROUS NARROW TUBES IN THE PRESENCE OF THERMAL RADIATION	CONFERENCE	9-11 December 2020	ISTAM 65 th CONGRESS	INTERNATIONAL	NO
4	A.REKHA	STABILITY ANALYSIS OF CO-EXISTENT STATE ON THE THREE SPECIES ECOLOGICAL COMMENSALISM-NUMERICAL APPROACH	CONFERENCE	14-15 October 2021	IVC-DIMR	INTERNATIONAL	NO

5	K.SHRAVANI	PERTURBATION SOLUTION FOR FLOW OF MHD OLDROYD B FLUID OVER AN EXPONENTIALLY ACCELERATED POROUS VERTICAL PLATE	CONFERENCE	14-15 October 2021	IVC-DIMR	INTERNATIONAL	NO
6	K.SHRAVANI	LAMINAR FLOW OF INCOMPRESSIBLE MAGNETO OLDROYD B FLUID BETWEEN TWO PARALLEL PLATES WITH POROUS LINING	CONFERENCE	9-11 December 2020	ISTAM 65 th CONGRESS	INTERNATIONAL	NO

Books published

S.No	Author(s)	Title	Publisher	ISBN No.	Year
1	Dr.Bitla Hari Prasad	A Text Book of Mathematical Modeling on Syn Ecology	International Research Publication House	978-93-87388-33-8	2020

2	Dr.Bitla Hari Prasad	Concepts of Mathematical Commensalism	Integrated Publications		Accepted
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Book Chapters published

S.No	Author(s)	Title of the Chapter	Title of the Book	Publisher	ISBN No.	Year
1	Dr.Bitla Hari Prasad	Mathematical Modeling on a Typical Three Species Ecology	Recent Studies in Mathematics and Computer Science, Vol. 2	Book Publisher International	978-93-90149-62-9	2020
2	Dr.Bitla Hari Prasad	Discrete Model on Three Species Syn-Ecology Consisting of Two Hosts and One Commensal with Unlimited Resources for the First Species	Current Research in Statistics and Mathematics (Volume - 1)	Bright Sky Publications		2022

Webinars/ Seminars/Conferences/ FDP/Workshops conducted: From Jan 2020 to till date

S.No	Title of Webinar/ conference/ seminar	Date(s) of the event & year	Organised by	Resource person	No.of participants	Whether International/ National/State/ Regional/ University or college level
1	Statistics role in Rubrics and Testing of Hypothesis	27-7-2020	Dept.of Mathematics, Statistics & IQAC	Dr.N.Ch.Bhatracharyulu & K.V.S.Sharma	119	National

12.Dept Journal

NA

13.PATENTS

Patent Publications:

CDU, "Some Mathematical Models on Biological Interaction between Amoeba and Paramecium with Restricted and Unrestricted Resources" (Indian Patent, 2022 details awaited)

Prof. B. Hari Prasad, G. Uday, A. Rekha, G. Narmada and P. "Method for Utilizing Mathematical models for analysis of data related to novel corona virus (**Covid-19**)" (Indian Patent No: 202141052476A, December, 2021)

Dr. D. Gopinath "Women Security Using IOT-Based Intelligent Electronic Programmable Jewelry" (Indian Patent No. No.202141038604A, Sep 10, 2021.

15. Research Scholars:

a. with fellowship

NA

b .without fellowship

Ph.D. SCHOLARS LIST-2020

S.No	Name of the Research Scholar	Name of the Research Supervisor	Subject	Area of Specialization	Title of the Thesis
1	CHILLARA SOMA SHEKAR	Dr. B. Hari Prasad	Mathematics	Mathematical Modelling	A Study on Some Mathematical Models in Multi-Ecological Systems.
2	BANGIMATA M SANDEEP KUMAR	Dr. B. Hari Prasad	Mathematics	Mathematical Modelling	Mathematical Modelling on Syn-Ecology with Restricted and Unrestricted Resources.
3	GATTU UDAY	Dr. B. Hari Prasad	Mathematics	Mathematical	Study of Some Mathematical

			cs	Modelling	Aspects of Modelling in Biosciences-Multiple Interacting Species.
4	ALETI REKHA	Dr. B. Hari Prasad	Mathematics	Mathematical Modelling	Study of Some Mathematical Models on Syn-Ecosystem and Epidemiology.
5	N. Ashok	Dr. M. Sunder Ram	Mathematics	Fluid Dynamics	Numerical treatment of convective heat and mass transfer of non-Newtonian fluid flow
6	K. Spandana	Dr. M. Sunder Ram	Mathematics	Fluid Dynamics	A study on effects of thermal radiation on magneto micro polar fluid flows
7	K. Shravani	Dr. M. Sunder Ram	Mathematics	Fluid Dynamics	A study on magneto Oldroyd B fluid flows
8	Ch.Satyanarayana	Dr. M. Sunder Ram	Mathematics	Fluid Dynamics	Behaviour of Nano particles on the flow of non-Newtonian nano fluids over a stretching surface.
9	T.VaniMadhavi	Dr.P.Pranay	Statistics	Statistics	A Study of Inventory problem using stock dependent demand.
10	Md.Safiya	Dr.D.Gopinath	Statistics	Statistics	Estimation of food grains in cold storage facilities in Northern Telangana using meta-heuristic optimization techniques.

Ph.D. SCHOLARS LIST-2021

S.No	Name of the Research Scholar	Name of the Research Supervisor	Subject	Area of Specialization	Title of the Thesis
1	B.Srinitha	Dr. M. Sunder Ram	Mathematics	Fluid Dynamics	Computational Treatment and Dynamics of Heat and Mass

					transfer in Micro Polar Fluid Flow.
2	K.Srividya	Dr. M. Sunder Ram	Mathematics	Fluid Dynamics	Heat and Mass Transfer Analysis of Magnetized Non-Newtonian Fluid Flow
3	Fakhraldean Gamar Khater Yahia	Dr. M. Sunder Ram	Mathematics	Fluid Dynamics	Thermal Performance of Nano Fluid Flow due to a Stretching Surface: A Numerical Study.
4	Shweta Srivastava	Dr. B. Hari Prasad	Mathematics	Mathematical Modelling	Some Mathematical Models on Syn- Ecology with Natural Growth Rates.
5	M. Raj Kumar	Dr. B. Hari Prasad	Mathematics	Mathematical Modelling	Stability Analysis of Multi-Species Ecological Models.
6	N. Dhvani	Dr. P.Pranay	Statistics	Statistics	Statistical modelling of weather forecasting.
7	T. Manjusha	Dr. P.Pranay	Statistics	Statistics	Fitting of model on malnutrition among Different categories
8	Muragesh M Math	Dr. D.Gopinath	Statistics	Statistics	A study on aspects of perishable items with stochastic life time and non stationary demand using advanced inventory models.

Ph.D. SCHOLARS LIST-2022

S.No	Name of the Research Scholar	Name of the Research Supervisor	Subject	Area of Specialization
1	T.Swapna	Dr. M. Sunder Ram	Mathematics	Fluid Dynamics

2	B.Vasu	Dr. M. Sunder Ram	Mathematics	Fluid Dynamics
3	Ch.satish	Dr. B. Hari Prasad	Mathematics	Mathematical Modelling
4	S.Lavanya	Dr. B. Hari Prasad	Mathematics	Mathematical Modelling
5	G.sachin rambhau	Dr. P.Pranay	Statistics	Statistics
6	B.Pratap	Dr. P.Pranay	Statistics	Statistics
7	A.Venkatesham	Dr. D.Gopinath	Statistics	Statistics
8	P.Sankeerthana	Dr. D.Gopinath	Statistics	Statistics
9	john benhur	Dr. D.Gopinath	Statistics	Statistics
10	Sayidali Isse Barre Isahak	Dr. D.Gopinath	Statistics	Statistics

16.Scholars Awarded:01

17.Course Intake

B.Sc(MPCS) 60

B.Sc(MCCS) 60

B.Sc(MStCS) 60

B.Sc(MEICS) 60

B.Sc(BtCCA) 60

BCA	60
B.Com(CA)	80
BBA	120
MCA	96
MSC(DS)	45
MSC(CS)	45

18. Achievements of the Faculty

2008 After attaining autonomous status in the middle of the year 2007, semester system was introduced in the year 2008

Mr.K.Venugopal, a senior faculty member and our former of the department was chosen as Best Teacher by Govt. of Andhra Pradesh

2017 Dr. M. Sunder Ram has taken over the Incharge of the Department

The senior member of the department Dr.M.Sunder Ram is the Steering Committee Coordinator for NAAC Peer Team for re-accreditation process at UG level for 3rd Cycle

2021 Appointed Dr.B. Hariprasad Professor, department of mathematics & Statistics has a IQAC coordinator, Dr.P. Pranay Associate Professor as a member on the Academic Council., Dr.D. Gopinath Associate Professor as a NSS Programme coordinator.

2022 Appointed Dr.D. Gopinath Associate Professor as a member on the Board of Management.

19. Achievements of the Students

- BSC (CS)-III yr. (Shouri-Attended parade in 26-jan-2024).

21. ALUMINI Coordination Cell

1.Dr.N.Ashok

Asst. Prof. CDU

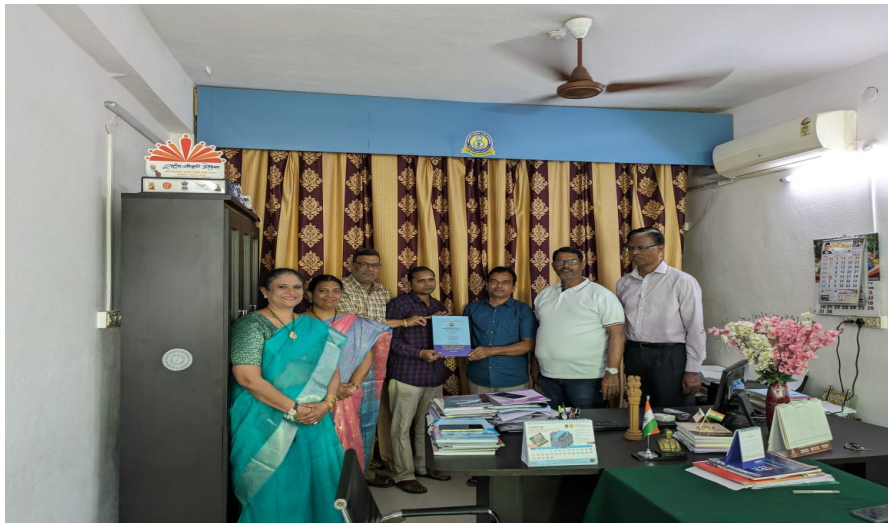
2.B.Vasu

Asst. Prof. CDU

22. PHOTO GALLERY



N.Ashok Awarded Ph.D under the supervision of Prof.M. Sunder ram



Submitted Prof.M. Sunder ram scholar Satyanarayana Ph.D Thesis



Submitted Prof.M. Sunder ram scholar Spandana Ph.D Thesis

23. CONTACT INFO

1. Prof.M.SUNDER RAM

MOBILE NO: 7288914444,9866455852