



ST JOSEPH'S COLLEGE FOR WOMEN,

ATMAKUR ROAD, KURNOOL -2

DEPARTMENT OF MATHEMATICS

PROGRAM OUTCOMES & COURSE OUTCOMES

Program- outcomes (PO_s)

Subject	PO _s
Mathematics	Develop proficiency in high-level mathematical methods, and acquire analytical and logical thinking skills.
Physics	Master a broad set of knowledge concerning the fundamentals in the basic areas of physics
Statistics	Statistical Knowledge Graduates will understand core concepts of statistics, probability, mathematics, and data analysis
Computer science	Mastery in the core areas of Algorithms, programming languages, Data structures, Databases, Software Engineering and Development.
	Apply problem-solving skills and knowledge of computer science to solve real problems.



MATHEMATICS COURSE OUTCOMES

DEPARTMENT OF MATHEMATICS

SEM	Course name	Course outcomes
1	ESSENTIALS AND APPLICATIONS OF MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES	<p>Apply critical thinking skills to solve complex problems involving complex numbers, trigonometric ratios, vectors, and statistical measures.</p> <p>Explain the basic principles and concepts underlying a broad range of fundamental areas of physics and connect their knowledge of physics to everyday situations.</p> <p>Explain the basic principles and concepts underlying a broad range of fundamental areas of chemistry and connect their knowledge of chemistry to everyday situations.</p> <p>Understand the interplay and connections between mathematics, physics, and chemistry in various applications. Recognize how mathematical models and physical and chemical principles can be used to explain and predict phenomena in different contexts. To explore the history and evolution of the internet and to gain an understanding of network security concepts, including threats, vulnerabilities, and countermeasures.</p>

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**ADVANCES IN
MATHEMATICAL,
PHYSICAL
AND CHEMICAL
SCIENCES**

Explore the applications of mathematics in various fields of physics and chemistry, to understand how mathematical concepts are used to model and solve real-world problems. To explain basic principles and concepts underlying a broad range of fundamental areas of physics and to connect their knowledge of physics to everyday situations. Understand different sources of renewable energy and their generation process and advances in nanomaterials and their properties, with a focus on quantum dots. To study the emerging field of quantum communication and its potential applications. To gain an understanding of the principles of biophysics in studying biological systems. Explore the properties and applications of shape memory materials.

Understand the principles and techniques used in computer-aided drug design and drug delivery systems to understand the fabrication techniques and working principles of nanosensors. Explore the effects of chemical pollutants on ecosystem and human health.

Understand the interplay and connections between mathematics, physics, and chemistry in various advanced applications. Recognize how mathematical models and physical and chemical principles can be used to explain and predict phenomena in different contexts.

		Understand and convert between different number systems, such as binary, octal, decimal, and hexagonal. Differentiate between analog and digital signals and understand their characteristics. Gain knowledge of different types of transmission media, such as wired (e.g., copper cables, fiber optics) and wireless (e.g., radio waves, microwave, satellite).
II	DIFFERENTIAL EQUATIONS	Convert non-exact homogeneous equations to exact differential equations by using integrating factors. Know the methods of finding solutions of differential equations of the first order but not of the first degree. Solve higher-order linear differential equations, both homogeneous and non-homogeneous, with constant coefficients. Understand the concept and apply appropriate methods for solving differential equations.
II	ANALYTICAL SOLID GEOMETRY	1. Understand planes and the system of planes. Know the detailed idea of lines 2. Understand sphere and their properties. Know the system of spheres and the coaxial system of spheres. 3. Understand various types of cones.
III	ABSTRACT ALGEBRA	Acquire basic knowledge structure of groups, sub-groups, and cyclic groups. To get the significance of the notion of a normal sub-group. To get the behavior of permutations and

		<p>operations on them.</p> <p>To study the applications of ring theory in various fields.</p> <p>Understand the ring theory concepts.</p>
IV	REAL ANALYSIS	<p>To get a clear idea about the real numbers and real-valued functions.</p> <p>To obtain the skills of analyzing appropriate methods for testing convergence of sequence.</p> <p>To test the continuity and differentiability of a function.</p> <p>Understand the computational efficiency of the principal algorithms for sorting, searching, and hashing. To know the geometrical interpretation of mean value theorems.</p>
IV	LINEAR ALGEBRA	<p>Understand the concept of vector spaces, and subspaces.</p> <p>Apply the Cayley-Hamilton theorem to problems for finding the inverse of a matrix and higher powers of matrices without using routine methods.</p> <p>Learn the properties of inner product spaces and determine orthogonality in inner product spaces.</p> <p>Understand the concepts of basis, dimension, and their properties.</p> <p>Understand the concepts of linear transformations and their properties.</p>

<p style="text-align: center; color: red; font-weight: bold; font-size: 2em;">V</p>	<p style="text-align: center; color: red; font-weight: bold;">MULTIPLE INTEGRALS AND APPLICATIONS OF VECTOR CALCULUS</p>	<ol style="list-style-type: none"> 1. Learn multiple integrals as a natural extension of the definite integral to a function of two variables in the case of double integral/three variables in the case of triple integral. 2. Learn applications in terms of finding surface area by double integral and volume by triple integral. 3. Determine the gradient, divergence, and curl of a vector and vector identities. 4. Evaluate line, surface, and volume integrals. 5. Understand the relation between surface and volume integrals(Gauss divergence theorem), the relation between line integral and volume integral(Green's theorem), and the relation between line and surface integral(Stokes theorem).
	<p style="text-align: center; color: red; font-weight: bold;">INTEGRAL TRANSFORMS WITH APPLICATIONS</p>	<ol style="list-style-type: none"> 1. Evaluate Laplace transforms of certain functions, and find Laplace transforms of derivatives and integrals. <p>Determine properties of Laplace transform which may be solved by application of special functions namely Dirac delta function, error function, Bessel function, and periodic function.</p> <p>Understand properties of inverse Laplace transforms, and find inverse Laplace</p>

		<p>transforms of derivatives and integrals. Solve ordinary differential equations with constant/variable coefficients by using Laplace transform method.</p> <p>Comprehend the properties of Fourier transforms and solve problems related to finite Fourier transforms</p>
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DEPARTMENT OF STATISTICS
PROGRAM OUTCOMES & COURSE OUTCOMES

Program- outcomes (PO_s)

2022-2023

Program Outcomes (Pos)

PO1. Students learn to apply theory learned so far up to 12th standard since statistics is applied Subject.

PO2: Student Employability increases due to various techniques covered in the papers like “Design of Experiment”, “Regression Analysis”, “Reliability and survival analysis” which are the Main features used in Business Analysis..

PO3: Due to the subject like “C Programming” and Statistical Computing using R software” Students get exposure to computer knowledge and their use hence their logical thinking is Developed.

PO4: Students get Knowledge of basic concepts required for higher studies.

PO5: Students starts thinking more scientifically and analytically.

Course Wise Objectives
COURSE-I: Descriptive Statistics

- The objective of this Course is to throw light on the role of statistics in different fields with special reference to business and economics.
- It gives the students to review good practice in presentation and the format most applicable to their own data.
- The measures of central tendency or averages reduce the data to a single value which is highly useful for making comparative studies.
- The measures of dispersion throw light on reliability of average and control of variability
- The concept of Correlation and Linear Regression deals with studying the linear relationship between two or more variables, which is needed to analyze the real life problems.
- The attributes gives an idea that how to deal with qualitative data.
- **COURSE-II: Probability Theory and Distributions**
- This Course deals with the situation where there is uncertainty and how to measure that uncertainty by defining the probability, random variable and mathematical expectation which are essential in all research areas.
- This Course gives an idea of using various standard theoretical distributions, their chief characteristics and applications in analyzing any data.

COURSE-III: Statistical Inference

- This Course deals with standard sampling distributions like Chi Square, t and F and their characteristics and applications.
- This Course deals with the different techniques of point estimation for estimating the parameter values of population and interval estimation for population parameters.
 - In this Course, various topics of Inferential Statistics such as interval estimation, Testing of Hypothesis, large sample tests (Z-test), small sample tests (t-test, F-test, chi-square test) and non-parametric tests are dealt with. These techniques play an important role in many fields like pharmaceutical, agricultural, medical etc.

COURSE-IV: Sampling Techniques and Design of Experiments

- The sampling techniques deals with the ways and methods that should be used to draw samples to obtain the optimum results, i.e., the maximum information about the characteristics of the population with the available sources at our disposal in terms of time, money and manpower to obtain the best possible estimates of the population parameters
- This Course throw light on understanding the variability between group and within group through Analysis of Variance
- This gives an idea of logical construction of Experimental Design and applications of these designs now days in various research areas.
- Factorial designs allow researchers to look at how multiple factors affect a dependent variable, both independently and together.

COURSE-V: Applied Statistics

- This Course deals the time series on simple description methods of data, 6 explains the variation, forecasting the future values, control procedures.
- It gives an idea of using index numbers in a range of practical situations, limitations and uses
- The vital statistics enlighten the students in obtaining different mortality, fertility rates thus obtaining the population growth rates and construction and use of life tables in actuarial science.

2023-2024 COURSE OUTCOMES

COURSE-I

After successful completion of the course students will be able to:

1. To acquaint with the role of statistics in different fields with special reference to business and economics.
2. To review good practice in presentation and the format most applicable to their own data.
3. To learn the measures of central tendency or averages reduce the data to a single value which is highly useful for making comparative studies.
4. To familiar with the measures of dispersion throw light on reliability of average and control of variability.
5. To deal with the situation where there is uncertainty and to measure that uncertainty by using the probability, which is essential in all research areas.

COURSE-II

After successful completion of the course students will be able to:

1. To get the knowledge of estimating future values by using curve fitting.
2. To calculate the relationship between bivariate data.
3. To find the relationship about the multivariate data.
4. To acquaint about the forecasting of the data by using regression techniques.
5. To find the association of the categorical data by using attributes

COURSE-III

1. After successful completion of the course students will be able to:
2. To acquaint with the role of statistics in different fields with special reference to agriculture.
3. Learn to apply the one of the design of experiment to agricultural fields.
4. Learn to apply the randomization to the blocks of various fields in agriculture.
5. To get the familiarity about applications of three principles.
6. Learn to deal the agricultural fields with different factors and levels.
7. To use appropriate experimental designs to analyze the experimental data.

COURSE-IV

1. After leaning this course the student will be able
2. Learn the different difference operators and applications.
3. Accustom with the interpolation techniques with equal and unequal intervals.
4. Able to use numerical differentiation tools.
5. Familiar to use numerical integration methods

COURSE-V

1. After learning this course, the student will be able to know about
2. Forecasting Techniques and its applications.
3. Interpret and use a range of index numbers commonly used in the business sector.
4. Perform calculations involving simple and weighted index numbers.
5. Understand the basic structure of the Consumer price index and perform calculations involving its use.
7. Various data collection methods enabling to have a better insight in policy making, planning and systematic implementation,
8. Construction and implementation of life tables.
9. Population growth curves, population estimates and projections,
10. Real data implementation of various demographic concepts as outlined above through practical