**PG & RESEARCH DEPARTMENT OF MATHEMATICS**

**FOR UG : PROGRAM OUTCOME (PO) :**

**PO1 :** Students will acquire critical thinking skills to solve problems that can be modeled

 mathematically.

**PO2 :** Gain proficiency in using computer technology appropriately to solve problems

and to promote understanding.

**PO3 :** Students should see a number of contrasting but complementary points of view in

the topics (continuous and discrete), techniques (algebraic and geometric), and

 approaches (theoretical and applied) to mathematics.

**PO4 :** Students will be able to read and construct mathematical arguments and proofs.

SUBJECT: ALGEBRA AND TRIGONOMETRY WITH GEOGEBRA

**Course Outcomes (CO)**

|  |  |  |
| --- | --- | --- |
| K1  | CO1  | Determine the convergence or divergence of sequences and series. |
| K2  | CO2  | Find the roots of higher degree algebraic and transcendental equations. |
| K3  | CO3  | Solve the problems related to convergence / divergence of Binomial, Exponential, Logarithmic Series. |
| K4  | CO4  | Describe to sum power series. |

SUBJECT: **CALCULUS WITH SCILAB**

**Course Outcomes (CO)**

|  |  |  |
| --- | --- | --- |
| K1  | CO1  | Define, curvature, compute limits of, differentiate, and integrate transcendental functions. |
| K2  | CO2  | Examine various techniques of integration and apply them to definite and improper integrals. |
| K3  | CO3  | Apply special functions using Beta and Gamma to evaluate multiple integrals. |
| K4  | CO4  | Use computational tools using SciLab. |

SUBJECT: **ALLIED : MATHEMATICAL STATISTICS– I**

**Course Outcomes (CO)**

|  |  |  |
| --- | --- | --- |
| K1  | CO1  | Explain and successfully understand all aspects of probability . |
| K2  | CO2  | Effectively use statistical software (e.g. Mini Tab, Excel) to perform statistical computations and display numerical and graphical summaries of data sets. |
| K3  | CO3  | Compute and interpret the coefficient of correlation and the "line of best fit" for bivariate data. |
| K4  | CO4  | Explore relationships between categorical variables using contingency table. |

SUBJECT: **PRACTICAL - I** **GEOGEBRA, SCILAB AND LIBRE OFFICE – I**

**Course Outcomes (CO)**

|  |  |  |
| --- | --- | --- |
| K1  | CO1  | Learn math tools for graphing, geometry, 3D by using GEOGEBRA. |
| K2  | CO2  | Demonstrate Linear algebra and Trigonometry concepts by mathematical software. |
| K3  | CO3  | Develop programs in SCILAB and Evaluate, analyze, plot results. |
| K4  | CO4  | Use computational tools of LIBRE OFFICE. |

SUBJECT: **ANALYTICAL GEOMETRY OF 3D WITH GEOGEBRA**

**Course Outcomes (CO)**

|  |  |  |
| --- | --- | --- |
| K1  | CO1  | Identify and classify geometric shapes using correct mathematical language. Draw and label figures based on verbal descriptions. |
| K2  | CO2  | Apply theorems involving vertical angles, complementary angles, supplementary angles, transversals, internal angle measure in triangles, circles and tangent lines to circles. |
| K3  | CO3  | Solve geometrical problems using the software GEOGEBRA. |
| K4  | CO4  | Apply geometric concepts to solve problems. |

SUBJECT: **MULTIVARIATE CALCULUS AND FOURIER SERIES WITH SCILAB**

**Course Outcomes (CO)**

|  |  |  |
| --- | --- | --- |
| K1  | CO1  | Understand the concepts of double and Triple integral applications.  |
| K2  | CO2  | Recognize and use the vocabulary of vectors (vector, scalar, magnitude, direction) to perform arithmetic on vectors and to solve application problems. |
| K3  | CO3  | Know and apply identities involving the trigonometric functions. |
| K4  | CO4  | Evaluate any periodic function can be expressed as a Fourier series.  |

SUBJECT: **ALLIED : MATHEMATICAL STATISTICS-II**

**Course Outcomes (CO)**

|  |  |  |
| --- | --- | --- |
| K1  | CO1  | Explain and successfully understand all aspects of parametric testing techniques including single and multi-sample tests for mean and proportion. |
| K2  | CO2  | Explain and successfully apply all aspects of appropriate parametric tests. |
| K3  | CO3  | Understand, apply and compute maximum likelihood estimation. |
| K4  | CO4  | Take up a career in statistical analysis. |

SUBJECT: **PRACTICAL-II** GEOGEBRA, SCILAB AND LIBRE OFFICE –II

**Course Outcomes (CO)**

|  |  |  |
| --- | --- | --- |
| K1  | CO1  | Learn math tools for graphing, geometry, 3D by using GEOGEBRA. |
| K2  | CO2  | Good understanding of Linear algebra and Trigonometry concepts by mathematical software. |
| K3  | CO3  | Develop programs in SCILAB and Evaluate, analyze, plot results. |
| K4  | CO4  | Use computational tools of LIBRE OFFICE. |

# FOR PG :PROGRAM OUTCOME (PO) :

**PO1:** Identify, formulate, and analyze the complex problems using the principles of Mathematics.

**PO2:** Solve critical problems by applying the Mathematical tools.

**PO3:** Apply the Mathematical concepts , in all the fields of learning including higher research, and

recognize the need and prepare for lifelong learning.

**PO4:** Able to crack competitive examinations, lectureship and fellowship exams approved by UGC

like CSIR – NET and SET.

SUBJECT: **ADVANCED ALGEBRA WITH GEOGEBRA**

# Course Outcomes (CO)

|  |  |  |
| --- | --- | --- |
| K1 | CO1 | Studies the [algebraic structures](https://en.wikipedia.org/wiki/Algebraic_structure) known as [groups](https://en.wikipedia.org/wiki/Group_%28mathematics%29) and the advance ideas in Group theory. |
| K2 | CO2 |  Recognize subgroup and the relation of conjugacy with Cauchy’s theorem and Sylow’s theorem. |
| K3 | CO3 |  To relate ring as one of the fundamental algebraic structures used in abstract algebra with Euclidean rings and Polynomial rings. |
| K4 | CO4 |  To explain field as a non-trivial division ring and Analyze the Roots of polynomials. |

SUBJECT: **ADVANCED REAL ANALYSIS**

**Course Outcomes (CO)**

|  |  |  |
| --- | --- | --- |
| K1 | CO1 | Acquire the knowledge of Limits and continuity of functions and the Derivatives of Real function with it’s higher order. |
| K2 | CO2 | Understand the Riemann Stieltjes integral of real valued functions on intervals and its properties. |
| K3 | CO3 | Demonstrate the idea in uniform convergence and differentiation and in uniform convergence and integration. |
| K4 | CO4 | Analyze the structure of the exponential, the logarithmic, the trigonometric, the gamma and beta functions**.** |

SUBJECT: **ORDINARY DIFFERENTIAL EQUATIONS WITH SCILAB**

**Course Outcomes (CO)**

|  |  |  |
| --- | --- | --- |
| K1  | CO1  |  Learn mathematical methods to solve higher order differential equations.  |
| K2  | CO2  | Understand the concept of power series solution, special function, existence and uniqueness of solutions of ODE’s.  |
| K3  | CO3  | To Examine Some Special Functions of Mathematical Physics and it’s properties. |
| K4  | CO4  | Infer the knowledge in Non-linear differential equations. |

SUBJECT: **NUMERICAL ANALYSIS**

**Course Outcomes (CO)**

|  |  |  |
| --- | --- | --- |
| K1  | CO1  |  Learn various tools in solving numerical problems.  |
| K2  | CO2  | To understand numerical methods of solving the non-linear equations, interpolation, differentiation, and integration. |
| K3  | CO3  | To Apply the Approximation methods and Iterative methods for finding solutions of Equations. |
| K4  | CO4  | Relate to competitive examinations.  |

SUBJECT: **MATHEMATICAL SOFTWARES – I**

**Course Outcomes (CO)**

|  |  |  |
| --- | --- | --- |
| K1 | CO1 | 1. Intended for students with no programming experience, provides the foundations of LATEX and programming in MATLAB. Variables, arrays, conditional statements, loops, functions, and plots are explained.
 |
| K2 | CO2 | 1. Good understanding of Linear algebra and Signal processing concepts.
 |
| K3 | CO3 | 1. Perform mathematical Modeling in MATLAB.
 |
| K4 | CO4 | 1. Develop programs in MATLAB. Evaluate, analyze and plot results.
 |

SUBJECT: **MATHEMATICAL SOFTWARES - I (PRACTICAL)**

**Course Outcomes (CO)**

|  |  |  |
| --- | --- | --- |
| K1 | CO1 | 1. Intended for students with no programming experience, provides the foundations of LATEX and programming in MATLAB. Variables, arrays, conditional statements, loops, functions, and plots are explained.
 |
| K2 | CO2 | 1. Good understanding of Linear algebra and Signal processing concepts.
 |
| K3 | CO3 | 1. Perform mathematical Modeling in MATLAB.
 |
| K4 | CO4 | 1. Develop programs in MATLAB. Evaluate, analyze and plot results.
 |

SUBJECT: **ADVANCED COMPLEX ANALYSIS WITH TABLEAU**

**Course Outcomes (CO)**

|  |  |  |
| --- | --- | --- |
| **K1** | **CO1** | Lay the foundation for topics in Advanced Complex Analysis by studying analyticf unctions and conformal mapping. |
| **K2** | **CO2** | To understand fundamental theorems used in complex analysis. |
| **K3** | **CO3** | To compare the concept of residues with Poisson’s formula. |
| **K4** | **CO4** | Analyze the Taylor series, Laurent series and elliptic functions. Develop clear thinking and analyzing capacity for research. |

|  |  |  |
| --- | --- | --- |
| **K1**  | **CO1**  | Identify various methods of solving different kinds of Partial differential equations.  |
| **K2**  | **CO2**  | Have a clear understanding on the concept of elliptic, parabolic and hyperbolic equations. |
| **K3**  | **CO3**  | Applying the core concepts of differential equation which can help individuals for better solving the problems. |
| **K4**  | **CO4**  | Analyze partial derivative equation techniques to predict the behaviour of certain phenomena.  |

SUBJECT:**PARTIAL DIFFERENTIAL EQUATIONS WITH SCILAB**

SUBJECT: **MECHANICS**

|  |  |  |
| --- | --- | --- |
| K1 | CO1 | Remember the postulates governing static and dynamic system and to study difference application of these concepts. |
| K2 | CO2 | End of this course, the students are expected to gain the knowledge about the Canonical Transformations and Introduction to Relativity |
| K3 | CO3 | Analyze the mechanism of solving the problem. |
| K4 | CO4 | On successful completion of this course, the students should gain knowledge about Hamilton’s Equations, Hamilton-Jacobi Theory and analyze them.. |

 SUBJECT **:OPTIMIZATION TECHNIQUES**

**Course Outcomes (CO)**

|  |  |  |
| --- | --- | --- |
| K1 | CO1 | Identify shortest route and shortest distance algorithms, Inventory models, Game theory concepts and Queuing Models. |
| K2 | CO2 | Understand shortest route and shortest distance algorithms, Inventory models, Game theory concepts and Queuing Models. |
| K3 | CO3 | Proficient in implementing Optimization methods for a variety of multi disciplinary applications. |
| K4 | CO4 | Analyze some managerial decision making problems. |

SUBJECT **:FUZZY LOGIC AND FUZZY SET**

|  |  |  |
| --- | --- | --- |
| K1 | CO1 | To Identify the fundamental theory and concepts of Fuzzy Logic. |
| K2 | CO2 | To understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic control and other machine intelligence applications of fuzzy logic |
| K3 | CO3 | To Apply the operations on fuzzy sets and the combinations of operations. |
| K4 | CO4 | Inference from conditional fuzzy propositions, Fuzzy quantifiers. |