PDA COLLEGE OF ENGINEERING,KALABURAGI
B E. Third Semester

Numerical and Statistical Methods
(Branch: ISE)
[As per Choice Based Credit System (CBCS) scheme]
(From the academic year 2022-23)

Course Code	21MA31E	CIE Marks	50
Credits	03	SEE Marks	50
Contact Hours/Week (L-T-P)	3-0-0	Total Marks	100
Contact Hours	42	Exam Hours	03

Course Learning Objectives: To enable the students to obtain the knowledge of Engineering Mathematics in the following topics

1. Interpolation methods , Numerical differentiation and Numerical integration
2. Numerical solution of ordinary differential equations.
3. Methods of least squares to fit straight line and second degree parabola
4. Linear programming problems

Module-I	9hours

Solution of Algebraic And Transcendental Equations: Bisection method Newton's- Raphson method and Regula falsi method.

Finite differences: Forward and Backward differences, Interpolation, Newton's Forward and Backward interpolation formulae and examples. Langrange's interpolation and inverse interpolation formulae and examples. (all formulae and rules without proof)

RBT Levels: L1, L2 & L3

Module-II	8 hours

Numerical differentiation: Numerical differentiation using Newton's forward and backward interpolation formulae and problems.

Numerical integration: Itroduction, Trapezoidal rule, Simpson's $1/3^{rd}$, Simpson's $3/8^{th}$ rule and Weddle's rule
(all formulae without proof)

RBT Levels: L1, L2 & L3

Module-III	9 hours

Numerical solutions of first order and first degree ordinary differential equations:

Taylors series method, Runge –Kutta method of fourth order, modified Euler's method and Milne's and Adam's-Bashforth predictor and corrector methods and problems. Numerical solution of Simultaneous ordinary differential equations of first order and second order differential equations by Runge-kutta method. (all formulae without proof)

RBT Levels: L1, L2 & L3

Module –IV	8 hours

Statistical methods:

Curve fitting by the method of least squares: Straight line, second degree parabola and the curves of the form $y = ab^x$, $y = ax^b$ and $y = ae^{bx}$.

Correlation and lines of regression, angle between two regression lines and rank correlation

RBT Levels: L1, L2 & L3

Module –V	8 hours

Optimization techniques:

Linear Programming, Mathematical formulation of linear Programming problem (LPP), Types of solutions, Graphical Method, basic feasible solution, canonical and standard forms and simplex method.

RBT Levels: L1, L2 & L3

Text books:

1 Higher Engineering Mathematics by B.S.Grewal, Khanna publishers; 40th Edition.2007

2 Engineering Mathematics by N. P. Bali and Manish Goyal. Laxmi publications, latest edition

Reference books:

1.Advanced Engineering Mathematics by E. Kreyszig, John Willey & sons 8th Edn.

2.A short course in differential equations – Rainvile E.D.9th Edition.

3.Advanced Engineering Mathematics by R.K.Jain & S.R.K Iyengar; Narosa publishing House.

4.Introductory methods of numerical analysis by S.S.Sastry

4. Statistical Methods Authored By Gupta S.P. Publisher: Sultan Chand & Sons. Publishing Year: 2021
5. Fundamentals of Mathematical Statistics Authored By Gupta S.C.& Kapoor V.K. Publisher:Sultan Chand & Sons.Publishing Year: 2020

Course Outcomes: On completion of this course, students are able to:

CO1: Solve the numerical problems in algebraic and transcendental equations and computation of interpolating polynomials using given data.

CO2: Compute derivatives of the functions numerically using given data and Evaluate integrations numerically.

CO3: Apply numerical methods to solve ordinary differential equations.

CO4: Apply the method of least square to estimate the parameters in regression model

CO5: Apply optimization techniques and LPP for real life problems.

Method of Examination:

Note:- The SEE question paper will be set for 100 marks and the marks scored by the student will be proportionately reduced to 50.

- The question paper will have **ten** full questions carrying equal marks.
- Each full question carries **20**marks.
- There will be **two** full questions (with a **maximum** of **four** sub questions) from each module.
- Each full question will have sub question covering all the topics under a module.

The students will have to answer **five** full questions, selecting **one** full question from each module.