SHARNBASVA UNIVERSITY, KALABURAGI

ENGINEERING MATHEMATICS – III			
3rd SEMESTER SYLLABUS			
Course Code	**21MAT31**	**CIE Marks**	**50**
Contact Hours/Week	**03**	**SEE Marks**	**50**
Total Hours	**40**	**Exam Hours**	**03**
Semester	**III**	**Credits**	**03**

Course Learning Objectives:

This course will enable students to:

- Introduce most commonly used analytical and numerical methods in the different engineering fields.
- Learn Laplace transform and Z-transforms to solve ODE and PDE's.
- Understanding the statistical methods, numerical methods.
- Solve the problem related to Interpolation.
- To discuss the random variable and associated probability distributions.
- Understand the vector space and associated results.
- Understand the basic concepts of set theory, relations, functions and mathematical logic.

Course Outcomes(COs):

After completion of course, the student will able to

CO#	Course Outcomes	POs	PSOs
CO1	Apply the knowledge of Laplace transform from time domain to frequency domain. Knowing the property of Laplace transform and solving the problems on Signal and image processing which transforms differential equation into algebraic equation form and solving the problems also in inverse Laplace transform.	1, 2, 3	
CO2	Knowing the random variable both discrete and continuous and their probability distribution, Mass density function and solving the problemson various engineering problems.	1, 2, 3	
CO3	Apply the concept of correlation and regression lines for solving the problems and numerical techniquesto solve engineering problems and fit a least squares curve to the given data.	1, 2, 3	
CO4	Studying the Forward and Backward Finite differences and solve the problems on interpolation and Finding the numerical integration by different methods.	1, 2, 3	
CO5	Apply the knowledge of Z-transforms in solving the difference equation arising in the continuous and discrete time signals and digital processing,Apply the knowledge of vector space in digital communication/ Apply sampling distribution to solve engineering problems./ Apply the operations like union and intersection on discrete structures such as sets, relations and functions and construct mathematical arguments using logical connectives.	1, 2, 3	

Bloom's level of the course outcomes:

CO#	Bloom's Level					
	Remember (L1)	Understand (L2)	Apply (L3)	Analyze (L4)	Evaluate (L5)	Create (L6)

CO1	√	√	√			
CO2	√	√	√			
CO3	√	√	√			
CO4	√	√	√			
CO5	√	√	√			

Course Articulation Matrix / Course mapping :

CO#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2		1				1			1			
CO2	3	2	2		1				1			1			
CO3	3	2	2		1				1			1			
CO4	3	2	2		1				1			1			
CO5	3	2	2		1				1			1			

Note: 1-Low, 2-Medium, 3-High

MODULE-1: LAPLACE TRANSFORMS

Laplace Transforms: Definition, Laplace transforms of Elementary functions, properties(without proof) periodic function, Unit step function, Unit impulse function.
Inverse Laplace Transforms: Definition, Convolution Theorem (without proof)and Finding Inverse Laplace transform by convolution Theorem. Solution of Linear Differential equations using Laplace Transforms and Applications (5 Assignment Problem).
Self Study : Solution of first order simultaneous differential equation

(RBT Levels: L1, L2 and L3) 8 Hours

Teaching – Learning Process	Chalk and talk method / Power Point Presentation

MODULE-2: PROBABILITY DISTRIBUTION-1

Probability Distribution: Random variables (discrete and continuous) probability mass/density functions. Binomial distribution, Poisson distribution. Exponential and Normal distributions. Problems. (5 Assignment Problem).

Self Study : Definition of probability , addition and multiplication rule, Bay's theorem.

(RBT Levels: L1, L2 and L3) **8 Hours**

Teaching – Learning Process	Chalk and talk method / Power Point Presentation

MODULE-3: STATISTICAL METHODS

Statistical Methods: Correlation-karl Pearson's co-efficient of correlation problems. Regression analysis lines of regression, Rank correlation (without proof)-problems.
Curve Fitting: Curve fitting by the method of least square. Fitting of the curves of the form$y = ax + b, y = ax^2 + bx + c$ & $y = ae^{bx}$.
Numerical Methods: Numerical solution of algebraic and transcendental equations by Regula-

FalsiMethod and Newton-Raphson method. (5 Assignment Problem).
Self Study :Secent method, mean, mode, median, variance and standard deviation.

8 Hours

(RBT Levels: L1, L2 and L3)

Teaching – Learning Process	Chalk and talk method / Power Point Presentation

MODULE-4: FINITE DIFFERENCES

Finite Difference: Forward and Backward differences, Newton's forward and backward interpolation formulae. Divided difference-Newton's divided difference formulae. Lagrange's-interpolation formula and inverse interpolation formula (all formula without proof) problems.

Numerical Integration: Simpsons$\left(\frac{1}{3}\right)^{rd}$, $\left(\frac{3}{8}\right)^{t}$ rules, Weddle's rule (without proof) problems.

(5 Assignment Problem).
Self Study : Numerical differentiation, Trapezoidal rule

(RBT Levels: L1, L2 and L3) **8 Hours**

MODULE-5

Department of ECE and EEE : Z-Transforms and Linear Algebra

Z- Transforms: Difference Equations, Basic definitions, Damping rule, Shifting rule, Initial and Final Value theorems (without proof) and problems.
Inverse Z-transforms. Applications of Z-transforms to solve difference equation.
Linear Algebra: Introduction toVector space and sub space, definitions, illustrative examples and simple problems, Basis and dimensions, Linear independent and linear dependent vectors(5 Assignment Problem).
Self Study : Two dimensional and three dimensional vectors, convergent and divergent series

(RBT Levels: L1, L2 and L3) **8 Hours**

Teaching – Learning Process	Chalk and talk method / Power Point Presentation

Department of Civil , Mech and Energy Engg : Sampling theory and Tracing of curves

Sampling theory : Sampling, Sampling distributions, standard error, test of hypothesis for means and proportions, Type I and Type II errors, Level of significance, confidence limits for means, one tailed and two tailed tests, student's t-distribution, Chi - square distribution as a test of goodness of fit.
Tracing of curves: Cartesian form - Strophoid, Leminscate, Parametric form - Cycloid, Astroid,
Polar form - Cardioid, Leminscate.
Self Study : Types of samplings, Cartesian equations and their geometrical representation

(RBT Levels: L1, L2 and L3) **8 Hours**

Teaching – Learning Process	Chalk and talk method / Power Point Presentation

Department of CSE : Relations, Functions and Logic

Functions: Cartesian Products and Relations, Functions – into, many one One-to-One, Onto, Bijective Functions. The Pigeon-hole Principle, Function Composition and Inverse functions.
Relations: Definition and different types of relations
Introduction to logic: Basic Connectives and Truth Tables, Logic Equivalence – The Laws of Logic, Logical Implication – Rules of Inference.

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Self Study : Different types of sets and operations on sets

(RBT Levels: L1, L2 and L3) 8 Hours

Teaching – Learning Process	Chalk and talk method / Power Point Presentation

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing marks for the CIE is 45% of the maximum marks (22.5 marks out of 50). The minimum passing marks for the SEE is 35% of the maximum marks (18 marks out of 50).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation(CIE):

The CIE shall be conducted by the course teacher throughout the semester. The CIE marks for the theory component of the IC shall be 30 marks and for the laboratory component 20 Marks.

The CIE marks for the theory component shall be 50 marks and scored will be reduced to 30.As below

- Three Tests each of 15 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90- 100% respectively. Average of Best Two performances of the Internal Tests shall be considered for 15 Marks.
- Session wise assignments for 25 marks
- For Seminar and library work 05 marks
- Attendance 5 marks (95% to 100%), 04 marks (85% to 94%)

CIE for the practical component of the IC:

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The 35 marks are for conducting the experiment and preparation of the laboratory record, the other 15 marks shall be for the test conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 50 marks. Marks of all experiments' write-ups are added and scaled down to 20 marks.

Semester End Examination(SEE)

1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
2. The question paper will have ten full questions carrying equal marks.
3. Each full question carries 20 marks.
4. There will be two full questions (with a maximum of three sub questions) from each module
5. Each full question will have sub questions covering all the topics under a module.
6. The students will have to answer five full questions, selecting one full question from each module.

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)Text Books

1. **B.S.Grewal**:"Higher Engineering Mathematics", Khanna publishers, 44th Ed., 2021.
2. **E. Kreyszig**: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed., 2018.

Reference Books

1. **V. Ramana:**"Higher Engineering Mathematics" McGraw-Hill Education,11th Ed.,2017
2. **Srimanta Pal & Subodh C. Bhunia**: "Engineering Mathematics" Oxford University Press, 3rdEd., 2016.
3. **N.P Bali and Manish Goyal**: "A textbook of Engineering Mathematics" Laxmi Publications,10th Ed.,2022.

4. **C. Ray Wylie, Louis C. Barrett:** "Advanced Engineering Mathematics" McGraw–Hill Book Co., New York, 6thEd., 2017.
5. **C.B Gupta, S. R Singh and Mukesh Kumar:** "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education (India)Pvt.Ltd 2015.
6. **H.K. Dass and Er. Rajnish Verma:** "Higher Engineering Mathematics" S.Chand Publication, 3rdEd., 2014.
7. **James Stewart:** "Calculus" Cengage Publications, 7thEd., 2019.
8. **David CLay:** "Linear Algebra and its Applications", Pearson Publishers, 4th Ed.,2018.
9. **Gareth Williams:** "Linear Algebra with applications", Jones Bartlett Publishers Inc., 6thEd., 2017.

Web links and Video Lectures:

1. http://nptel.ac.in/courses.php?disciplineID=111
2. http://www.class-central.com/subject/math
3. http://academicearth.org.