Course Title	Mathematics for AI & ML		
Course Code	24MAAI301	(L-T-P) C	(3-1-0) 3
Exam	3 hours	Hours/Week	03
SEE	50 marks	Total Hours	42L + 48ABL = 90

Course Objective: To equip students with the theoretical foundations and analytical skills necessary to model and solve real-world problems in artificial intelligence, machine learning, and engineering through the principles of linear algebra.

Course Outcomes (COs): Upon completion of the course, students shall be able to:

No.	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Examine suitable solution procedure to solve the linear models, linearly dependency or independency of vectors, the existence of diagonalization of matrix. Apply matrix factorization to applications such as computer graphics.	1,2,3	-
2.	Compute the Eigen values/Eigen vectors to the given linear system, suitable matrices arising in magnification, rotation of images using the knowledge of vector space, matrix of linear transformations.	1,2	-
3.	Analyze the application-oriented problems connected with difference equations, Markov chain, and discrete dynamical systems by using the concept of Eigen values, Eigen vectors.	1,2,3	-
4.	Apply the techniques of singular value decomposition, PCA, to analyze the process of data compression/image processing.	1,2	-

Course Contents:

Module 1	10 Hours

Linear Algebra: Importance of Matrices in engineering. Rank of a matrix. Consistency of non-homogeneous and homogeneous system of equations, Solution of the system of linear equations by Gauss elimination method and Gauss – Seidel iterative method.

Applications of solution of system of equations to balance the chemical equations. Traffic-flow problem. To find the suitable combination of food stuff so as to get the desired nutrients as

prescribed by a dietician.

Self-Study- linear models in business and engineering, Partitioned matrices, Matrix factorization, the Leontief input–output model, and application to computer graphics.

Module 2	**10 Hours**

Vector Space: Introduction: Vector space, subspace, basis of a vector space, and dimension of a vector space. Linearly dependent and independent vectors. Introduction to linear transformation: rank, nullity of a linear transformations, matrix of a linear transformation. Special matrices-matrix of rotation, reflection, translation. To find the matrix of transformation when the image of some points is given.

Applications: Transformation of 3D coordinate in robotic arm.

Self-Study- Bases for Null space and Column space. Change of basis in R^n.

Module 3	**10 Hours**

Eigen value & Eigen vectors: Computation of Eigen value, Eigen vectors, applications of diagonalization, Jordan canonical form. Application to discrete dynamical systems- coupled differential equations governing the electrical circuits systems, applications to difference equations, applications to web page ranking.

Self-Study- Stretching of an elastic membrane, to determine the growth of a population model. Role of Eigen values, eigenvectors in determining natural frequency, mode shapes of equations of motions (Spring mass system).

MODULE - 4	**12 Hrs.**

Orthogonality & Least Square: Orthogonal sets, orthogonal projections, Gram Schmidt process, QR-factorization, least square problems, multiple regression through matrix approach, singular value decomposition theorem, examples. Principal component analysis- applications of PCA to data compression, image processing.

Self-Study- Application of Eigen value Eigen vectors in Signature testing, Face recognition. Stability analysis of differential equations which governs the dynamical systems using the concept of Eigen value, Eigen vectors.

Note – Theorems and properties without proof. Applicable to all the modules.

Self-study is not included in SEE

Prescribed Text Books:

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Linear Algebra and its Applications	David C. Lay, Steven R. Lay and J.J. Mc Donald	5 ISBN-10:9350517698	Pearson Education Ltd	2015

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Advanced Engineering Mathematics	E. Kreyszig	10	Wiley	2015
2.	Linear Algebra and its Applications	Gilbert Strang	4	Cenage publications	2014

EBooks and online course materials:

1. https://www.geneseo.edu/~aguilar/public/assets/courses/233/main_notes.pdf
2. https://theengineeringmaths.com/wp-content/uploads/2017/08/ftransforms.pdf
3. https://see.stanford.edu/materials/lsoftaee261/book-fall-07.pdf

Online Courses and Video Lectures:

1. https://www.coursera.org/learn/introduction-to-linear-algebra
2. https://archive.nptel.ac.in/courses/111/106/111106135/

Teaching - Learning – Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Integrated Lab Component	-	-	-
3	Student Study Hours – Self Learning	1	14	14
3	Activity Based Learning (ABL1 & ABL2)	-	-	27
4	Evaluation of Learning Process	-	-	07
Total Learning Hours / Semester				**90**

Proposed Assessment Plan (for 50 marks of CIE):

Tool	**Remarks**	**Marks**
CIE	Three CIEs conducted for 20 marks each and reduced to 10 marks	30
Activity Details	Details of activities to be conducted 1) Details of activity 1 2) Details of activity 2	20
Total		**50**

Activity Based Learning (27 Hours)

ABL 1 (14 Hours) : Activity 1 details		**Hours**
Writing Assignment with Problems on concerned to real world applications.	Submission of the final assignment report and evaluation. (Questions of Blooms level L3 and Higher)	14
Total		**14**
ABL 2 (13 Hours): Activity 2 details		
Problem Solving Assignment	Understand the input data requirements	1
	Formulate the methodology	4
	Design the solution	4
	Solving the problem and submission	4
Total		**13**

Evaluation of Learning Process (7 Hours)

Type of Evaluation	**Hours**
Test (1, 2 and 3)	3
Activity (1 and 2)	1
Semester End Exam	3
Total	**7**

Course Articulation Matrix

Course Outcomes	Program Outcomes [POs]												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2	1										
CO2	3	2											
CO3	3	2	1										
CO4		3	2										

Course Title	**Computational Statistics**		
Course Code	24MACB301	**(L-T-P) C**	**(3-1-0) 3**
Exam	3 hours	**Hours/Week**	**03**
SEE	50 marks	**Total Hours**	**42L + 48ABL = 90**

Course Objective: To equip students with a solid foundation in computational statistics, enabling them to analyze and interpret data, make informed decisions based on statistical evidence, and effectively communicate statistical findings.

Course Outcomes (COs): Upon completion of the course, students shall be able to:

No.	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Demonstrate the fundamental statistical concepts, descriptive statistics, sampling estimation of point estimation and confidence intervals.	1,2	-
2.	Apply a range of statistical techniques including hypothesis testing, independence test, simple linear and logistic regression analysis to solve problems	1,2	-
3.	Analyze the given datasets using the appropriate statistical methods including multiple-regression analysis, analysis of variance to draw meaningful conclusions, and effectively communicate the results of their analyses	1,2,3	-
4.	Interpret the probability distribution and give the statistical output and also, predict the probability in the long run for Markov chain-based problems.	1,2	-

Course Contents:

Module 1	**10 Hours**

Introduction to Statistical Concepts:

Introduction to Statistics: Definition and importance of statistics, Types of data and variables, Descriptive Statistics, Measures of central tendency (mean, median, and mode) Measures of variability (range, variance, and standard deviation).

Probability distributions (discrete and continuous): mean, variance and standard deviation.

Exponential distribution, Uniform distribution, Normal distribution.

Applications: Current measurement problems

Self-study: Data visualization techniques (histograms, boxplots).

Module 2	**10 Hours**

Joint Probability Distribution: Joint distributions of discrete random variables-Marginal probability distribution, Independent random variables, expectation, co-variance, and correlation.

Markov Chains: Regular stochastic matrices, transition probability matrix, transition-probability matrix, higher transition-probabilities, stationary distribution of regular Markov chains and irreducible Markov chain.

Applications: Application of Markov chain to determine the voting tendencies.

Self-study: Estimating the population distribution of a city due to migration.

Module 3	**10 Hours**

Statistical Inference

Sampling and Estimation: Sampling methods and techniques, Point estimation and confidence intervals, Sample size determination.

Hypothesis Testing: Introduction to hypothesis testing- Null and alternative hypotheses, Type I and Type II errors, significance level, and p-values. Parametric Tests: One-sample and two-sample-z-tests, t-tests. Chi-square test for independence of test.

Applications: Propellant burning rate, process-capacity problem, drying time problem

MODULE - 4	**12 Hrs.**

Statistical Models and Analysis

Introduction to Regression Analysis- Simple linear regression: Assumptions and interpretation. Coefficient of determination (R-squared). Multiple Regression Analysis: Multiple linear regression. Logistic regression, Odds ratio and interpretation.

Analysis of Variance (ANOVA): One-way ANOVA and two-way ANOVA.

Self-study: Model assumptions and diagnostics, Variable selection techniques (stepwise, backward, forward), Analysis of Categorical Data

Note – Theorems and properties without proof. Applicable to all the modules.

Self-study is not included in SEE

Prescribed Text Books:

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Fundamentals of Statistics	S C Gupta	7	Himalaya Publishing House	
2.	Statistics for Business: Decision Making and Analysis	Robert Stine	2	Pearson	2017
3.	Probability, Statistics and Random Process	T Veerarajan	3	Tata McGraw Hill Co.	2008

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Introduction to Statistical Learning with Applications in R	Gareth James, Daniela Witten, Trevor Hastie, and Robert Tibshirani			
2.	Statistical Computing with R	Maria L. Rizzo, Chapman and Hall/CRC	2	Taylor and Francis Group	2019
3.	Bayesian Data Analysis	Andrew Gelman, John B. Carlin, Hal S. Stern, David B. Dunson, Aki Vehtari, and Donald B. Rubin			
4.	Numerical Recipes: The Art of Scientific Computing	William H. Press, Saul A. Teukolsky, William T. Vetterling, and Brian P. Flannery			

E Books and online course materials:

1. **https://www.coursera.org/learn/the-power-of-statistics**
2. **https://nptel.ac.in/courses/110107114**

Online Courses and Video Lectures:

1. **https://www.coursera.org/learn/stanford-statistics**

2. **https://www.coursera.org/learn/machine-learning-probability-and-statistics**
3. **https://onlinecourses.nptel.ac.in/noc21_ma74**

Teaching - Learning – Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Integrated Lab Component	-	-	-
3	Student Study Hours – Self Learning	1	14	14
3	Activity Based Learning (ABL1 & ABL2)	-	-	27
4	Evaluation of Learning Process	-	-	07
Total Learning Hours / Semester				**90**

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
CIE	Three CIEs conducted for 20 marks each and reduced to 10 marks	30
Activity Details	Details of activities to be conducted 3) Details of activity 1 4) Details of activity 2	20
Total		**50**

Activity Based Learning (27 Hours)

ABL 1 (14 Hours) : Activity 1 details		**Hours**
Writing Assignment with Problems on concerned to real world applications.	Submission of the final assignment report and evaluation. (Questions of Blooms level L3 and Higher)	14
Total		**14**
ABL 2 (13 Hours): Activity 2 details		
	Understand the input data requirements	1

Problem Solving Assignment	Formulate the methodology	4
	Design the solution	4
	Solving the problem and submission	4
Total		**13**

Evaluation of Learning Process (7 Hours)

Type of Evaluation	**Hours**
Test (1, 2 and 3)	3
Activity (1 and 2)	1
Semester End Exam	3
Total	**7**

Course Articulation Matrix

Course Outcomes	**Program Outcomes [POs]**												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2											
CO2	3	2											
CO3	3	2	2										
CO4	3	2											

Course Title	Mathematics-III for Computer Science Engineering		
Course Code	24MACS301	**(L-T-P) C**	**(4-0-0) 4**
Exam	3 hours	**Hours/Week**	**04**
SEE	50 marks	**Total Hours**	**56L + 64ABL = 120**

Course Objective: To introduce linear algebra and Probability theory which can be employed as tools in solving engineering application problems.

Course Outcomes (COs): Upon completion of the course, students shall be able to:

No.	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Demonstrate the matrix concepts and solution techniques to solve systems of linear equations and perform geometric transformations in engineering applications.	1	-
2.	Apply concepts of Eigen values, eigenvectors, and matrix factorization techniques to solve engineering problems and analyze models such as elastic deformation and population growth.	1,2	-
3.	Analyze and apply various probability distributions and statistical measures, including mean, variance, and cumulative distribution functions, to solve engineering and real-world problems.	1	-
4.	Analyze the problem connected with sampling theory and apply the same to engineering problems. Also model real life problems/engineering application problem and solve the same.	1,2	-

Course Contents:

Module 1	**14 Hours**

Linear Algebra: Importance of Matrices in engineering. Rank of a matrix. Consistency of non-homogeneous and homogeneous system of equations, Solution of the system of linear equations by Gauss elimination method and Gauss – Seidel iterative method. Special matrices-matrix of rotation, reflection, translation. To find the matrix of transformation when the image of some points is given. Eigen values and Eigenvectors Illustrative examples, Applications-Stretching of an elastic membrane. Diagonalization and powers of 3X3 matrices when Eigen values are already given.

Applications: Traffic flow problem. To determine the growth of a population model. Rayleigh power method to find the highest Eigen value.

Self-Study-- Stability analysis of differential equations which governs the dynamical systems using the concept of Eigen value, eigenvectors.

Module 2	**10 Hours**

Random Variables: Random variables (discrete and continuous), Probability density function, Cumulative distribution function, Mean and Variance. Probability Distributions: Binomial and Poisson distributions, Exponential distribution and Normal distribution.

Application: Current measurement problems, Digital transmission channel. Detection of signal.

Self-Study: Uniform distribution.

Module 3	**10 Hours**

Joint probability distribution: Joint distribution of Discrete random variables- Marginal **probability distribution, Independent random variable,** Expectation, Covariance, Correlation coefficient.

Markov chains- Regular stochastic matrices, transition-probability matrix, Higher transition-probabilities, Stationary distribution of regular Markov chains and irreducible Markov chain.

Application: Application of Markov chain to determine the voting tendencies, Estimating the population distribution of a city due to migration.

Self-Study: Joint probability distribution-Continuous random variables

MODULE - 4	**12 Hrs.**

Sampling Distribution: Continuous probability distribution: Exponential pdf, Normal/Gaussian pdf. Discussion on the choice of PDF. Illustrative examples from engineering field. Population and sampling, sampling with and without replacement, sampling distribution of means, sampling distribution of proportions, sampling distribution of differences and sums.

Confidence intervals and Hypothesis testing: Brief introduction to confidence intervals, Testing a hypothesis, central limit theorem-statement, level of significance, simple sampling of attributes, test of significance for large samples, comparison of large samples, Student's t-distribution, Chi—square Distribution

Application: Propellant burning rate, process-capacity problems, drying time problem

Self-Study—F-test Analysis of variance.

Note – Theorems and properties without proof. Applicable to all the modules.

Self-study is not included in SEE

Prescribed Text Books:

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Higher Engineering Mathematics	Dr. B. S. Grewal	44	Khanna Publications	2016
2.	Linear algebra	David c lay	3	Pearson education	2002

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Advanced Engineering Mathematics	E. Kreyszig	10	Wiley	2015
2.	Advanced engineering mathematics	R K Jain and S R K Iyengar	2	Pearson education	2002
3.	Calculus	Thomas Finney	9	Pearson education	2002

E Books and online course materials:

1. https://www.geneseo.edu/~aguilar/public/assets/courses/233/main_notes.pdf

Online Courses and Video Lectures:

1. https://www.coursera.org/learn/introduction-to-linear-algebra
2. **https://www.coursera.org/learn/stanford-statistics**
3. **https://onlinecourses.nptel.ac.in/noc21_ma74**
4. https://archive.nptel.ac.in/courses/111/106/111106135/

Teaching - Learning – Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Integrated Lab Component	-	-	-
3	Student Study Hours – Self Learning	1	14	14
3	Activity Based Learning (ABL1 & ABL2)	-	-	27
4	Evaluation of Learning Process	-	-	07
Total Learning Hours / Semester				**90**

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
CIE	Three CIEs conducted for 20 marks each and reduced to 10 marks	30
Activity Details	Details of activities to be conducted 5) Details of activity 1 6) Details of activity 2	20
Total		**50**

Activity Based Learning (27 Hours)

ABL 1 (14 Hours) : Activity 1 details		**Hours**
Writing Assignment with Problems on concerned to real world applications.	Submission of the final assignment report and evaluation. (Questions of Blooms level L3 and Higher)	14
Total		**14**
ABL 2 (13 Hours): Activity 2 details		
Problem Solving Assignment	Understand the input data requirements	1
	Formulate the methodology	4
	Design the solution	4

	Solving the problem and submission	4
Total		**13**

Evaluation of Learning Process (7 Hours)

Type of Evaluation	**Hours**
Test (1, 2 and 3)	3
Activity (1 and 2)	1
Semester End Exam	3
Total	**7**

Course Articulation Matrix

Course Outcomes	**Program Outcomes [POs]**												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3												
CO2	3	2											
CO3	3												
CO4	3	2											

Course Title	Mathematics-III for Information Science Engineering		
Course Code	24MAIS301	(L-T-P) C	(3-1-0) 3
Exam	3 hours	Hours/Week	03
SEE	50 marks	Total Hours	42L + 48ABL = 90

Course Objective: To introduce linear algebra and transform calculus which may be employed as tools in solving engineering application problems.

Course Outcomes (COs): Upon completion of the course, students shall be able to:

No.	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Utilize the concepts of linear algebra to solve the engineering application problems and compute the number of linearly independent vectors.	1	-
2.	Examine for the existence of diagonalization of matrix, find the suitable matrix of image transformations. Compute Eigen values and Eigen vectors of a matrix.	1,2	-
3.	Determine Fourier series of a given function, the orthogonal basis, QR factors of Matrices, and solve homogeneous differential equations using matrices	1	-
4.	Define mathematical procedures connected with linear algebra, Fourier series and model the real-life problems/engineering application problems.	1,2	-

Course Contents:

Module 1	10 Hours

Linear Algebra: Importance of Matrices in engineering. Rank of a matrix. Consistency of non-homogeneous and homogeneous system of equations, Solution of the system of linear equations by Gauss elimination method and Gauss – Seidel iterative method. Linearly dependent and independent vectors.

Applications of solution of system of equations to balance the chemical equations.

Self-Study--Traffic flow problem, to find the suitable combination of food stuff so as to get the

desired nutrients as prescribed by a dietician.	
Module 2	**10 Hours**
Linear algebra: Orthogonal matrices, Gram Schmidt process, QR-factorization, symmetric matrices and quadratic forms, Matrix method to solve homogeneous differential equations of order 2, degree 1. Special matrices-matrix of rotation, reflection, translation. To find the matrix of transformation when the image of some points is given. **Self-study**: Linear models in business and engineering. Partition matrices, Matrix factorization, Application to computer graphics.	
Module 3	**10 Hours**
Linear Algebra: Eigen values and Eigenvectors, properties, Illustrative examples. Applications-Stretching of an elastic membrane, to determine the growth of a population model. Role of eigen values, eigenvectors in determining natural frequency, Rayleigh power method to find the highest eigen value. Diagonalization and powers of 3X3 matrices when Eigen values are already given. **Self-Study--** Stability analysis of differential equations which governs the dynamical systems using the concept of eigen value, eigenvectors. Applications of system of equations, linear transformation in computer science. Application of eigen value eigenvectors in data compression, Signature testing, Face recognition. Google page ranking.	
MODULE - 4	**12 Hrs.**
Fourier Series: Periodic functions and their graphical representation, to find the function for standard graphs, to find Fourier series by change of interval method, To represent the experimental data as a Fourier series using the method - Practical harmonic analysis. application of Fourier series in engineering-To represent the signal (wave form) in terms of Fourier series, Fourier series representation for the excitation described by the wave form, graphs of Fourier series approximating the given function. **Self-Study--** Half range series method. Applications of Fast Fourier transforms, Discrete Fourier transforms in information science engineering.	

Note – Theorems and properties without proof. Applicable to all the modules.

Self-study is not included in SEE

Prescribed Text Books:

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Higher Engineering Mathematics	Dr. B. S. Grewal	44	Khanna	2016
2.	Advanced Engineering Mathematics	Erwin Kreyszig	8	Wiley India Pvt. Ltd	2004
3.	Calculus	Thomas Finney	9	Thomas Finney	2002

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
01	Numerical methods	R K. Jain and S. R. K. Jain & S. R. K	6	New age international pvt	2014
02	A textbook of Engineering Mathematics	N.P. Bali and Manish Goyal	6	Laxmi	2010

E Books and online course materials:

1. https://www.geneseo.edu/~aguilar/public/assets/courses/233/main_notes.pdf

Online Courses and Video Lectures:

1. https://www.coursera.org/learn/introduction-to-linear-algebra
2. https://archive.nptel.ac.in/courses/111/106/111106135/

Teaching - Learning – Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Integrated Lab Component	-	-	-
3	Student Study Hours – Self Learning	1	14	14
3	Activity Based Learning (ABL1 & ABL2)	-	-	27
4	Evaluation of Learning Process	-	-	07
Total Learning Hours / Semester				**90**

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
CIE	Three CIEs conducted for 20 marks each and reduced to 10 marks	30
Activity Details	Details of activities to be conducted 7) Details of activity 1 8) Details of activity 2	20
Total		**50**

Activity Based Learning (27 Hours)

ABL 1 (14 Hours) : Activity 1 details		**Hours**
Writing Assignment with Problems on concerned to real world applications.	Submission of the final assignment report and evaluation. (Questions of Blooms level L3 and Higher)	14
Total		**14**
ABL 2 (13 Hours): Activity 2 details		
Problem Solving Assignment	Understand the input data requirements	1
	Formulate the methodology	4
	Design the solution	4

	Solving the problem and submission	4
Total		**13**

Evaluation of Learning Process (7 Hours)

Type of Evaluation	**Hours**
Test (1, 2 and 3)	3
Activity (1 and 2)	1
Semester End Exam	3
Total	**7**

Course Articulation Matrix

Course Outcomes	**Program Outcomes [POs]**												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	-											
CO2	3	2											
CO3	3	-											
CO4	3	2											

Course Title	**Mathematics-III for Electrical and Electronics Engineering**		
Course Code	24MAEE301	**(L-T-P) C**	**(3-1-0) 3**
Exam	3 hours	**Hours/Week**	**03**
SEE	50 marks	**Total Hours**	**42L + 48ABL = 90**

Course Objective: To introduce linear algebra and transform calculus which may be employed as tools in solving engineering application problems.

Course Outcomes (COs): Upon completion of the course, students shall be able to:

No.	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Analyze the engineering problems using concepts of linear algebra.	PO1	-
2.	Apply the Fourier Transform to interpret continuous and discrete-time signals to solve engineering problems.	PO1, PO2	-
3.	Represent the function/experimental data in terms of a Fourier series and to solve the problems.	PO1	-
4.	Solve Z - transforms of the given function and gain the capability to find solutions of difference equations.	PO1, PO2	-

Course Contents:

Module 1	**10 Hours**

Linear Algebra: Importance of Matrices in engineering. Rank of a matrix. Consistency of non-homogeneous and homogeneous system of equations, Solution of the system of linear equations by Gauss elimination method and Gauss – Seidel iterative method.

Eigen values and Eigenvectors, properties, Illustrative examples. Stability analysis of differential equations which governs the dynamical systems using the concept of Eigen value &eigenvectors.

Applications of solution of system of equations: circuit flow problem.

Self-Study- linear transformation.

Module 2	10 Hours
Fourier Transform: Introduction, Fourier Integral, Infinite Fourier transform, Properties of Fourier transform (Linearity, Change of Scale, Shifting), Evaluation of Complex Fourier transform, Fourier sine & Fourier cosine transforms. **Inverse Fourier Transforms** Inverse complex Fourier transform, Inverse sine & Cosine transforms, Properties. **Application:** Applications of Fourier transforms in Electrical & Electronics engineering. **Self-Study**- Fast Fourier transforms.	
Module 3	**10 Hours**
Fourier Series: Introduction, Periodic function, Periodic functions and their graphical representation, Trigonometric series, Fourier series of Odd & Even functions, to find Fourier series by change of interval method, to represent the experimental data as a Fourier series using the method - Practical harmonic analysis. **Application of Fourier series in engineering**-To represent the signal (wave form) in terms of Fourier series, Fourier series representation for the excitation described by the wave form, graphs of Fourier series approximating the given function. **Self-Study**- Half range series method.	
MODULE - 4	**12 Hrs.**
Z-Transforms: Introduction to Z-transforms,Definition and property , Z-transforms of some standard functions, Standard forms, properties, Linearity property, Damping rule, Shifting rule, Initial value theorem, Final value theorem. – Problems. **Application** -Application to deflection of a loaded string. **Self-Study-** Inverse Z transforms, Solution of Difference equations using Z Transforms.	

Note– Theorems and properties without proof. Applicable to all the modules.

Self-study is not included in SEE.

Prescribed Text Books:

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Linear Algebra and its Applications	David C. Lay, Steven R. Lay and J.J. Mc Donald	5 ISBN-10:9350517698	Pearson Education Ltd	2015

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Advanced Engineering Mathematics	E. Kreyszig	10	Wiley	2015
2.	Linear Algebra and its Applications	Gilbert Strang	4	Cenage publications	2014

E Books and online course materials:

1. https://www.geneseo.edu/~aguilar/public/assets/courses/233/main_notes.pdf

Online Courses and Video Lectures:

1. https://www.coursera.org/learn/introduction-to-linear-algebra
2. https://www.coursera.org/specializations/linear-algebra-elementary-to-advanced
3. https://archive.nptel.ac.in/courses/111/106/111106135/

Teaching - Learning – Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/	No. of Weeks	Hours/ Semester

		Week		
1	Class Room Teaching & Learning	3	14	42
2	Integrated Lab Component	-	-	-
3	Student Study Hours – Self Learning	1	14	14
3	Activity Based Learning (ABL1 & ABL2)	-	-	27
4	Evaluation of Learning Process	-	-	07
Total Learning Hours / Semester				**90**

Proposed Assessment Plan (for 50 marks of CIE):

Tool	**Remarks**	**Marks**
CIE	Three CIEs conducted for 20 marks each and reduced to 10 marks	30
Activity Details	Details of activities to be conducted 9) Details of activity 1 10) Details of activity 2	20
Total		**50**

Activity Based Learning (27 Hours)

ABL 1 (14 Hours) : Activity 1 details		**Hours**
Writing Assignment with Problems on concerned to real world applications.	Submission of the final assignment report and evaluation. (Questions of Blooms level L3 and Higher)	14
Total		**14**
ABL 2 (13 Hours): Activity 2 details		
Problem Solving Assignment	Understand the input data requirements	1
	Formulate the methodology	4
	Design the solution	4
	Solving the problem and submission	4

Total		**13**

Evaluation of Learning Process (7 Hours)

Type of Evaluation	**Hours**
Test (1, 2 and 3)	3
Activity (1 and 2)	1
Semester End Exam	3
Total	**7**

Course Articulation Matrix

Course Outcomes	**Program Outcomes [POs]**												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	-											
CO2	3	2											
CO3	3	-											
CO4	3	2											

Course Title	Bridge Course for Diploma Students **BRIDGE COURSE MATHEMATICS - I** **(Common to all Branches of Engineering)** **(Audit Course)**		
Course Code	**24BCM301**	**L-T-P**	**(3-0-0)**
Exam	**3 Hrs.**	**Hours/Week**	**3**
CIE	**50 Marks**	**Total Hours**	**42**

Course Objective: Students will be able to use appropriate data structures for solving problems.

Course Outcomes: At the end of course, student will be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Solve simple problems on determinants, matrix multiplication, partial differentiation, and integration.	1	-
2	Compute the roots of transcendental equations and interpolate when the experimental data is given.	1	-
3	Expand the given function in terms of Taylor/ Macluarin's series	1	-

MODULE-1	**10 Hrs.**

Basic Formulas: Partial fractions. Matrices and determinants: matrix multiplication, evaluation of determinants, finding inverse.

Differentiation-I: Review of limit and Continuity, differentiation- Basic formulas, Sum rule, product rule, quotient rule, chain rule and problems.

Differentiation-II: Taylor's series, and Macluarin's series of simple functions for single variable, simple problems.

MODULE-2	**10 Hrs.**

Partial Differentiation: Definition, Illustrative examples on Partial differentiation, Total differentiation, chain rule, Differentiation of composite and implicit functions, Jacobians, illustrative examples and problems, simple problems.	
MODULE-3	**10 Hrs.**
Integration: Basic formulas, Illustrative examples, evaluation of definite integrals, Integration by parts, Bernoulli's rule of Integration. **Integral calculus**: Reduction formula for functions $sin^n x$, $cos^n x$(without proof), Simple problems, Double & triple integration, simple problems with standard limits.	
MODULE-4	**12 Hrs.**
Numerical Methods - Numerical Solution of algebraic & transcendental equations by Bisection method, Newton Raphson method, Regular Falsi method. **Numerical Interpolation**-Definition of forward, backward differences, Newton's forward and backward interpolation formulae, Lagrange's interpolation formula.	

Prescribed Text Books:

Sl.No	BookTitle	Authors	Edition	Publisher	Year
01	Higher Engineering Mathematics	Dr.B.S.Grewal	40th edition	Khanna Publications	2007
02	Advanced Engineering Mathematics	Erwin Kreyszig	8th edition	TataMcGrawHill, Publications	2007

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
01	Calculus	Thomas Finney	9th edition	Pearson education	2002

02	A text book of Engineering Mathematics	N.P. Baliand Manish Goyal	Reprint	Laxmi Publications	2010

Teaching - Learning - Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	12	36
2	Integrated Lab Component	0	0	00
3	Student Study Hours - Self Learning	2	1	2
3	Activity Based Learning (ABL1 & ABL2)	-	-	-
4	Evaluation of Learning Process	-	-	04
Total Learning Hours/Semester				**42**

Proposed Assessment Plan (for 50marks of CIE):

Tool	Remarks	Marks
CIE	Two CIEs conducted for 50 marks each and reduced to 50 marks	50
Total		**50**

Evaluation of Learning Process (4Hours)

Type of Evaluation	Hours
Test (1, 2 and 3)	3
Activity (1 and 2)	1
Semester End Exam	3
Total	**7**

Course Articulation Matrix

Course Outcomes	Program Outcomes												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	1												
CO2	1												
CO3	1												