COURSE HANDOUT

ENGINEERING MATHEMATICS (BSC-101)

ECE-1st SEMESTER

ACADEMIC YEAR (2024-25)

Dr. Sooraj Singh

Assistant Professor

Department of Electronics and Communication Engineering

Department of Electronics and Communication Engineering

Model Institute of Engineering & Technology (Autonomous)

Kot Bhalwal, Jammu - 181122

www.mietjmu.in

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
BSC-101	Engineering Mathematics	BSC	**5**	**3**	**2**	0	50	100	150

COURSE OUTCOMES

At the end of the course the student will be able to:	
CO1	Apply the knowledge of calculus to plot graphs of functions and solve the problem of maxima and minima..
CO2	Determine the convergence/divergence of infinite series, approximation of functions using power and Taylor's series expansion and error estimation.
CO3	Apply the concept of definite integrals to calculate area under the curves.
CO4	Understand and apply the concepts of matrices
CO5	Demonstrate knowledge of vector space by solving associated problems

Section A

UNIT 1: Differential Calculus– I: Leibnitz theorem (without proof), Partial differentiation, Euler's theorem on homogeneous functions, Asymptotes, Double points, curvature, Curve tracing in Cartesian, polar and parametric forms**. (11 HRS)**

UNIT 2: Differential Calculus – II: Rolle's Theorem, Mean value Theorem**,** Taylor's and Maclaurin's series with remainder , indeterminant forms, Taylor series in two variables, Maxima and Minima of functions of two variables, method of Lagrange's multipliers. **(11 HRS)**

UNIT 3: Integral Calculus: Definite integrals with important properties, differentiation under the integral sign, Gamma, Beta and error functions with simple problems, applications of definite integrals to find length, area, volume and surface area of revolutions, transformation of coordinates, double and triple integrals with simple problems. **(10 HRS)**

Section B

Unit 4:Matrices: Matrices, vectors: addition and scalar multiplication, matrix Multiplication, Linear systems of equations, linear Independence, rank of a matrix, determinants, Cramer's Rule, inverse of a matrix, Gauss elimination and Gauss Jordan elimination. **(15 HRS)**

Unit 5: Vector Space, linear dependence of vectors, basis, dimension, Linear Transformations, range and kernel of a linear map, rank and nullity, Inverse of a linear transformation, rank nullity theorem , composition of linear maps, Eigen values, eigenvectors, symmetric, skew-symmetric, and orthogonal matrices, Eigen bases. **(10 HRS)**

Textbooks

S.No	Name of the Books	Name of the Author	Publisher Name	Edition (Pub.Yr.)
1	Engineering Mathematics	Dr. B. S. Grewal	Khanna Publications	43rd (2017)
2.	Calculus and Analytic Geometry	Thomas and Finney	Addision Weslay, Narosa	1st (2010)
3	Engineering Mathematics	N.P Bali	Laxmi publications	13th (2016)

Reference Books

S.No	Name of the Books	Name of the Author	Publisher Name	Edition (Pub.Yr.)
1	Advanced Engineering Mathematics	Sharma, Pratibha Mishra	Bhavya Books	2nd (2019)
2	Integral Calculus	S. Narayan	S. Chand, New Delhi	35th (2005)

COURSE PLAN		
Unit-I DIFFERENTIAL CALCULUS I		
S.No	**Topics**	**Recommended Books**
1	Leibnitz theorem	Book 1, Ch.1
2	Partial differentiation	Book 1, Ch.1
3	Euler's theorem on homogeneous functions	Book 1, Ch.1
4	Asymptotes	Book 1, Ch.2
5	Double points	Book 1, Ch.2
6	Curvature	Book 1, Ch.2
7	Curve tracing in Cartesian, polar and parametric forms.	Book 1, Ch.2
Unit-II DIFFERENTIAL CALCULUS II		

8	Rolle's Theorem, Mean value Theorem	Book 2, Ch.3
9	Taylor's and Maclaurin's series with remainder	Book 2, Ch.3
10	In-determinant forms	Book 2, Ch.3
11	Taylor series in two variables	Book 2, Ch.3
12	Maxima and Minima of functions of two variables	Book 2, Ch.3
13	Method of Lagrange's multipliers	Book 2, Ch.3
	Unit-III INTEGRAL CALCULUS	
14	Definite integrals with important properties	Book 3, Ch.4
15	Differentiation under the integral sign	Book 3, Ch.4
16	Gamma Function with problems	Book 3, Ch.4
17	Beta Function with problems	Book 3, Ch.4
18	Applications of definite integrals to find length, area, volume and surface area of revolutions	Book 3, Ch.4
19	Transformation of coordinates	Book 3, Ch.4
20	Double and triple integrals with simple problems	Book 3, Ch.4
21	Definite integrals with important properties	Book 3, Ch.4
	Unit-IV MATRICES	
22	Matrices	Book 3, Ch.5
23	Vectors: addition and scalar multiplication	Book 3, Ch.5
24	Matrix multiplication	Book 3, Ch.5
25	Linear systems of equations	Book 3, Ch.5
26	Linear Independence	Book 3, Ch.5
27	Rank of a matrix	Book 3, Ch.5
28	Determinants and Cramer's Rule	Book 3, Ch.5
29	Inverse of a matrix	Book 3, Ch.5
30	Gauss elimination	Book 3, Ch.5

31	Gauss Jordan elimination	Book 3, Ch.5
	Unit-V VECTOR SPACE	
32	Linear dependence of vectors	Book 3, Ch.7
33	Basis and dimension	Book 3, Ch.7
34	Linear transformations	Book 3, Ch.7
35	Range and kernel of a linear map	Book 3, Ch.7
36	Rank and nullity	Book 3, Ch.7
37	Inverse of a linear transformation	Book 3, Ch.8
38	Rank nullity theorem	Book 3, Ch.8
39	Composition of linear maps	Book 3, Ch.8
40	Eigen values and Eigen vectors	Book 3, Ch.8
41	Symmetric and Skew symmetric and Orthogonal matrices	Book 3, Ch.8
42	Eigenbases	Book 3, Ch.8

ADDITIONAL WEB RESOURCES

1.	On **partial differentiation** by Prof S. K. Gupta IIT Rookre**.** https://nptel.ac.in/courses/111107108/5
2.	On **differential equation** by Prof. Dr. Srinivasa Rao Manam (Deptt of mathematics) IIT Madras Chennai. https://nptel.ac.in/courses/111106100/4

GRADING AND ASSESSMENT

- **Sessional Test**: 20 marks
- **Assignment**: 20 marks
- **Attendance**: 10 marks
- **Final Examination**: 100 marks

COURSE POLICIES

- **Attendance**: Minimum 75% attendance is mandatory to appear in the final examination of the course.
- **Academic Integrity**: MIET's academic integrity policies apply. Plagiarism will not be tolerated.
- **Late Submissions**: Assignments and projects must be submitted by the specified timelines.

FACULTY INFORMATION

- **Office Hours**

  Monday (12:05 PM - 12:55 PM)
  Friday (12:05 PM - 12:55 PM)

- **Contact Information**
  sooraj.ash@mietjammu.in