



ARSD College, University of Delhi

Model Course Handout/Lesson Plan

Course Name : B.Sc. (P) Electronics						
Semester	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
I		CALCULUS AND MATRICES	5	1		6
Teacher/Instructor(s)		MONU KUMAR				
Session		2021				

Course Objective: The primary objective of this course is to gain proficiency in differential calculus, and introduce the basic tools of matrices and complex numbers which are used to solve application problems in a variety of settings ranging from chemistry and physics to business and economics. Differential calculus develops the concepts of limit, continuity and derivative, and is fundamental for many fields of mathematics

Course Learning Outcomes:

This course will enable the students to:

- i) Define and use fundamental concepts of calculus including limits, continuity and differentiability
- ii) Solve systems of linear equations and find eigenvalues and corresponding eigenvectors for a square matrix, and check for its diagonalizability.
- iii) Perform operations with various forms of complex numbers to solve equations

Lesson Plan:

Unit No.	Learning Objective	Lecture No.	Topics to be covered
1.		1-2	Graphs of simple basic functions such as: Polynomial, Trigonometric, Inverse trigonometric.
		3-5	Exponential and Logarithmic functions
		6-9	Limits and continuity of a function including ϵ - δ approach,
		10-15	Properties of continuous functions including Intermediate value theorem
		16-17	Differentiability, Successive differentiation,
		18-20	Leibnitz theorem, Recursion formulae for higher derivatives
		21-22	Rolle's theorem, Lagrange's mean value theorem with geometrical interpretations and simple applications, 2
		23-25	Taylor's theorem, Taylor's series and McLaurin's series, McLaurin's expansion of functions and their use in polynomial approximation and error estimation
		26	Functions of two or more variables
27-30	Graphs and level curves of functions of two variables, Partial differentiation up to second order		
2		31	Elementary row operations
		32-33	Row reduction and echelon forms
		34-37	Solution of systems of linear equations in matrix form.
		38-40	Linear independence and dependence, Rank of a matrix and applications
		41-42	Elementary linear transformations
		43-45	Linear transformation like shear, translation, dilation, rotation, reflection,
		46-47	and their matrix form
		48-50	Matrix of a general linear transformation
3-		51-55	Eigenvectors & Eigen values of square matrices up to order 3 and Diagonalization.
			Geometrical representation of addition, subtraction
		56-58	multiplication and division of complex numbers
		58-61	Lines, Circles, Discs in terms of complex variables
		1-65	Statement of the Fundamental Theorem of Algebra and its consequences
		66-70	De Moivre's theorem and its application to solve simple equations in complex variables

Evaluation Scheme:

No.	Component	Duration	Marks
1.	Internal Assessment		25
	• Quiz		
	• Class Test		
	• Attendance		
	• Assignment		
2.	End Semester Examination	3 hr	75

Details of the Course		
Unit	Contents	Contact Hours
1	Graphs of simple basic functions such as: Polynomial, Trigonometric, Inverse trigonometric, Exponential and Logarithmic functions; Limits and continuity of a function including ϵ δ – approach, Properties of continuous functions including Intermediate value theorem; Differentiability, Successive differentiation, Leibnitz theorem, Recursion formulae for higher derivatives; Rolle’s theorem, Lagrange’s mean value theorem with geometrical interpretations and simple applications, Taylor’s theorem, Taylor’s series and Maclaurin’s series, Maclaurin’s series expansion of functions and their use in polynomial approximation and error estimation; Functions of two or more variables, Graphs and level curves of functions of two variables, Partial differentiation up to second order	25
2	Elementary row operations, Row reduction and echelon forms, Solution of systems of linear equations in matrix form, Linear independence and dependence, Rank of a matrix and applications; Elementary linear transformations like shear, translation, dilation, rotation, reflection, and their matrix form, Matrix of a general linear transformation; Eigenvectors and eigenvalues of square matrices up to order 3 and diagonalization	20
3	Geometrical representation of addition, subtraction, multiplication and division of complex numbers; Lines, circles, and discs in terms of complex variables; Statement of the Fundamental Theorem of Algebra and its consequences; De Moivre’s theorem and its application to solve simple equations in complex variables.	25
	Total	70
Suggested Books:		
Sl. No.	Name of Authors/Books/Publishers	Year of Publication/Reprint
1-	Andreescu, Titu & Andrica Dorin. Complex numbers from A to...Z. (2nd ed.). Birkhäuser..	2014.
2-	Anton, Howard, Bivens, Irl, & Davis, Stephen. Calculus (10th ed.). John Wiley & Sons Singapore Pvt. Ltd. Reprint by Wiley India Pvt. Ltd. Delhi.	2013, 2016
3-	Kolman, Bernard, & Hill, David R. Introductory Linear Algebra with Applications (7th ed.). Pearson Education, Delhi. First Indian Reprint.	2001, 2003

4-	Lay, David C., Lay, Steven, R., & McDonald Judi, J. Linear Algebra and its Applications (5th ed.). Pearson	2016.
5-	Thomas, Jr. George B., Weir, Maurice D., & Hass, Joel Thomas' Calculus (13th ed.). Pearson Education, Delhi. Indian Reprint	2014, 2017.
Mode of Evaluation:		Internal Assessment / End Semester Exam