



ARSD College, University of Delhi

Lesson Plan

Course Name : B.SC(PROGRAM) CS 1 ST YEAR						
Semester	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
1		CALCULUS & MATRIX	2			6
Teacher/Instructor(s)		ANUJ KUMAR				
Session		(JULY - DEC) 2021				

Course Objective

Course Objectives: 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:

- Define and use fundamental concepts of calculus including limits, continuity and differentiability.
- Perform operations with various forms of complex numbers to solve equations.

Teaching Plan (Paper I: Calculus and Matrices):

Week 1: Graphs of simple basic functions such as: Polynomial, Trigonometric, Inverse trigonometric, Exponential and logarithmic functions. [5] Sections 1.1, 1.2, 1.3, 7.2, 7.3, and 7.6.

Weeks 2 and 3: Limits and continuity of a function including – approach, Properties of continuous functions including Intermediate value theorem. [2] Chapter 1.

Week 4: Differentiability, Successive differentiation, Leibnitz theorem, Recursion formulae for higher derivatives. [5] Chapter 3 (Sections 3.2, 3.3, and 3.6), and Exercise 26, Page 184.

Week 5 & 6: 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 expansion of functions such as e^x , $\sin x$, $\cos x$, $\log(1+x)$ and $(1+x)^n$; their use in polynomial approximation and error estimation. [5] Chapter 4 (Sections 4.2, and 4.3). [2] Chapter 9 (Sections 9.8, and 9.9).

Week 7 & 9: Functions of two or more variables, Graphs and level curves of functions of two variables, Partial differentiation up to second order. [2] Chapter 13 (Sections 13.1, and 13.3).

Weeks 10 to 14: Geometrical representation of addition, subtraction, multiplication and division of complex numbers; Lines, Circles, 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. [5] Appendix A.7. [1] Sections 1.2, 2.1.2, 2.1.3, 2.1.4, 2.2.3, 3.5.1, 3.5.2, and 3.6.1.

References: 1. Andreescu, Titu & Andrica Dorin. (2014). Complex umbers from A to...Z. (2nd ed.). Birkhäuser. 2. Anton, Howard, Bivens, Irl, & Davis, Stephen (2013). Calculus (10th ed.). John Wiley & Sons Singapore Pvt. Ltd. Reprint (2016) by Wiley India Pvt. Ltd. Delhi. Department of Mathematics, University of Delhi 6 3. Kolman, Bernard, & Hill, David R. (2001). Introductory Linear Algebra with Applications (7th ed.). Pearson Education, Delhi. First Indian Reprint 2003. 4. Lay, David C., Lay, Steven, R., & McDonald Judi, J. (2016). Linear Algebra and its Applications (5th ed.). Pearson. 5. Thomas, Jr. George B., Weir, Maurice D., & Hass, Joel (2014). Thomas' Calculus (13th ed.). Pearson Education, Delhi. Indian Reprint 2017.

Additional Reading: i. Prasad, Gorakh (2016). Differential Calculus (19th ed.). Pothishala Pvt. Ltd. Allahabad.

[Facilitating the Achievement of Course Learning Outcomes]

Teaching and Learning Activity.

- (1) Topics to be explained with illustrations.
- (2) Students to be given homework/assignments.
- (3) Students to be encouraged to look for new applications.

Assessment Tasks

- Presentations and class discussions.
- Assignments and class tests.
- Mid-term examinations.
- Practical examinations.
- End-term examinations.

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