

MOHAMMED SATHAK A J COLLEGE OF ENGINEERING

Siruseri IT park, OMR, Chennai - 603103

LESSON PLAN**Department of Science and Humanities**

Name of the Subject	MATRICES AND CALCULUS	Name of the handling Faculty	Mrs.D.VIMALA
Subject Code	MA3151	Year / Sem	I/I
Acad Year	2021-2022	Batch	2021-2025

Course Objective

To develop the use of Matrix algebra techniques that are needed by engineers for practical applications.

To familiarize the students with differential calculus.

To familiarize the student with functions of several variables. This is needed in many branches of engineering.

To make the students understand various techniques of integration.

To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.

Course Outcome

Use the matrix algebra methods for solving practical problems.

Apply differential calculus tools in solving various application problems.

Able to use differential calculus ideas on several variable functions.

Apply different methods of integration in solving practical problems.

Apply multiple integral ideas in solving areas, volumes and other practical problems.

Lesson Plan

Sl. No.	Topic(s)	T / R*	Periods Required	Mode of Teaching (BB / PPT / NPTEL / MOOC / etc	Blooms Level (L1-L6)	CO	PO
		Book					
UNIT I MATRICES							
1	Eigenvalue and Eigenvectors of real matrix	T1	1	PPT/BB	L1,L2	CO1	PO1,PO3
2	Find the characteristic equation and properties of eigenvalues and eigenvectors	T1	1	PPT/BB	L2,L4	CO1	PO1,PO3

3	Statement and applications of cayley-Hamilton Theorem	T1	1	PPT/BB	L1,L4	CO1	PO1,PO3
4	Diagonalization of matrices by orthogonal transformation	T1	1	PPT/BB	L1,L2	CO1	PO1,PO3
5	Diagonalization of matrices by orthogonal transformation	T1	1	PPT/BB	L1,L2	CO1	PO1,PO3
6	Reduction of a quadratic form to canonical form by orthogonal transformation	T1	1	PPT/BB	L1,L2	CO1	PO1,PO3
7	Reduction of a quadratic form to canonical form by orthogonal transformation	T1	1	PPT/BB	L2,L4	CO1	PO1,PO3
8	Nature of quadratic forms	T1	1	PPT/BB	L1	CO1	PO1,PO3
9	Applications: stretching of an elastic membrane	T1	1	PPT/BB	L1,L2	CO1	PO1,PO3
10	Applications: stretching of an elastic membrane	R1	1	PPT/BB	L3	CO1	PO1,PO3
11	Tutorial	R1	1	PPT/BB	L3	CO1	PO1,PO3
12	Tutorial	R1	1	PPT/BB	L3	CO1	PO1,PO3

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any

Evaluation method :Assignment -1 given compare these topics with real time applications

UNIT II DIFFERENTIAL CALCULUS

13	Representation of functions	T1	1	PPT/BB	L1,L2	CO2	PO1,PO3
14	Limit of a function	T1	1	PPT/BB	L2,L4	CO2	PO1,PO3
15	Continuity	T1	1	PPT/BB	L1,L4	CO2	PO1,PO3
16	Continuity	T1	1	PPT/BB	L1,L2	CO2	PO1,PO3
17	Derivatives-Problems	T1	1	PPT/BB	L1,L2	CO2	PO1,PO3
18	Differentiation rules-Sum, Product, Quotient, Chain rules	T1	1	PPT/BB	L1,L2	CO2	PO1,PO3
19	Implicit differentiation	T1	1	PPT/BB	L2,L4	CO2	PO1,PO3

20	Logarithmic differentiation	T1	1	PPT/BB	L1	CO2	PO1,PO3
21	Applications-Maxima and Minima of functions of one variable.	T1	1	PPT/BB	L1,L2	CO2	PO1,PO3
22	Applications-Maxima and Minima of functions of one variable.	R1	1	PPT/BB	L3	CO2	PO1,PO3
23	Tutorial	R1	1	PPT/BB	L3	CO2	PO1,PO3
24	Tutorial	R1	1	PPT/BB	L3	CO2	PO1,PO3

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any

Evaluation method :Assignment -2 given compare these topics with real time applications

UNIT III		FUNCTIONS OF SEVERAL VARIABLES					
25	Partial differentiation	T1	1	PPT/BB	L1,L2	CO3	PO1,PO2, PO3
26	Homogeneous functions and Euler's theorem	T1	1	PPT/BB	L2,L4	CO3	PO1,PO2, PO3
27	Total derivative	T1	1	PPT/BB	L2	CO3	PO1,PO2, PO3
28	Change of variables	T1	1	PPT/BB	L1,L2,L4	CO3	PO1,PO2, PO3
29	Jacobians	T1	1	PPT/BB	L1,L2,L4	CO3	PO1,PO2, PO3
30	Partial differentiation of implicit functions	T1	1	PPT/BB	L1,L4	CO3	PO1,PO2, PO3
31	Taylor's series for functions of two variables	T1	1	PPT/BB	L2,L4	CO3	PO1,PO2, PO3
32	Application of maxima and minima of functions of two variables	T1	1	PPT/BB	L1	CO3	PO1,PO2, PO3
33	Lagrange's method of undetermined multipliers.	T1	1	PPT/BB	L1,L2,L4	CO3	PO1,PO2, PO3
34	Lagrange's method of undetermined multipliers.	R2	1	PPT/BB	L3	CO3	PO1,PO2, PO3
35	Tutorial	R2	1	PPT/BB	L3	CO3	PO1,PO2, PO3
36	Tutorial	R2	1	PPT/BB	L3	CO3	PO1,PO2, PO3

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any							
Evaluation method :Assignment -3 given compare these topics with real time applications							
UNIT IV INTEGRAL CALCULUS							
37	Definite and Indefinite integrals	T1	1	PPT/BB	L1	CO4	PO1,PO2
38	Substitution rule	T1	1	PPT/BB	L1,L4	CO4	PO1,PO2
39	Techniques of Integration	T1	1	PPT/BB	L1	CO4	PO1,PO2
40	Integration by parts	T1	1	PPT/BB	L1,L2	CO4	PO1,PO2
41	Trigonometric integrals	T1	1	PPT/BB	L2,L4	CO4	PO1,PO2
42	Trigonometric substitutions	T1	1	PPT/BB	L2,L4	CO4	PO1,PO2
43	Integration of rational functions by partial fraction	T1	1	PPT/BB	L2,L4	CO4	PO1,PO2
44	Integration of irrational functions	T1	1	PPT/BB	L2,L4	CO4	PO1,PO2
45	Improper integrals.	R1	1	PPT/BB	L1	CO4	PO1,PO2
46	Application of hydrostatic force and pressure, moments and centres of mass	R1	1	PPT/BB	L3	CO4	PO1,PO2
47	Tutorial	R1	1	PPT/BB	L3	CO4	PO1,PO2
48	Tutorial	R1	1	PPT/BB	L3	CO4	PO1,PO2
Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any							
Evaluation method :Assignment -4 given compare these topics with real time applications							
UNIT V MULTIPLE INTEGRALS							
49	Double integrals	T1	1	PPT/BB	L1,L2	CO5	PO1
50	Change of order of integration	T1	1	PPT/BB	L1,L2,L4	CO5	PO1
51	Double integrals in polar coordinates	T1	1	PPT/BB	L1,L4	CO5	PO1
52	Area enclosed by plane curves	T1	1	PPT/BB	L1,L4	CO5	PO1

53	Triple integrals	T1	1	PPT/BB	L1,L2	CO5	PO1
54	Volume of solids	T1	1	PPT/BB	L1,L2	CO5	PO1
55	Change of variables in double and triple integrals.	T1	1	PPT/BB	L1,L2	CO5	PO1
56	Change of variables in double and triple integrals.	T1	1	PPT/BB	L1,L2,L4	CO5	PO1
57	Application of moments and centres of mass, moment of inertia.	T1	1	PPT/BB	L1,L2	CO5	PO1
58	Application of moments and centres of mass, moment of inertia.	R2	1	PPT/BB	L3	CO5	PO1
59	Tutorial	R2	1	PPT/BB	L3	CO5	PO1
60	Tutorial	R2	1	PPT/BB	L3	CO5	PO1

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any

Evaluation method :Assignment -5 given compare these topics with real time applications

Content Beyond the Syllabus Planned

1	Go to nearest village collect the required data frame the problem use F-distribution and solve it.
2	

Text Books

1	Kreyszig.E, "Advanced Engineering Mathematics", John wiley and Sons, 10th Edition, New Delhi, 2016.
2	Grewal.B.s., " Higher Engineering Mathematics", Khanna Publisheres, New Delhi, 44th Edition, 2018.
3	James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 8th Edition, New Delhi, 2015. [For Units II & IV - Sections 1.1, 2.2, 2.3, 2.5, 2.7 (Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1 (Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].

Reference Books

1	Anton. H, Bivens. I and Davis. S, "Calculus", Wiley, 10th Edition, 2016
2	Bali. N., Goyal. M. and Watkins. C., “Advanced Engineering Mathematics”, Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.), New Delhi, 7th Edition, 2009.
3	Jain. R.K. and Iyengar. S.R.K., “Advanced Engineering Mathematics”, Narosa Publications, New Delhi, 5th Edition, 2016.

Justification for CO-PO mapping

CO1	Apply the ideas of limits, continuity and derivatives				
CO2	Analyze the ideas of partial differentiation.				
CO3	Understand definite and indefinite integral				
CO4	Evaluate and apply multiple integrals to find area and volume Situations.				
CO5	Identify and solve linear differential equations with constant coefficients				
3	High level	2	Moderate level	1	Low level
Name & Sign of Faculty Incharge :					
Name & Sign of Subject Expert :					
Head of the Department : Dr. S. RAJAKUMAR					

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