



ESTD : 2007

# Sri Indu Institute of Engineering and Technology (Autonomous)

(Formerly RVR Institute of Engineering & Technology )

**An Autonomous Institution Under UGC**

NAAC Accredited. Recognized Under 2(f) of UGC Act 1956

EAMCET CODE: INDI

Approved by AICTE, New Delhi, & Affiliated to JNTUH, Hyderabad.

JNTUH CODE: X3



## COURSE FILE

ON

## MATRICES & CALCULUS

**Course Code - MA101BS**

**I-B. Tech Semester-I**

**A.Y. 2022-2023**

**Prepared by**

**Mrs.V. SUJATHA**

**Assistant Professor**

Head of the Department  
Department of H&S  
SRI INDU INSTITUTE OF ENGG & TECH  
Sheriguda(VIII) Ibrahimpatnam (M) R.R. Dist-501 510

PRINCIPAL  
Sri Indu Institute of Engineering & Techno.  
Sheriguda(VIII), Ibrahimpatnam  
R.R. Dist. Telangana-501 510.



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## INSTITUTE VISION & MISSION

### Vision:

To become a premier institute of academic excellence by providing the world class education that transforms individuals into high intellectuals, by evolving them as empathetic and responsible citizens through continuous improvement.

### Mission:

- **IM1:** To offer outcome-based education and enhancement of technical and practical skills.
- **IM2:** To Continuous assess of teaching-learning process through institute- industry collaboration.
- **IM3:** To be a Centre of excellence for innovative and emerging fields in technology development with state-of-art facilities to faculty and students' fraternity.
- **IM4:** To Create an enterprising environment to ensure culture, ethics and social responsibility among the stakeholders.

  
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# SRI INDU INSTITUTE OF ENGINEERING AND TECHNOLOGY

(UGC AUTONOMOUS INSTITUTION)

Accredited by NAAC A+ Grade, Recognized under 2(f) of UGC Act 1956.

(Approved by AICTE, New Delhi and Affiliated to JNTUH, Hyderabad)

Khalsa Ibrahimpatnam, Sheriguda(V), Ibrahimpatnam(M), Ranga Reddy Dist., Telangana – 501510



## PROGRAM OUTCOMES

PO1. **ENGINEERING KNOWLEDGE:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. **PROBLEM ANALYSIS:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. **DESIGN/DEVELOPMENT OF SOLUTIONS:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. **CONDUCT INVESTIGATIONS OF COMPLEX PROBLEMS:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **MODERN TOOL USAGE:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. **THE ENGINEER AND SOCIETY:** Apply reasoning informed by the contextual knowledge to associate, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **ENVIRONMENT AND SUSTAINABILITY:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **ETHICS:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. **INDIVIDUAL AND TEAM WORK:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **COMMUNICATION:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, give and receive clear instructions.

PO11. **PROJECT MANAGEMENT AND FINANCE:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. **LIFE-LONG LEARNING:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

  
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Sheriguda(V) Ibrahimpatnam (M) R.R. Dist-501510

# SRI INDU INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. in COMPUTER SCIENCE AND ENGINEERING (IOT)

## COURSE STRUCTURE, I YEAR SYLLABUS (BR22 Regulations)

Applicable from Academic Year: 2022-23 Batch

### I Year I Semester

S. No.	Course Code	Course Title	L	T	P	Credits
1.	MA101BS	Matrices and Calculus	3	1	0	4
2.	AP102BS	Applied Physics	3	1	0	4
3.	CS102ES	C Programming for Engineers	3	0	0	3
4.	ME102ES	Engineering Workshop	0	1	3	2.5
5.	EN104HS	English for Skill Enhancement	2	0	0	2
6.	EC101ES	Elements of Electronics and Communication Engineering	0	0	2	1
7.	AP105BS	Applied Physics Laboratory	0	0	3	1.5
8.	EN107HS	English Language and Communication Skills Laboratory	0	0	2	1
9.	CS105ES	C Programming for Engineers Laboratory	0	0	2	1
10.	*MC101ES	Environmental Science	3	0	0	0
11.		Induction Programme				
		<b>Total</b>	<b>14</b>	<b>3</b>	<b>12</b>	<b>20</b>

### I Year II Semester

S. No.	Course Code	Course Title	L	T	P	Credits
1.	MA201BS	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2.	CH203BS	Engineering Chemistry	3	1	0	4
3.	ME201ES	Computer Aided Engineering Graphics	1	0	4	3
4.	EE201ES	Basic Electrical Engineering	2	0	0	2
5.	EC201ES	Electronic Devices and Circuits	2	0	0	2
6.	CS202ES	Applied Python Programming Laboratory	0	1	2	2
7.	CH206BS	Engineering Chemistry Laboratory	0	0	2	1
8.	EE202ES	Basic Electrical Engineering Laboratory	0	0	2	1
9.	EC202ES	Electronic Devices and Circuits Laboratory	0	0	2	1
		<b>Total</b>	<b>11</b>	<b>3</b>	<b>12</b>	<b>20</b>



# MATRICES AND CALCULUS

(Course Code: MA101BS)

B.Tech. I Year I Sem.

L T P C  
3 1 0 4

**Pre-requisites:** Mathematical Knowledge at pre-university level

**Course Objectives:** To learn

- Types of matrices and their properties.
- Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
- Concept of eigenvalues and eigenvectors and to reduce the quadratic form to canonical form
- Geometrical approach to the mean value theorems and their application to the mathematical problems
- Evaluation of surface areas and volumes of revolutions of curves.
- Evaluation of improper integrals using Beta and Gamma functions.
- Partial differentiation, concept of total derivative
- Finding maxima and minima of function of two and three variables.
- Evaluation of multiple integrals and their applications

**Course outcomes:** After learning the contents of this paper the student must be able to

- Write the matrix representation of a set of linear equations and to analyze the solution of the system of equations
- Find the Eigenvalues and Eigen vectors
- Reduce the quadratic form to canonical form using orthogonal transformations.
- Solve the applications on the mean value theorems.
- Evaluate the improper integrals using Beta and Gamma functions
- Find the extreme values of functions of two variables with/ without constraints.
- Evaluate the multiple integrals and apply the concept to find areas, volumes

## UNIT - I: Matrices

10 L

Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Gauss Seidel Iteration Method.

## UNIT - II: Eigen values and Eigen vectors

10 L

Linear Transformation and Orthogonal Transformation: Eigenvalues, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

**UNIT - III: Calculus****10 L**

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean Value Theorem, Taylor's Series.

Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates), Definition of Improper Integral: Beta and Gamma functions and their applications.

**UNIT - IV: Multivariable Calculus (Partial Differentiation and applications)****10 L**

Definitions of Limit and continuity.

Partial Differentiation: Euler's Theorem, Total derivative, Jacobian, Functional dependence & independence. Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

**UNIT-V: Multivariable Calculus (Integration)****8 L**

Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form), Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals.

Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals).

**TEXT BOOKS:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2016.

**REFERENCE BOOKS:**

1. Erwin kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9<sup>th</sup> Edition, Pearson, Reprint, 2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.



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**Course: Matrices and Calculus(C111)**

**Class: I-B. TECH CSE-IOT**

**Course Outcomes**

After completing this course, the student will be able to:

C111.1: Write the matrix form of linear system of equations and test the consistency of the given system. (Analyzing)

C111.2: Reduce the quadratic form to canonical form using orthogonal transformations. (Applying)

C111.3: Solve the applications on the mean value theorems and expand Taylor's series. (Creating)

C111.4 : Evaluate the improper integrals using Beta and Gamma functions.(Evaluating)

C111.5 : Find the Maxima and Minima of functions of two variables and three variables.(Remembering)

C111.6 : Compare the difference between double integrals and triple integrals in cartesian and polar Coordinates. (Understanding)



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## CO's Mapping with PO/PSO

### Mapping of course outcomes with program outcomes:

High -3      Medium -2      Low-1

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C111.1	3	2	-	1	1	-	-	-	-	-	-	1
C111.2	3	2	-	1	1	-	-	-	-	-	-	1
C111.3	2	2	-	1	1	-	-	-	-	-	-	1
C111.4	2	3	-	1	1	-	-	-	-	-	-	2
C111.5	3	2	-	1	1	-	-	-	-	-	-	2
C111.6	3	2	-	1	1	-	-	-	-	-	-	2
C111	2.6	2.16	-	1	1	-	-	-	-	-	-	1.5

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## CO-PO mapping Justification

**PO1. ENGINEERING KNOWLEDGE:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**PO2.PROBLEM ANALYSIS:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PO4. CONDUCT INVESTIGATIONS OF COMPLEX PROBLEMS:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO5. MODERN TOOL USAGE:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

**PO12. LIFE-LONG LEARNING:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

C111.1 : Write the matrix form of linear system of equations and test the consistency of the given system.(Analyzing)

	<b>Justification</b>
<b>PO1</b>	Student construct the matrix representation using system of linear equations (level 3)
<b>PO2</b>	Student analyze the linear equations in several variables (level 2)
<b>PO4</b>	Student can use different matrix methods to get solution (level 1)
<b>PO5</b>	Student apply numerical techniques to solve linear system. (level 1)
<b>PO12</b>	Student can recognize importance of consistent concepts in linear system of equations. (level 1)

C111.2 : Reduce the quadratic form to canonical form using orthogonal transformations.(Applying)

	<b>Justification</b>
<b>PO1</b>	Student get the knowledge of diagonalization on finding eigen values and eigen vectors (level 3)
<b>PO2</b>	Student can identify normalization of vectors to get modal matrix in orthogonal transformation (level 2)
<b>PO4</b>	Student can use knowledge of eigen values and eigen vectors in diagonalizing the matrix (level 1)
<b>PO5</b>	Student apply techniques of diagonalization to say nature of quadratic form. (level 1)
<b>PO12</b>	Student can recognize step by step procedure in orthogonal transformation. (level 1)

C111.3 : Solve the applications on the mean value theorems and expand Taylor's series.(Creating)

	<b>Justification</b>
<b>PO1</b>	Student get the knowledge of continuous and derivable when using Mean value theorems(level 3)
<b>PO 2</b>	Student can compare the difference between Taylor's series and Maclaurin's series (level 2)
<b>PO4</b>	Student can use mean value theorems after satisfying continuity and differentiability of the given functions in the given intervals(level 1)
<b>PO5</b>	Student apply Maclaurin's series for the given function when is at origin.(level 1)
<b>PO12</b>	Student can recognize importance of mean value theorems(level 1)

C111.4 Evaluate the improper integrals using Beta and Gamma functions.(Evaluating)

	<b>Justification</b>
<b>PO1</b>	Student get the knowledge of Beta and Gamma functions.(level3)
<b>PO2</b>	Student can explain the concept of improper integrals using Beta and Gamma functions.(level2)
<b>PO4</b>	Student can use techniques of Beta functions can find exact value of integral function.(level 1)
<b>PO5</b>	Student apply formula of Beta and Gamma functions.(level 1)
<b>PO12</b>	Student can recognize importance of calculus formulas in Beta and Gamma functions. (level 1)

C111.5 : Find the Maxima and Minima of functions of two variables and three variables.(Remembering)

	<b>Justification</b>
<b>PO1</b>	Student get the knowledge to finding maxima and minima of functions(level3)
<b>PO2</b>	Student can differentiate the functions of two variables and three variables in finding maxima and minima of functions (level2)
<b>PO4</b>	Student can analyze the steps involving in functions of two variables and three variables. (level 1)
<b>PO5</b>	Student apply mean value theorems in the form of geometrical interpretation. (level 1)
<b>PO12</b>	Student can recognize importance of differentiation for finding Jacobian of two and three variables (level 1)

C111.6 : Compare the difference between double integrals and triple integrals in cartesian and polar coordinates(Understanding)

	<b>Justification</b>
<b>PO1</b>	Student get the knowledge to finding double and triple integrals.(level 3)
<b>PO2</b>	Student can differentiate integration in double and triple integrals(level 2)
<b>PO4</b>	Student can analyze the steps involving in cartesian and polar form for multiple integrals(level 1)
<b>PO5</b>	Student apply areas and volume concepts in double and triple integrals(level 1)
<b>PO12</b>	Student can recognize importance of multiple integrals in spherical and polar forms(level 1)



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<https://siiet.ac.in/>

Lr. No. SIET/BR22/Academic Calendar/2022/02

Date: 15.12.2022

## REVISED ACADEMIC CALENDAR I.B.TECH FOR THE ACADEMIC YEAR 2022-23 (BR22-REGULATIONS)

Dr. I. Satyanarayana,  
Principal.

**X3**

To,  
All the HOD's  
Sir,

Sub: SIET (Autonomous)–Academic & Evaluation–Revised Academic Calendar for **I.B.Tech - I & II Semesters** for the academic year 2022-2023-Reg.

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The approved Academic Calendar for **I.B.Tech – I & II Semesters** for the academic year 2022-23 is given below.

### **I-SEMESTER**

S. NO	Description	Period		Duration
		From	To	
1.	Commencement of I Semester class work (including Induction programme)	03.11.2022		
2.	1 <sup>st</sup> Spell of Instructions	03.11.2022	28.12.2022	8 Weeks
3.	I Mid Examinations	29.12.2022	04.01.2023	1 Week
4.	Submission of First Mid Term Exam Marks to the Autonomous Section on or before	10.01.2023		
5.	2 <sup>nd</sup> Spell of Instructions	05.01.2023	02.03.2023	8 Weeks
6.	Second Mid Term Examinations	03.03.2023	09.03.2023	1 Week
7.	Preparation & Practical Examinations	10.03.2023	16.03.2023	1 Week
8.	Submission of Second Mid Term Exam Marks to the Autonomous Section on or before	16.03.2023		
9.	I Semester End Examinations	17.03.2023	01.04.2023	2 Weeks

### **II-SEMESTER**

S. NO	Description	Period		Duration
		From	To	
1.	Commencement of II Semester class work	03.04.2023		
2.	1 <sup>st</sup> Spell of Instructions (including Summer Vacation)	03.04.2023	10.06.2023	10 Weeks
	Summer Vacation	15.05.2023	27.05.2023	2 Weeks
3.	I Mid Examinations	12.06.2023	17.06.2023	1 Week
4.	Submission of First Mid Term Exam Marks to the Autonomous Section on or before	23.06.2023		
5.	2 <sup>nd</sup> Spell of Instructions	19.06.2023	12.08.2023	8 Weeks
6.	II Mid Term Examinations	14.08.2023	19.08.2023	1 Week
7.	Preparation & Practical Examinations	21.08.2023	26.08.2023	1 Week
8.	Submission of Second Mid Term Exam Marks to the Autonomous Section on or before	26.08.2023		
9.	II Semester End Examinations	28.08.2023	09.09.2023	2 Weeks

**Commencement of Class Work for II B.Tech I Semester – 11.09.2023**

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<https://siiet.ac.in/>

**Class:** IOT

**Semester:** I

**W.E.F:** 14-11-2022

**LH:-** D-110

	I 9:40- 10:30	II 10:30 - 11:20	III 11:20- 12:10	12:10- 12:45	IV 12:45- 1:35	V 1:35- 2:25	VI 2:25- 3:15	VII 3:15-4:00
MON	PPS	M&C	ENG	<b>L U N C H</b>	M&C	ENG	AP	ECSE(T)
TUE	M&C	PPS	AP		EWS/ELCS LAB			ENG(T)/M&C(T)
WED	AP LAB				ENG	PPS	E- CSE	WED
THU	EWS/ELCS LAB				AP	M&C	PPS	PPS(T)/APT(T)
FRI	M&C	AP	ECSE		PPS	AP	PPS	AP(T)/PPS(T)
SAT	M&C	ENG	AP		PPS LAB			M&C(T)/ENG(T)

Course Code	Course Name	Name of the Faculty	Course Code	Course Name	Name of the Faculty
MA101BS	Matrices and Calculus	V.SUJATHA	ME102ES	Engineering Workshop	W.MARUTHI /M.V.B.KALYAN
AP102BS	Applied Physics	P.SRINIVASA CHARY	AP105BS	Applied Physics - Lab	M.MANISHA/M.JANAIAH
CS103ES	Programming for Problem Solving	G.KALYANI	CS107ES	Programming for Problem Solving Lab	G.KALYANI /U.NARESH
EN104HS	English for Skill Enhancement	S.SWAPNA	EN107HS	English Language and Communication Skills Lab	S.SWAPNA/E.PRARTHANA
CS106ES	Elements of Computer Science & Engineering	P.SRILATHA	MC101ES	Environmental Science	K.MOUNIKA

*[Signature]*  
**Class In-Charge**

*[Signature]*  
**Time Table Coordinator**



*[Signature]*  
**Head of The Department**  
**Dr. R. YADAGIRI RAO**  
M.Sc., B.Ed., M.Tech(CSE), Ph.D.  
**Head of the Department**  
**Department of H&S**  
**SRI INDU INSTITUTE OF ENGG & TECH**  
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## Matrices and Calculus : Lesson Plan

L/H	Topic	TA/TM	Reference book
1	Unitwise Introduction of Matrices and Calculus Syllabus	Lecture Method	R-1
2	<b>UNIT –I Matrices</b> Types of matrices ,examples	Lecture Method	R-1
3	Properties and problems on Symmetric,skew symmetric Matrices	Lecture Method	R-1
4.	Rank of the matrix	Lecture Method	R-1,W1
5.	Rank of the matrix by using Echelon form	Lecture Method	R-1
6	Rank of the matrix by using Normal form	Lecture Method	R-1
7	Problems on Rank of the matrix	Lecture Method	T-1
8	Inverse of the matrix by using Gauss Jordan method	Lecture Method	R-1
9	Problems	Problem solving Method	T-1
10	Concept to know the consistency of Linear system of equations	Lecture Method,Video	R-1
11	Homogeneous system of linear equations and problems	Lecture Method,Video	R-1,T-1
12	Non Homogeneous system of linear equations and problems	Problem solving Method,Video	R-1,T-1
13	Gauss Elimination method and Problems	Lecture Method/ Problem solving Method,Video	T-1,V-4
14	Gauss seidal Iteration methd and Problems	Lecture Method /Problem solving Method,Video	T-1,W2,V-3
15	<b>UNIT – II</b> <b>Eigen values and Eigen Vectors</b> Introduction of Linear transformation and Orthogonal transformation	Lecture Method,Video	R-1
16	To finding eigen values and Eigen Vectors of a Martix	Problem solving Method,Web Presentation,video	T-1,V-1
17	To finding eigen values and Eigen Vectors of a Martix	Problem solving Method,Web Presentation,video	T-1
18	Problems	Problem solving Method,Web,Video	T-1,
19	Properties of Eigen values and Eigen vectors	Lecture Method	R-1
20	To find Diagonalization of a Matrix	Lecture Method	T-1
21	Problems on Diagonalization	Problem solving Method	T-1
22	Cayely Hamilton theorem -Problems	Problem solving Method,Video	T-1,V-2
23	Cayely Hamilton theorem -Problems	Problem solving Method,Video	T-1
24	Finding Inverse and powers of a Matrix by using Cayley Hamilton theorem	Lecture Method,Video	R-1
25	Finding Inverse and powers of a Matrix by using Cayley Hamilton theorem	Lecture Method,Video	R-1,V-2
26	Quadratic form - Introduction	Lecture Method	T-1
27	Nature and Signature of Quadratic form	Lecture Method	R-1
28	Reduction of Quadtratic form to Canonical form by using Orthogonal transformation	Lecture Method	R-1
29	<b>UNIT - IIICalculus</b>	Lecture	R-1

	Introduction of Mean value theorems	Method	
30	Rolle's Mean value theorem - Problems	Problem solving Method,web presentation	R-1
31	Lagrange's Mean value theorem- Problems	Problem solving Method ,web presentation	R-1,w4
32	Applications	Lecture Method	R-1
33	Cauchy's mean value theorem –Problems	Problem solving Method, web presentation	R-1,T-1
34	Taylor's Series - Problems	Problem solving Method	R-1,T-1
35	Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves	Lecture Method	R-1
36	Introduction of ImproperIntegrals Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves	Lecture Method	R-1
37	Introduction of Improper Integrals	Lecture Method	R-1
38	Beta and Gamma functions and their properties - problems	Problem solving Method	R-1,T-1
39	<b>UNIT - IV</b> <b>Multi variable Calculus(Partial differentiation and applications)</b> Introduction of Limit and Continuity	Lecture Method	R-1
40	Euler's theorem - Problems	Problem solving Method	R-1,T-1
41	Total derivative - Problems	Problem solving Method	R-1,T-1
42	Jacobian - Problems	Problem solving Method	R-1,T-1
43	Functional dependence & independence - Problems	Problem solving Method	T-1
44	Functionaldependence &independenc Problems	Problem solving Method	T-1
45	Maxima and Minima of functions of two variables - Problems	Problem solving Method,Video	T-1,V-5,W3
46	Maxima and Minima of functions of two variables - Problems	Problem solving Method,Video	T-1,V-5
47	Maxima and Minima of functions of three variables - Problems	Problem solving Method,Video	T-1,V-5
48	Maxima and Minima of functions of three variables - Problems	Problem solving Method,Video	T-1,V-5
49	<b>UNIT-V</b> <b>Multi variable calculus (Integration)</b> Introduction to multiple integration	Lecture Method	R-1
50	Evaluation of double integrals in Cartesian and polar coordinates	Lecture Method	R-1
51	Change of order of integration in Cartesian form	Lecture Method	R-1
52	Evaluation of triple integrals	Problem solving Method,Video	T-1
53	Change of variables Cartesian to polar in double integrals	Problem solving Method,Video	T-1
54	Change of variables Cartesian to spherical in triple integrals	Problem solving Method,Video	T-1
55	Change of variables Cartesian to Cylindrical in triple integrals	Lecture Method	R-1
56	Areas by double integrals	Lecture Method	R-1
57	Volumes by double and triple integrals	Lecture Method	R-1,w5

REFERENCES :

R-1 .Ramana B.V.,Higher Engineering Mathematics, Tata McGRAW Hill,New DelhiR-2

.N.P. Bali and Manish Goyal,A text book of Engineering Mathematics

TEXTBOOKS :

T-1 B.S.Grewal,Higher Engineering Mathematics,Khanna PublishersT-2

Erwin Kreyszig,Advanced Engineering Mathematics



**GAP BEYOND THE SYLLABUS-MAPPING TO PO/PSO**

1. Regular industrial visits help students to know the information useful for knowledge upgradation.
2. Students are encouraged to take part in Technical Quizzes and various co-curricular activities to ensure their overall development
3. Teaching at least a few portions giving practical demonstration to create interest among the students
4. Introducing current Scientific and Technological innovations and development
5. Computer aided learning tools are also used for better visual display for the Mathematics

**Mapping to PO/PSO:**

High -3      Medium -2      Low-1

<b>PO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>
1	-	-	-	2	-	-	-	-	-	-	-	2
2	-	-	-	-	-	-	-	-	-	2	-	-
3	-	-	-	-	-	-	-	-	-	-	3	-
4	-	-	-	-	-	-	-	-	1	-	-	-
5	-	-	-	-	2	-	-	-	-	-	-	-



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Khalsa Ibrahimpatnam, Sheriguda(V), Ibrahimpatnam(M), Ranga Reddy Dist., Telangana

## WEB REFERENCES :

- W-1 [https://en.wikipedia.org/wiki/Rank\\_\(linear\\_algebra\)](https://en.wikipedia.org/wiki/Rank_(linear_algebra)) (For UNIT-I,UNIT-II)
- W-2 <http://mathforcollege.com/ma/book2021/gauss-seidel-method.html> (For UNIT- I)
- W-3 <https://tutorial.math.lamar.edu/Classes/CalcIII/RelativeExtrema.aspx> (For UNIT-III )
- W-4 [https://courses.lumenlearning.com/calculus1/chapter/the-mean-value-theorem-for-integrals\\_](https://courses.lumenlearning.com/calculus1/chapter/the-mean-value-theorem-for-integrals_) (For UNIT-IV)
- W-5 <https://math.stackexchange.com/questions/1903927/volume-of-solid-rotated-about-y-axis>(For UNIT-V)

## VIDEO REFERENCES :

- V-1 <https://www.youtube.com/watch?v=h5urBuE4Xhg>(Video for Eigen values and eigen vectors)
- V-2 <https://www.youtube.com/watch?v=8D3WViAyJvc> (Cayley-Hamilton Theorem)
- V-3 <https://www.youtube.com/watch?v=ajJD0Df5CsY> (For Gauss seidal iteration method)
- V-4 <https://www.youtube.com/watch?v=2j5Ic2V7wq4> (For Gauss Elimination method)
- V-5 [https://www.youtube.com/watch?v=gLWUrF\\_cOwQ](https://www.youtube.com/watch?v=gLWUrF_cOwQ) (For Maxima and Minima)
- V-6 <https://www.youtube.com/watch?v=ry9cgNx1QV8> (For Maxima and Minima)





**M&C LECTURE NOTES**

[https://drive.google.com/file/d/1auDWI9WJJ4bPUQS\\_Ow81nHZ4tXeAgbw/view?usp=sharing](https://drive.google.com/file/d/1auDWI9WJJ4bPUQS_Ow81nHZ4tXeAgbw/view?usp=sharing)

**UNIT 1:** [https://drive.google.com/file/d/1s4dLKyzPIIvIG4vR4XNahxS\\_i8QRkiLa/view?usp=sharing](https://drive.google.com/file/d/1s4dLKyzPIIvIG4vR4XNahxS_i8QRkiLa/view?usp=sharing)

**UNIT 2:** <https://drive.google.com/file/d/1ZPKTjJgzg4CTv38ZpTUg30pxAgn6IPnX/view?usp=sharing>

**UNIT 3:** <https://drive.google.com/file/d/17-2bLhYvNqI3brTwnwojns025NGcBzD1/view?usp=sharing>

**UNIT 4:** <https://drive.google.com/file/d/11od9SSFNkeh9ixF32L4SV-RRFScL3xjT/view?usp=sharing>

**UNIT 5:** <https://drive.google.com/file/d/1NNxDuH8nQtu64EeDLCTmIvEVTkuH3syH/view?usp=sharing>



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POWERPOINT PRESENTATION

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## **Eigenvalues and Eigenvectors**

**V. SUJATHA, Assistant Professor**

<https://docs.google.com/presentation/d/11zrCnBITr1TD6WCBs-zN2fpaKCKUVIEK/edit?usp=sharing&oid=106039517343501825239&rtpof=true&sd=true>

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## **Multiple Integration**

**V. Sujatha, Assistant  
Professor**

**PEARSON**

<https://drive.google.com/file/d/1n9y4qTU0LMLUs7J-KKA15E5EmYMMSVMk/view?usp=sharing>

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**PREVIOUS QUESTION PAPERS**

<https://drive.google.com/file/d/1dIABobEjhLe0bpp0c--M1mkvHlpwhzrz/view?usp=sharing>

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Set-I

I B. TECH SEM-I MID-I EXAMINATION Dec-2022/Jan-2023

Year & Branch: Common to All

Date & Session: 29-12-2022 & FN

Subject: MATRICES & CALCULUS

Marks: 20

Time

: 2 Hours

## Part-B

Answer any **FOUR** Questions. All Question Carry Equal Marks.

1. Define the Rank of the Matrix and find the rank of the following matrix using Echelon form

$$\begin{bmatrix} 1 & 2 & 3 & 4 \\ -2 & -3 & 1 & 2 \\ -3 & -4 & 5 & 8 \\ 1 & 3 & 10 & 14 \end{bmatrix} \quad \text{(Remembering(L1))}$$

2. Show that the equations  $x - 4y + 7z = 14$ ,  $3x + 8y - 2z = 13$ ,  $7x - 8y + 26z = 5$  are inconsistent

(Evaluating(L5))

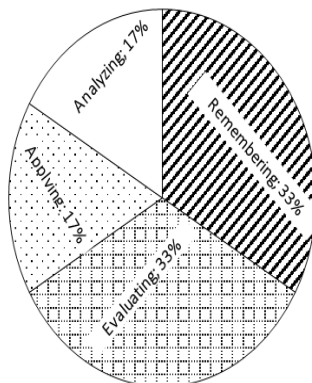
3. . Solve the system of equations  $10x + y + z = 12$ ,  $2x + 10y + z = 13$ ,  $2x + 2y + 10z = 14$  by using Gauss seidel iteration method (Applying(L3))

4. If  $A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$  find the value of the matrix  $A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 - 2A + I$  using Cayley Hamilton theorem (Remembering(L1))

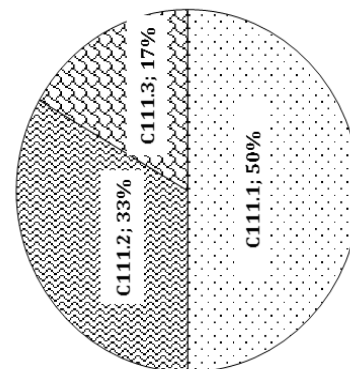
- 5 .Reduce the given Quadratic form to canonical form  $2xy + 2yz + 2zx$  by orthogonal reduction and find the Nature, Index and Signature of Quadratic form. (Analyzing(L4))

6. Verify Rolle's theorem for  $f(x) = e^x(\sin x - \cos x)$  in  $\left[ \frac{\pi}{4}, \frac{5\pi}{4} \right]$  (Evaluating(L5))

QUESTION PAPER MAPPING WITH BT



QUESTION PAPER MAPPING WITH CO'S



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Set-II

I B.TECH SEM-I MID-II EXAMINATION March-2023

Year & Branch: Common to All

Date & Session : 03-03-2023 &FN

Subject : MATRICES & CALCULUS

Marks: 20

Time

: 2 Hours

## Part-B

\Answer any **FOUR** Questions. All Question Carry Equal Marks.

1. a) Express  $f(x) = \log \cos x$  as Taylor's series about  $x = \pi/3$  **Understanding(L2)**

b) Obtain the Maclaurin's series expansion of  $f(x) = \cos x$  **Understanding(L2)**

2. If  $x+y+z = u$ ,  $y+z = uv$ ,  $z = uvw$  then evaluate i)  $\frac{\partial(x,y,z)}{\partial(u,v,w)} \frac{\partial(x,y,z)}{\partial(u,v,w)}$  ii)  $\frac{\partial(u,v,w)}{\partial(x,y,z)} \frac{\partial(u,v,w)}{\partial(x,y,z)}$

**Evaluating(L5)**

3. Find the maximum and minimum distances of the point of  $u = x^2y^3z^4$  if  $2x+3y+4z = a$  **Remembering(L1)**

4. Evaluate i)  $\int_0^5 \int_0^{x^2} x(x^2 + y^2) \int_0^5 \int_0^{x^2} x(x^2 + y^2) dx dy$  **Evaluating(L5)**

ii)  $\int_0^4 \int_0^{x^2} e^{\frac{y}{x}} \int_0^4 \int_0^{x^2} e^{\frac{y}{x}} dx dy$  **Evaluating(L5)**

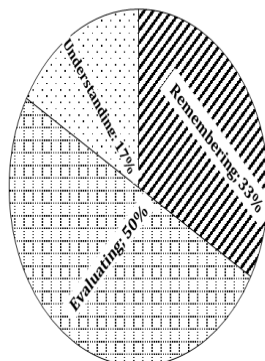
5. Evaluate  $\int_0^\pi \int_0^{a(1+\cos\theta)} r^2 \cos\theta dr d\theta$  Evaluate  $\int_0^\pi \int_0^{a(1+\cos\theta)} r^2 \cos\theta dr d\theta$

**Evaluating(L5)**

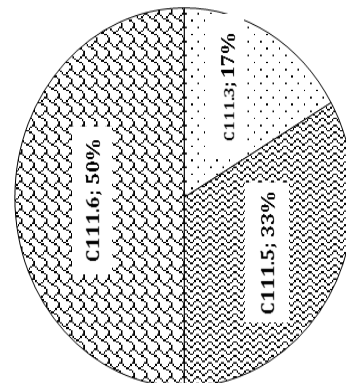
6. Find the area of the region bounded by the parabolas  $y^2=4ax$  and  $x^2 = 4ay$

**Remembering(L1)**

QUESTION PAPER MAPPING WITH BT



QUESTION PAPER MAPPING WITH CO'S





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### **MID I & MID-II KEY link**

[https://drive.google.com/file/d/1r\\_tqhyATwxUgbvZDkhQ\\_c1jCjVvOI78k/view?usp=sharing](https://drive.google.com/file/d/1r_tqhyATwxUgbvZDkhQ_c1jCjVvOI78k/view?usp=sharing)

### **MID-I & MID-II SAMPLE STUDENT SCRIPTS Link**

[https://drive.google.com/file/d/1eAoi\\_2SUXspGsVhI\\_L0L81mjliQJ0ZBU/view?usp=sharing](https://drive.google.com/file/d/1eAoi_2SUXspGsVhI_L0L81mjliQJ0ZBU/view?usp=sharing)

<https://drive.google.com/file/d/1ScVlpQFsxKh9bncnHDBjxHr5RkGUj-kX/view?usp=sharing>



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**I-MID M&C ASSIGNMENT**

1. Define the Rank of the Matrix and find the rank of the following matrix using Echelon form

$$\begin{bmatrix} 1 & 2 & 3 & 4 \\ -2 & -3 & 1 & 2 \\ -3 & -4 & 5 & 8 \\ 1 & 3 & 10 & 14 \end{bmatrix} \begin{bmatrix} 1 & 2 & 3 & 4 \\ -2 & -3 & 1 & 2 \\ -3 & -4 & 5 & 8 \\ 1 & 3 & 10 & 14 \end{bmatrix}$$

2. Define the Rank of the Matrix and find the rank of the following matrix using Normal form

$$\begin{bmatrix} 2 & 1 & 3 & 4 \\ 0 & 3 & 4 & 1 \\ 2 & 3 & 7 & 5 \\ 2 & 5 & 11 & 6 \end{bmatrix} \begin{bmatrix} 2 & 1 & 3 & 4 \\ 0 & 3 & 4 & 1 \\ 2 & 3 & 7 & 5 \\ 2 & 5 & 11 & 6 \end{bmatrix}$$

(Remembering(L1))

$$\begin{bmatrix} 0 & 1 & -3 & -1 \\ 1 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & k & 0 \end{bmatrix} \begin{bmatrix} 0 & 1 & -3 & -1 \\ 1 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & k & 0 \end{bmatrix}$$

3. Find the value of k if the rank of the matrix A is 2 where  $A = \begin{bmatrix} 0 & 1 & -3 & -1 \\ 1 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & k & 0 \end{bmatrix}$

(Remembering(L1))

4. Find the inverse of the matrix A using Gauss Jordan Method(Elementary row operations)

$$\begin{bmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{bmatrix}$$

(Remembering(L1))

5. Discuss for what values of a, b the simultaneous equations  $x+y+z = 6$ ,  $x+2y+3z = 10$ ,  $x+2y+az=b$  have i) no solution ii) a unique solution iii) an infinite number of solutions (Creating(L6))

6. Show that the system of equations  $x+2y+z = 3$ ,  $2x + 3y + 2z = 5$ ,  $3x-5y+5z = 2$ ,  $3x+9y-z = 4$  are Consistent and solve them. (Evaluating(L5))

7. Solve the system of equations  $10x + y + z = 12$ ,  $2x + 10y + z = 13$ ,  $2x + 2y + 10z = 14$  by using Gauss seidel iteration method (Applying(L3))

8. Verify Cayley Hamilton theorem and find  $A^{-1}$  and  $A^4$  for the matrix  $A =$

$$\begin{bmatrix} 7 & 2 & -2 \\ -6 & -1 & 2 \\ 6 & 2 & -1 \end{bmatrix} \begin{bmatrix} 7 & 2 & -2 \\ -6 & -1 & 2 \\ 6 & 2 & -1 \end{bmatrix}$$

(Evaluating(L5))

$$\begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix} \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$$

9. If  $A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$  find the value of the matrix  $A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 - 2A + I$  using Cayley Hamilton theorem (Remembering(L1))

10. Prove that the sum of eigen values of the matrix A is equal to its trace of A and product of eigen values to its determinant. (Evaluating(L5))

$$\begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix} \begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$$

11. Diagonalize the matrix  $A = \begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$  (Analyzing(L4))

12. Reduce the Quadratic form  $3x^2 + 5y^2 + 3z^2 - 2yz + 2zx - 2xy$  to the canonical form by orthogonal Reduction and find the Nature, rank, index and signature of the Quadratic form. (Analyzing(L4))

- 13.. Reduce the given Quadratic form to canonical form  $2xy + 2yz + 2zx$  by orthogonal reduction and find the Nature, Index and Signature of Quadratic form. (Analyzing(L4))

14. Verify Rolle's theorem for  $f(x) = e^x(\sin x - \cos x)$  in  $[\frac{\pi}{4}, \frac{5\pi}{4}]$  (Evaluating(L5))

15. State Rolle's theorem and verify for  $f(x) = x^3 - 6x^2 + 11x - 6$  in  $[1, 3]$  (Understanding(L2))

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### II-MID M&C ASSIGNMENT

1. a) Express  $f(x) = \log \cos x$  as Taylor's series about  $x = \pi/3$  **Understanding(L2)**  
 b) Obtain the Maclaurin's series expansion of  $f(x) = \cos x$  **Understanding(L2)**
2. Find the volume of the solid generated by revolving the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$  ( $0 < b < a$ ) rotates about major axis **Remembering(L1)**
3. Show that the area of the surface generated by the revolution about the x-axis of the loop of the curve  $3ay^2 = x(x-a)^2$  is  $\frac{\pi a^2 \pi a^2}{3 \cdot 3}$  **Evaluating(L5)**
4. If  $z = \log(e^x + e^y)$  show that  $rt - s^2 = 0$  **Evaluating(L5)**
5. Using Euler's theorem, prove that  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \sin 2u$  if  $u = \tan^{-1} \left( \frac{x^3 + y^3}{x+y} \right)$  **Applying(L3)**
6. If  $u = f(r)$  and  $x = r \cos \theta$ ,  $y = r \sin \theta$  then prove that  $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} = f''(r) + \frac{1}{r} f'(r)$  **Evaluating(L5)**
7. Find  $\frac{du}{dx}$  if  $u = \sin(x^2 + y^2)$  where  $a^2 x^2 + b^2 y^2 = c^2$  **Remembering(L1)**
8. If  $x+y+z = u$ ,  $y+z = uv$ ,  $z = uvw$  then evaluate i)  $\frac{\partial(x,y,z)}{\partial(u,v,w)}$  ii)  $\frac{\partial(u,v,w)}{\partial(x,y,z)}$  **Evaluating(L5)**
9. Show that the functions  $u = x+y+z$ ,  $v = xy+yz+zx$  and  $w = x^2 + y^2 + z^2$  are functionally dependent and find the relation between them **Evaluating(L5)**
10. Find the maximum and minimum distances of the point of  $u = x^2 y^3 z^4$  if  $2x+3y+4z = a$  **Remembering(L1)**
11. Find the maxima and minima of the function  $f(x,y) = x^3 + 3xy^2 - 15x^2 - 15y^2 + 72x$  **Remembering(L1)**
12. Evaluate i)  $\int_0^5 \int_0^{x^2} x(x^2 + y^2) dx dy$  **Evaluating(L5)**  
 ii)  $\int_0^4 \int_0^{x^2} e^{\frac{y}{x}} dx dy$  **Evaluating(L5)**
13. Solve  $\int_0^{\log 2} \int_0^x \int_0^{x+\log y} e^{x+y+z} dx dy dz$  **Evaluating(L5)**
14. Find the area of the region bounded by the parabolas  $y^2 = 4ax$  and  $x^2 = 4ay$  **Remembering(L1)**
15. Evaluate the double integral  $\int_0^{4a} \int_{\frac{y^2}{4a}}^{\frac{x^2 - y^2}{4a}} dx dy$  by changing into polar coordinates **Evaluating(L5)**
16. Change the order of integration in  $\int_0^1 \int_{x^2}^{2-x} xy dx dy$  and hence evaluate the double integral **Creating(L6)**

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**I-MID & II-MID M&C ASSIGNMENT PROOFS**

**MID-I & MID-II link**

Mid1: [https://drive.google.com/file/d/1WXhCUtDwn3RVYHqcm4\\_8R05RuG5QQITG/view?usp=sharing](https://drive.google.com/file/d/1WXhCUtDwn3RVYHqcm4_8R05RuG5QQITG/view?usp=sharing)

Mid2: <https://drive.google.com/file/d/1EJtDhhF8kVqJHi6aTqw3wQMeJte4LoEa/view?usp=sharing>

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### SCHEME OF EVALUATION WITH CO and BTL MAPPING

SCHEME OF EVALUATION-MATRICES & CALCULUS(MID-I)(Set-I)		
<b>Instructions:</b>		
a) Any answer by alternate method should be valued and suitably awarded.		
b) All answers (including extra, stuck off and repeated) should be valued. Answers with maximum marks must be considered.		
Qn No	Description of Answer	Marks
1.	Using row1 and column1 operations (C111.1) (Analyzing)	1
	Using row2 and column2 operations (C111.1) (Analyzing)	1
	Using row3 and column3 operations & get rank (C111.1) (Analyzing)	3
2.	To write matrix form (C111.1) (Analyzing)	1
	To write augmented form and getting rank using echelon form and rank of A not equal to rank of [A;B](C111.1) (Analyzing)	2
	To compare consistency and to get solution(C111.1) (Analyzing)	2
3.	To check diagonal dominant (C111.1) (Analyzing)	1
	To find iterations until get solution (C111.1) (Analyzing)	4
4.	To find characteristic equation of A (C111.2) (Applying)	2
	Using Cayley Hamilton theorem and Calculations(C111.2) (Applying)	3
5.	To form matrix for the given quadratic form(C111.2) (Applying)	1
	To find eigen values and eigen vectors (C111.2) (Applying)	2
	To get $P^TAP = D$ and writing canonical form, rank, index and signature(C111.2) (Applying)	2
6.	To check continuous and derivable and $f(a)=f(b)$ of $f(x)$ (C111.3) (Creating)	3
	To apply Rolle's theorem and get value of c (C111.3) (Creating)	2
<b>TOTAL</b>		<b>20</b>

# SRI INDU INSTITUTE OF ENGINEERING AND TECHNOLOGY

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Khalsa Ibrahimpatnam, Sheriguda(V), Ibrahimpatnam(M), Ranga Reddy Dist., Telangana 501510

## SCHEME OF EVALUATION-MATRICES & CALCULUS(MID-II)(Set-2)

### Instructions:

- Any answer by alternate method should be valued and suitably awarded.
- All answers (including extra, stuck off and repeated) should be valued. Answers with maximum marks must be considered.

Qn No	Description of Answer	Marks
1 a)	To write Taylor's series expansion (C111.3) (Creating)	1
	To calculate value of $f(x) = \log \cos x$ at $x = \pi/3$ (C111.3) (Creating)	1
b)	To write Maclaurin's series expansion (C111.3) (Creating)	1
	To calculate value of $f(x) = \cos x$ at $x = 0$ (C111.3) (Creating)	2
2.	To find Jacobian of $x, y, z$ with respect to $u, v, w$ (C111.5) (Remembering)	3
	To find Jacobian of $u, v, w$ with respect to $x, y, z$ (C111.5) (Remembering)	2
3.	Using Lagrange's method of multipliers formula (C111.5) (Remembering)	1
	To calculate maximum and minimum values (C111.5) (Remembering)	4
4.	To evaluate $\int_0^5 \int_0^{x^2} x(x^2 + y^2) dx dy$ (C111.6) (Understanding)	2
	To evaluate $\int_0^4 \int_0^{x^2} e^{\frac{y}{x}} dx dy$ (C111.6) (Understanding)	3
5.	To Evaluate $\int_0^{\pi} \int_0^{a(1+\cos\theta)} r^2 \cos\theta dr d\theta$ (C111.6) (Understanding)	5
6.	To take limits of $x$ and $y$ (C111.6) (Understanding)	2
	To find area of the region bounded by the parabolas (C111.6) (Understanding)	3
<b>TOTAL</b>		<b>20</b>



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## TUTORIAL TOPICS

S. No	Topic	Teahind Method/Teaching Aid	No.of Sessions Planned	Reference book
1	Rank of the matrix by using Echelon form	Lecture Method	1	R-1
2	Rank of the matrix by using Normal form	Lecture Method	1	R-1
3	Inverse of the matrix by using Gauss Jordan method	Lecture Method	1	R-1
4	Homogeneous system of linear equations and problems	Lecture Method,Video	1	R-1,T-1,V-1
5	Non Homogeneous system of linear equations and problems	Problem solving Method,Video	1	R-1,T-1,V-1
6	Gauss Elimination method and Problems	Lecture Method/ Problem solving Method,Video	1	T-1,V-5
7	Gauss seidal Iteration methd and Problems	Lecture Method /Problem solving Method,Video	1	T-1,V-4
8	To finding eigen values and Eigen Vectors of a Martix	Problem solving Method,Web Presentation,video	1	T-1,W-2,V-1
9	To find Diagonalization of a Matrix	Lecture Method	1	T-1
10	Cayely Hamilton theorem -Problems	Problem solving Method,Video	1	T-1,V-2
11	Reduction of Quadratic form to Canonical form by using Orthogonal transformation	Lecture Method	1	R-1
12	Rolle's Mean value theorem - Problems	Problem solving Method,web presentation	1	R-1,W-5
13	Lagrange's Mean value theorem-Problems	Problem solving Method ,web presentation	1	R-1,W-5
14	Cauchy's mean value theorem –Problems	Problem solving Method, web presentation	1	R-1,T-1,W-5
15	Taylor's Series - Problems	Problem solving Method	1	R-1,T-1
16	Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves	Lecture Method	1	R-1
17	Euler's theorem - Problems	Problem solving Method	1	R-1,T-1
18	Total derivative - Problems	Problem solving Method	1	R-1,T-1
19	Jacobian - Problems	Problem solving Method	1	R-1,T-1
20	Functional dependence & independence - Problems	Problem solving Method	1	T-1
21	Maxima and Minima of functions of two variables - Problems	Problem solving Method,Video	1	T-1,V-8
22	Evaluation of double integrals in Cartesian and polar coordinates	Lecture Method	1	R-1
23	Change of order of integration in Cartesian form	Lecture Method	1	R-1
24	Evaluation of triple integrals	Problem solving Method,Video	1	T-1,V-9

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## Result Analysis:

IOT

Course Title	<b>MATRICES AND CALCULUS</b>
Course Code	<b>MA101BS</b>
Programme	B.Tech
Year & Semester	I year I- semester
Regulation	BR22
Course Faculty	V.SUJATHA, Assistant Professor , H&S

## Weak Students:

S No	Roll no	Intermediate Marks	Internal-I Status (30)	Internal-II Status (30)
1	22X31A6960	51%	22	24
2	22X31A6959	54%	21	20
3	22X31A6955	55%	14	18
4	22X31A6907	55.6%	15	16
5	22X31A6932	60%	22	25
6	22X31A6941	60%	15	16
7	22X31A6962	60%	19	19
8	22X31A6917	62%	22	28
9	22X31A6904	65%	17	14
10	22X31A6905	65%	17	14
11	22X31A6922	68%	27	19

## Advanced learners:

S No	Roll No	Intermediate Marks	Gate Material
1	22X31A6929	97%	Probability, Discrete Mathematics, Graph theory, Differential Equations
2	22X31A6931	96.2%	
3	22X31A6910	96.2%	
4	22X31A6943	96%	
5	22X31A6954	94%	
6	22X31A6903	93.8%	
7	22X31A6924	92.4%	



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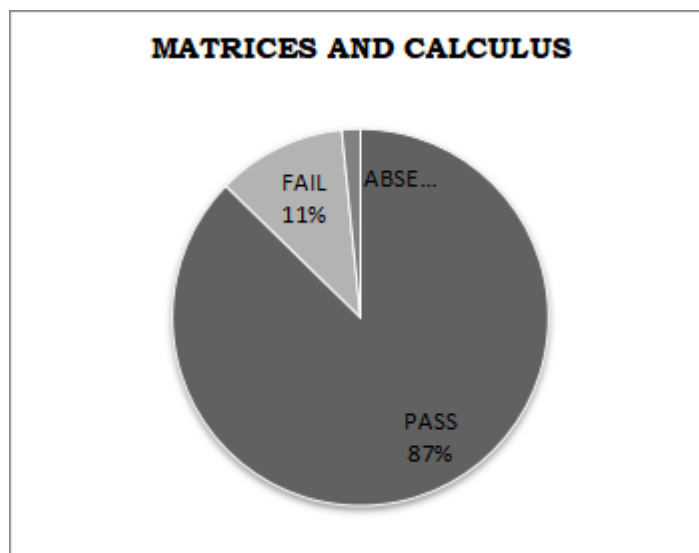
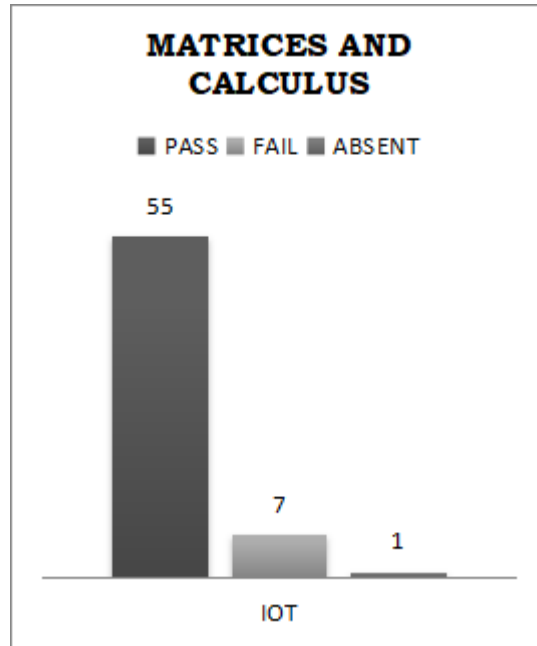


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**RESULT ANALYSIS AT THE END OF SEMISTER**

**Branch: IOT**

**Subject: MATRICES AND CALCULUS**





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Khalsa Ibrahimpatnam, Sheriguda(V), Ibrahimpatnam(M), Ranga Reddy Dist., Telangana – 501510

**DEPARTMENT OF HUMANITIES AND SCIENCE**

**REMEDIAL CLASSES TIME TABLE**

<b>DAY/ PERIOD</b>	<b>MON 4.00-5.00</b>	<b>TUE 4.00-5.00</b>	<b>WED 4.00-5.00</b>	<b>THUR 4.00-5.00</b>	<b>FRI 4.00-5.00</b>	<b>SAT 4:00 -5:00</b>
<b>CSE-A</b>	M&C	PPS	AP	EG	M&C	AP
<b>CSE-B</b>	AP	M&C	EG	PPS	AP	M&C
<b>CSE-C</b>	PPS	EG	AP	M&C	PPS	EG

<b>DAY/ PERIOD</b>	<b>MON 4.00-5.00</b>	<b>TUE 4.00-5.00</b>	<b>WED 4.00-5.00</b>	<b>THUR 4.00-5.00</b>	<b>FRI 4.00-5.00</b>	<b>SAT 4:00 -5:00</b>
<b>ECE-A</b>	M&C	CHEM	BEE	ENG	M&C	CHEM
<b>ECE-B</b>	BEE	M&C	CHEM	M&C	BEE	CHEM

<b>DAY/ PERIOD</b>	<b>MON 4.00-5.00</b>	<b>TUE 4.00-5.00</b>	<b>WED 4.00-5.00</b>	<b>THUR 4.00-5.00</b>	<b>FRI 4.00-5.00</b>	<b>SAT 4:00 -5:00</b>
<b>AIML</b>	CHEM	BEE	M&C	BEE	CHEM	M&C
<b>CYBER</b>	PPS	EG	AP	M&C	PPS	EG

<b>DAY/ PERIOD</b>	<b>MON 4.00-5.00</b>	<b>TUE 4.00-5.00</b>	<b>WED 4.00-5.00</b>	<b>THUR 4.00-5.00</b>	<b>FRI 4.00-5.00</b>	<b>SAT 4:00 -5:00</b>
<b>CIVIL &amp; IOT</b>	CHEM	BEE/EM	M&C	BEE/EM	CHEM	M&C



# SRI INDU INSTITUTE OF ENGINEERING AND TECHNOLOGY

Department of Humanities & Sciences

## Course Outcome Attainment (Internal Examination-1)

Name of the faculty: V.SUJATHA Academic Year: 2022-2023  
 Branch & Section: IOT Examination: I Internal  
 Course Name: M&C Year: I Semester: I

S.No	HT No.	Q1a	Q1b	Q1c	Q2a	Q2b	Q2c	Q3a	Q3b	Q3c	Q4a	Q4b	Q4c	Q5a	Q5b	Q5c	Q6a	Q6b	Q6c	Obj1	A1
Max. Marks ==>		5			5			5			5			5			5			10	5
1	22X31A6901							5			5			5			5			10	5
2	22X31A6902	5			2			5												9	5
3	22X31A6903	5			5						5						5			9	5
4	22X31A6904	4			1									3			5			8	5
5	22X31A6905	4						2									4			7	5
6	22X31A6906	5						5						5			5			10	5
7	22X31A6907	2						1									3			9	5
8	22X31A6908	5			2						4									7	5
9	22X31A6909	5			5			5									2			8	5
10	22X31A6910	5						5			5			5						10	5
11	22X31A6911				5			5			5			5						10	5
12	22X31A6912	4			2			2									2			7	5
13	22X31A6913	5			5			5									5			9	5
14	22X31A6914	5															1			8	5
15	22X31A6915	5			4			3			4			3						7	5
16	22X31A6916	5			5			5						2						9	5
17	22X31A6917	5			3			4			1									9	5
18	22X31A6918				4			5			5						4			8	5
19	22X31A6919	5			3						2									7	5
20	22X31A6920	5			5			5			5									10	5
21	22X31A6921	A			A			A			A						A			A	5
22	22X31A6922	5			5						4						5			8	5
23	22X31A6923	5						5			4						4			8	5
24	22X31A6924	5			2			5			4									7	5
25	22X31A6925	5			3			5									5			9	5
26	22X31A6926	5			5			5									5			10	5
27	22X31A6927	5						5			5						5			10	5
28	22X31A6928	5						5			5						5			9	5
29	22X31A6929	5			5									5						10	5
30	22X31A6930	5			5						4						5			8	5
31	22X31A6931	5			5						5			5						10	5
32	22X31A6932	5			5						3									9	5
33	22X31A6933	4			1			5			4									8	5
34	22X31A6934	5						5			5						5			10	5
35	22X31A6935	5						5			5			5						10	5
36	22X31A6936	5									5			5			5			8	5
37	22X31A6937	5			5			5			3									7	5
38	22X31A6938				5			5			5						5			10	5
39	22X31A6939	5			5			5			4						5			6	5
40	22X31A6940	5												5			5			9	5
41	22X31A6941	1			2			2			2									8	5
42	22X31A6942	5									5						5			8	5
43	22X31A6943				5			5			5						5			7	5
44	22X31A6944	4			3			3			4									7	5
45	22X31A6945	4									2						5			8	5
46	22X31A6946	1			1			1												9	5
47	22X31A6947	5			1			1			3									9	5
48	22X31A6948				5			5			5						5			10	5
49	22X31A6949	5									5						5			8	5
50	22X31A6950	4			5			5			4									9	5
51	22X31A6951	5			3			3			4									8	5
52	22X31A6952	5			5			5									5			7	5
53	22X31A6953	5									5			5						10	5
54	22X31A6954	5			5			5			5						5			8	5
55	22X31A6955	5									2									7	5
56	22X31A6956	5			4			4			5									8	5
57	22X31A6957	5									5						5			10	5
58	22X31A6958	5			5									5			5			10	5
59	22X31A6959	5			4						4									8	5
60	22X31A6960	5			4												5			8	5
61	22X31A6961	3						4			2						1			8	5
62	22X31A6962	2			5			4												8	5
63	22X31A6963	5			5						4						2			9	5
64	22X31A6964	A			A			A			A						A			A	0

Target set by the faculty / HoD	3.00	0.00	0.00	3.00	0.00	0.00	3.00	0.00	0.00	3.00	0.00	0.00	3.00	0.00	0.00	3.00	0.00	0.00	6.00	3.00
Number of students performed above	52	0	0	33	0	0	34	0	0	37	0	0	13	0	0	30	0	0	62	63
Number of students attempted	58	0	0	44	0	0	42	0	0	45	0	0	14	0	0	37	0	0	64	64
Percentage of students scored more than target	90%			75%			81%			82%			93%			81%			97%	98%

**CO Mapping with Exam Questions:**

CO - 1	Y			Y															Y	Y
CO - 2							Y			Y						y			Y	Y
CO - 3													y						y	y
CO - 4																				
CO - 5																				
CO - 6																				

Scored >Target %	90%			75%			81%			82%			93%			81%			97%	98%
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**CO Attainment based on Exam Questions:**

CO - 1	90%			75%															97%	98%
CO - 2							81%			81%						81%			97%	98%
CO - 3													81%						97%	98%
CO - 4																				
CO - 5																				
CO - 6																				

CO	Subj	obj	Asgn	Overall	Level	Attainment Lev	
CO-1	82%	86%	98%	89%	3.00	1	40%
CO-2	81%	85%	98%	88%	3.00	2	50%
CO-3	81%	89%	98%	89%	3.00	3	60%
CO-4							
CO-5							
CO-6							

**Attainment (Internal 1 Examination) 3.00**



Target set by the faculty / HoD	1.80	1.20	0.00	3.00	0.00	0.00	3.00	0.00	0.00	1.80	1.20	0.00	3.00	0.00	0.00	3.00	0.00	0.00	6.00	3.00	3.00
Number of students performed above the target	49	45	0	57	0	0	53	0	0	45	32	0	9	0	0	32	0	0	62	58	64
Number of students attempted	50	49	0	61	0	0	59	0	0	49	40	0	12	0	0	38	0	0	64	58	64
Percentage of students scored more than target	98%	92%		93%			90%			92%	80%		75%			84%			97%	100%	100%

**CO Mapping with Exam Questions:**

CO - 1																					
CO - 2																					
CO - 3	Y																		Y	Y	y
CO - 4						Y													Y	Y	y
CO - 5								Y				y							Y	Y	y
CO - 6				Y											y				Y	Y	y

% Students Scored >Target %	98%	92%		93%			90%			92%	80%		75%			84%			97%	100%	100%
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**CO Attainment based on Exam Questions:**

CO - 1																					
CO - 2																					
CO - 3	98%																		97%	100%	100%
CO - 4						98%													97%	100%	100%
CO - 5								98%			98%								97%	100%	100%
CO - 6				98%												98%			97%	100%	100%

CO	Subj	obj	aaasn	ppt	Overall	Level
CO-1						
CO-2						
CO-3	98%	97%	100%	100%	99%	3
CO-4	98%	97%	100%	100%	99%	3.00
CO-5	98%	97%	100%	100%	99%	3.00
CO-6	98%	97%	100%	100%	99%	3.00

Attainment Level	
1	40%
2	50%
3	60%

Attainment (Internal Examination-2) **3.00**



# SRI INDU INSTITUTE OF ENGINEERING AND TECHNOLOGY

Department of Humanities & Sciences

## Course Outcome Attainment (University Examinations)

Name of the faculty		V.SUJATHA		Academic Year:		2022-2023	
Branch & Section:		IOT		Year / Semester:		I/I	
Course Name:		M&C					
S.No	Roll Number	Marks Secured		S.No	Roll Number	Marks Secured	
1	22X31A6901	48	✓	36	22X31A6936	32	
2	22X31A6902	25	✓	37	22X31A6937	30	
3	22X31A6903	37	✓	38	22X31A6938	30	
4	22X31A6904	21	✓	39	22X31A6939	32	
5	22X31A6905	21	✓	40	22X31A6940	30	
6	22X31A6906	22	✓	41	22X31A6941	27	
7	22X31A6907	12	✓	42	22X31A6942	34	
8	22X31A6908	21	✓	43	22X31A6943	51	
9	22X31A6909	27	✓	44	22X31A6944	28	
10	22X31A6910	32	✓	45	22X31A6945	23	
11	22X31A6911	31	✓	46	22X31A6946	29	
12	22X31A6912	41	✓	47	22X31A6947	35	
13	22X31A6913	33	✓	48	22X31A6948	36	
14	22X31A6914	6	✓	49	22X31A6949	35	
15	22X31A6915	31	✓	50	22X31A6950	42	
16	22X31A6916	35	✓	51	22X31A6951	23	
17	22X31A6917	21	✓	52	22X31A6952	25	
18	22X31A6918	37	✓	53	22X31A6953	44	
19	22X31A6919	22	✓	54	22X31A6954	31	
20	22X31A6920	40	✓	55	22X31A6955	11	
21	22X31A6921	14	✓	56	22X31A6956	31	
22	22X31A6922	21	✓	57	22X31A6957	28	
23	22X31A6923	25	✓	58	22X31A6958	22	
24	22X31A6924	33	✓	59	22X31A6959	10	
25	22X31A6925	24	✓	60	22X31A6960	28	
26	22X31A6926	27	✓	61	22X31A6961	23	
27	22X31A6927	31	✓	62	22X31A6962	15	
28	22X31A6928	40	✓	63	22X31A6963	13	
29	22X31A6929	49	✓	64	22X31A6964		
30	22X31A6930	48	✓	65			
31	22X31A6931	56	✓	66			
32	22X31A6932	27	✓	67			
33	22X31A6933	37	✓	68			
34	22X31A6934	31	✓	69			
35	22X31A6935	42	✓	70			
Max Marks		60					
Class Average mark		30		<b>Attainment Level</b>		<b>% students</b>	
Number of students performed above the target		33		1		40%	
Number of successful students		63		2		50%	
Percentage of students scored more than target		52%		3		60%	
<b>Attainment level</b>		<b>3</b>					



# SRI INDU INSTITUTE OF ENGINEERING AND TECHNOLOGY



Department of Humanities & Sciences

## Course Outcome Attainment

Name of the faculty: <u>V.SUJATHA</u>	Academic Year: <u>2022-2023</u>
Branch & Section: <u>IOT</u>	Examination: <u>I Internal</u>
Course Name: <u>M&amp;C</u>	Year: <u>I</u>
	Semester: <u>I</u>

Course Outcomes	1st Internal Exam	2nd Internal Exam	Internal Exam	University Exam	Attainment Level
CO1	3.00		3.00	3.00	3.00
CO2	3.00		3.00	3.00	3.00
CO3	3.00	3.00	3.00	3.00	3.00
CO4		3.00	3.00	3.00	3.00
CO5		3.00	3.00	3.00	3.00
CO6		3.00	3.00	3.00	3.00
<b>Internal &amp; University Attainment:</b>			3.00	3.00	
<b>Weightage</b>			30%	70%	
<b>CO Attainment for the course (Internal, University)</b>			0.90	2.10	
<b>CO Attainment for the course (Direct Method)</b>			3.00		
<b>Overall course attainment level</b>					<b>3.00</b>



# SRI INDU INSTITUTE OF ENGINEERING & TECHNOLOGY

Department of Humanities & Sciences

## Program Outcome Attainment (from Course)

Name of Faculty:	V.SUJATHA	Academic Year:	2022-2023
Branch & Section:	IOT	Year:	I
Course Name:	M&C	Semester:	I

### CO-PO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2		1	1							1		
CO2	3	2		1	1							1		
CO3	2	2		1	1							1		
CO4	2	3		1	1							2		
CO5	3	2		1	1							2		
CO6	3	2		1	1							2		
<b>Course</b>	<b>2.67</b>	<b>2.17</b>		<b>1.00</b>	<b>1.00</b>							<b>1.50</b>		

CO	Course Outcome Attainment
	3.00
CO1	3.00
CO2	3.00
CO3	3.00
CO4	3.00
CO5	3.00
CO6	3.00
<b>Overall course attainment level</b>	<b>3.00</b>

### PO-ATTAINMENT

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO Attainment	2.67	2.17		1.00	1.00							1.50

CO contribution to PO - 33%, 67%, 100% (Level 1/2/3)



**SRI INDU INSTITUTE OF ENGINEERING AND TECHNOLOGY**  
**(UGC AUTONOMOUS INSTITUTION)**

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(Approved by AICTE, New Delhi and Affiliated to JNTUH, Hyderabad  
Khalsa Ibrahimpatnam, Sheriguda(V), Ibrahimpatnam(M), Ranga Reddy Dist., Telangana – 501510

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**ATTENDANCE REGISTER**

**Attendance Link :**

<https://drive.google.com/file/d/1RHVCeY6DAgcqf1ZBOjdjDeMR4nBrEbW1/view?usp=sharing>