SRI BHARATHI

ENGINEERING COLLEGE FOR WOMEN

(Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai)

Kaikkurichi, Pudukkottai -622 303

www.sbec.edu.in

NAAC DOCUMENTS

Quality Indicator Frame Work

Criterion – 1

CURRICULAR ASPECTS

Submitted by

IQAC

Internal Quality Assurance Cell

Sri Bharathi Engineering College for Women

SRI BHARATHI ENGINEERING COLLEGE FOR WOMEN

(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

Kaikkurichi, Pudukkottai, Tamil Nadu – 622 303, India

Criterion 1	Curricular Aspects	100

1.1 Curricular Planning and Implementation(20)

1.1.1 The Institution ensures effective curriculum planning and delivery through a well-planned and documented process including Academic calendar and conduct of continuous internal Assessment

Table of contents

SRI BHARATHI ENGINEERING COLLEGE FOR WOMEN

(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)
Kaikkurichi, Pudukkottai, Tamil Nadu – 622 303, India

DEPARTMENT OF SCIENCE AND HUMANITIES

PREFACE OF THE COURSE FILE

Batch : **2021-2025**

Academic Year : **2021-2022 / ODD**

Program : **CIVIL,ECE&EEE**

Year & Semester : **1st Year / 1st Semester / 'B' Section**

Course Code : **MA3151** NBA Course Code: **C102**

Name of the Course : **MATRICES AND CALCULUS**

Faculty in-charge : **Ms.N.VITHYA,AP/MATHS**

Signature of the Faculty incharge

HoD / S&H

Dr. S.THILAGAVATHI M.E.,Ph.D.,
PRINCIPAL
SRI BHARATHI ENGINEERING
COLLEGE FOR WOMEN
Kaikkurchi - 622 303, Pudukkottai Dt.

HOD/S&H
SRI BHARATHI ENGINEERING
COLLEGE FOR WOMEN
KAIKKURICHI
PUDUKKOTTAI - 622 303.

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DEPARTMENT OF SCIENCE AND HUMANITIES

REVIEW OF COURSE FILE

(To be pasted on the inner side of the file-backside).(#-State Yes/No.)

S.No	Details Date:	R-I-*	R-II-*&	R-III-*&	R-IV-*&$	R-V-*&$@
1.	Preface of the course file	Yes				
2.	Vision, Mission, PEOs, POs, PSOs, Blooms taxonomy	Yes				
3.	Subject handlers of yesteryears					
4.	Timetable/Workload of the staff – Distribution of teaching load – Roles and Responsibilities	Yes				
5.	Syllabus signed by staff & HoD	Yes				
6.	Lecture Schedule signed by staff & HoD	Yes				
7.	Course Committee meeting circular and minutes	Yes				
8.	Identification of Curricular gap and Content Beyond the syllabus	Yes				
9.	Self-study topics	Yes				
10.	Previous AU Question papers	Yes				
11.	Unit wise Q&A and Objective type questions	Yes				
12.	Unit wise course material	Yes				
13.	Assignment question paper with sample answer sheets and mark entry		Yes			
14.	Tutorial question paper with key and mark entry		Yes			
15.	Class test/IA test Q Paper with Key, sample answer papers and mark entry		Yes			
16.	IA Test- result analysis-CAP-evidence-root cause analysis.		Yes			
17.	Retest –Q paper-Attendance-marks		Yes			
18.	AU Web portal entry sheet		Yes			
19.	Very poor performance in first two tests-action taken.-communication to parents-evidence					
20.	Absence for two tests-action taken-communication to parents-evidence.					
21.	Indiscipline of student reported, if any					
22.	Special class/coaching class/remedial class/attendance-CAP					
23.	Conduct of Seminar, Quizzes - proof					
24.	Content beyond the syllabus - proof				Yes	
25.	Student feedback on faculty				Yes	
26.	Course end survey					
27.	Internal Assessment sheet				Yes	
28.	AU question paper with students feedback					
29.	Discrepancy of the question paper and correspondence, if any					
30.	AU result analysis-Details of arrear students.					
31.	AU grade sheet					Yes
32.	CO – PO & PSO attainment sheet					Yes
	Signature of Course handling faculty	N.Vidhya	N.Vidhya	N.Vidhya	N.Vidhya	N.Vidhya
	Signature of HoD/ S&H	R.Sethi	R.Sethi	R.Sethi	R.Sethi	R.Sethi

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ACADEMIC YEAR (2021 – 2022) -ODD SEMESTER

INDIVIDUAL STAFF WORKLOAD FOR FIRST YEAR

S. NO	STAFF NAME	SUBJECT CODE & NAME	YEAR & DEPT	NO OF HOURS	TOTAL HOURS
1	Ms.R.Rajeswari	**MA8351**- Discrete Mathematics	II(CSE)	05	10
		MA8353- Transforms &Partial Differential Equations	II(EEE&CIVIL)	05	
2	Mrs.N.Vithya	**MA3151**- Matrices and Calculus	I- SEC B (ECE,EEE,CIVIL)	06	11
		MA8551- Algebra and Number Theory	III(CSE)	05	
3	Ms.R.Divya	**MA3151**- Matrices and Calculus	I- SEC-A (CSE)	06	11
		MA8352- Linear Algebra &Partial Differential Equations	II(ECE)	05	
4	Mrs.R.Saratha	**PH3151**-Engineering Physics	I SEC A(CSE)	05	05
5	Mrs.V.Vinojini	**PH3151**-Engineering Physics	I SEC-B (CIVIL,ECE&EEE)	05	05
6	Mrs.T.Renugadevi	**BS3171**-Physics Laboratory	I SEC-A & SEC-B (CSE,CIVIL, ECE&EEE)	06	06
7	Ms.T.Annalakshmi	**CY3151**-Engineering Chemistry	I SEC A(CSE)	04	07
		BS3171-Chemistry Laboratory	I SEC A(CSE)	03	
8	Mrs.S.Renugadevi	**CY3151**-Engineering Chemistry	I SEC-B (CIVIL,ECE&EEE)	04	07
		BS3171-Chemistry Laboratory	I SEC-B (CIVIL,ECE&EEE)	03	
9	Mr.S.Ramesh Raja	**HS3151**- Professional English - I	I-SEC-A(CSE)	05	08
		Communicative English	I-SEC-B(CIVIL,ECE&EEE)	01	
		HS8381- Interpersonal Skills / Listening and Speaking	II(ECE&CIVIL)	02	
10	Mrs.P.Alagumathi	**HS3151**- Professional English - I	I-SEC-B (CIVIL,ECE&EEE)	05	10
		Communicative English	I-SEC A(CSE)	01	
		HS8381- Interpersonal Skills / Listening and Speaking	II(CSE)	02	
		HS8581- Professional communication Lab	III(EEE)	02	

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Dr. S.THILAGAVATHI M.E.,P
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MA3151 **MATRICES AND CALCULUS** **L T P C**
3 1 0 4

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.

UNIT-IMATRICES **9 + 3**

Eigen values and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors–Cayley-Hamilton theorem–Diagonalization of matrices by orthogonal transformation–Reduction of a quadratic form to canonical form by orthogonal transformation–Nature of quadratic forms–Applications: Stretching of an elastic membrane.

UNIT-II DIFFERENTIALCALCULUS **9 + 3**

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Implicit differentiation - Logarithmic differentiation -Applications: Maxima and Minima of functions of on a variable.

UNIT-III FUNCTIONSOFSEVERALVARIABLES **9 + 3**

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables –Applications: Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

UNIT-IV INTEGRALCALCULUS **9 + 3**

Definite and Indefinite integrals - Substitution rule - Techniques of Integration: Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals -Applications: Hydrostatic force and pressure, moments and centers of mass.

UNIT – V MULTIPLEINTEGRALS **9 + 3**

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves–Triple integrals–Volume of solids–Change of variables in double and triple integrals –Applications: Moments and centers of mass, moment of inertia.

TOTAL: 60 PERIODS

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COURSE OUTCOME

At the end of the course, the student should be able to:

- Use the matrix algebra methods for solving practical problems.
- Apply differential calculus tools in solving various application problems.
- Describe the partial differential equations with initial and Lagrange's method by using certain techniques with engineering applications.
- Carry out the differentiation to solve maxima and minima problems.
- Explain different methods of integration in solving practical problems.
- Determine multiple integral ideas in solving areas, volumes and other practical problems.

TEXT BOOK

1. Kreyszig.E, "*Advanced Engineering Mathematics*", John Wiley and Sons, 10th Edition, New Delhi, 2016.
2. Grewal.B.S., "*Higher Engineering Mathematics*", Khanna Publishers, 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].

REFERENCES

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.
4. Narayanan. S. and Manicavachagom Pillai. T. K., "*Calculus*" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.
5. Ramana. B.V., "*Higher Engineering Mathematics*", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.
6. Srimantha Pal and Bhunia. S.C, "*Engineering Mathematics*" Oxford University Press, 2015.
7. Thomas. G. B., Hass. J, and Weir. M.D, "*Thomas Calculus*", 14th Edition, Pearson India, 2018.

Faculty Incharge **HoD/S&H**

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DEPARTMENT OF S&H
COURSE PLAN

Sub Code :MA3151	**Branch/Year/Sem:CIVIL,ECE&EEE/I/I**
Sub Name :Matrices and calculus	**Batch :2021-2025**
Staff Name:Ms.N.VITHYA	**Academic Year :2021-2022(ODD)**

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.

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REFERENCES

R1. Anton. H, Bivens. I and Davis. S, "*Calculus*", Wiley, 10th Edition, 2016

R2. Bali. N., Goyal. M. and Watkins. C., "*Advanced Engineering Mathematics*", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.

R3. Jain . R.K. and Iyengar. S.R.K., "*Advanced Engineering Mathematics*", Narosa Publications, New Delhi, 5th Edition, 2016.

R4. Narayanan. S. and Manicavachagom Pillai. T. K., "*Calculus*" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.

R5. Ramana. B.V., "*Higher Engineering Mathematics*", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.

R6. Srimantha Pal and Bhunia. S.C, "*Engineering Mathematics*" Oxford University Press, 2015.

R7. Thomas. G. B., Hass. J, and Weir. M.D, "*Thomas Calculus*", 14th Edition, Pearson India, 2018.

WEBSITE RESOURSE

W1: https://www.cuemath.com/calculus/maxima-and-minima/

W2: **https://www.cliffsnotes.com/study-guides/calculus/calculus/integration/integration-techniques**

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TEACHING METHODOLOGIES

- **BB** BLACK BOARD
- **PPT**

MA3151 MATRICES AND CALCULUS L T P C
3 1 0 4

UNIT-I MATRICES 9 + 3

Eigen values and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors–Cayley-Hamilton theorem–Diagonalization of matrices by orthogonal transformation–Reduction of a quadratic form to canonical form by orthogonal transformation–Nature of quadratic forms–Applications: Stretching of an elastic membrane.

UNIT-II DIFFERENTIALCALCULUS 9 + 3

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Implicit differentiation - Logarithmic differentiation - Applications: Maxima and Minima of functions of on a variable.

UNIT-III FUNCTIONSOFSEVERALVARIABLES 9 + 3

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables –Applications: Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

UNIT-IV INTEGRALCALCULUS 9 + 3

Definite and Indefinite integrals - Substitution rule - Techniques of Integration: Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals -Applications: Hydrostatic force and pressure, moments and centers of mass.

UNIT – V MULTIPLEINTEGRALS 9 + 3

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves–Triple integrals–Volume of solids–Change of variables in double and triple integrals –Applications: Moments and centers of mass, moment of inertia.

TOTAL: 60 PERIODS

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Topic No	Topic Name	Books For reference	Page No	Teaching Methodology	No of periods required	Cumulative periods
UNIT-I	**MATRICES**					**[12]**
1.	Introduction to matrices	T2	26-40	BB	1	1
2.	Types of matrices	T2	41-52	BB	1	2
3.	Eigen values and Eigenvectors of a real matrix	T2	54-57	BB	1	3
4.	Characteristic equation	T2	52-54	BB	1	4
5.	Properties of Eigen values and Eigenvectors	T2	57-58	BB	1	5
6.	Cayley-Hamilton theorem	T2	58-61	BB	1	6
7.	Diagonalization of matrices by orthogonal transformation	T2	61-64	BB	1	7
8.	Reduction of a quadratic form to canonical form by orthogonal transformation	T2	64-65	BB	1	8
9.	Reduction of a quadratic form to canonical form by orthogonal transformation	T2	66-67	BB	1	9
10.	Nature of quadratic forms	T2	121-125	BB	1	10
11.	Applications: Stretching of an elastic membrane.	T2	125-135	BB	1	11
12.	Tutorial.					12

LEARNING OUTCOME:

At the end of unit , the students will be able to

- Define matrices concepts.
- Know the fundamentals of matrix, types of matrices, Eigen values and Eigen vectors of matrices, Diagonalization of matrices, reduction of quadratic form.
- Understand the application of matrices in stretching of an elastic membrane.

UNIT II	**DIFFERENTIAL CALCULUS**					**[12]**
13.	Representation of functions	R1	1-30	BB	1	13
14.	Representation of functions	R1	31-48	BB	1	14
15.	Limit of a function	R1	49-61	BB	1	15
16.	Limit of a function	R1	62-80	BB	1	16
17.	Continuity	R1	90-101	BB	1	17
18.	Derivatives	R1	110-122	BB	1	18
19.	Derivatives Differentiation rules (sum, product, quotient, chain rules)	R1	134-148	BB	1	19
20.	Derivatives Differentiation rules (sum, product, quotient, chain rules)	R1	148-160	BB	1	20
21.	Implicit differentiation, Logarithmic differentiation	R1	161-167	BB	1	21

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22.	Applications: Maxima and Minima of functions of on a variable.	W1		PPT	1	22
23.	Applications: Maxima and Minima of functions of on a variable.	R1	220-230	BB	1	23
24.	Tutorial				1	24

LEARNING OUTCOME:

At the end of unit, the students will be able to

- Understand the concept of two differential calculus.
- Define the concept of function, limits, continuity, derivatives, differentiation rules and application of differential calculus.

UNIT – III FUNCTIONS OF SEVERAL VARIABLES [12]

25.	Partial differentiation	R1	906-920	BB	1	25
26.	Partial differentiation	R1	920-927	BB	1	26
27.	Homogeneous functions and Euler's theorem	R1	928-937	BB	1	27
28.	Total derivative	R1	949-956	BB	1	28
29.	Change of variables	R1	1056-1060	BB	1	29
30.	Jacobians	R1	1061-1071	BB	1	30
31.	Partial differentiation of implicit functions	R1	940-949	BB	1	31
32.	Taylor's series for functions of two variables	R1	948-659	BB	1	32
33.	Applications: Maxima and minima of functions of two variables	R1	971-975	BB	1	33
34.	Applications: Maxima and minima of functions of two variables	R1	975-977	BB	1	34
35.	Lagrange's method of undetermined multipliers.	R1	977-980	BB	1	35
36.	Tutorial			BB	1	36

LEARNING OUTCOME:

At the end of unit, the students will be able to

- Understand the concept of functions of several variables.
- Gain knowledge about classification partial differential equations, homogeneous functions and Euler's theorem, Jacobians, Taylor's theorem, application of partial differential equations.

UNIT-IV INTEGRAL CALCULUS [12]

37.	Integrals	R1	265-271	BB	1	37
38.	Definite integrals	R1	300-309	BB	1	38
39.	Indefinite integrals	R1	271-281	BB	1	39
40.	Substitution rule	R1	281-287	BB	1	40
41.	Techniques of Integration: Integration by parts	W2		PPT	1	41
42.	Trigonometric integrals ,Trigonometric substitutions	R1	500-508	BB	1	42

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43.	Integration of rational functions by partial fraction	**R1**	508-514	BB	1	43
44.	Integration of irrational functions Improper integrals	**R1**	533-540	BB	1	44
45.	Integration of irrational functions Improper integrals	**R1**	540-547	BB	1	45
46.	Applications: Hydrostatic force and pressure	**R1**	382-390	BB	1	46
47.	Applications of calculus(CBS)	**R1**	391-394	PPT		
48.	Tutorial			BB		

LEARNING OUTCOME:

At the end of unit , the students will be able to

- Understand the concept of Integration.
- Known about various techniques to solve integration.
- Get the knowledge about application of integration in Hydrostatics forces and pressure.

UNIT-V MULTIPLE INTEGRATION [12]

49.	Double integrals	**R1**	1000-1018	BB	1	49
50.	Change of order of integration	**R1**	1048-1050	BB	1	50
51.	Change of order of integration	**R1**	1050-1058	BB	1	51
52.	Double integrals in polar coordinates	**R1**	1009-1018	BB	1	52
53.	Area enclosed by plane curves	**R1**	1018-1021	BB	1	53
54.	Area enclosed by plane curves	**R1**	1021-1026	BB	1	54
55.	Triple integrals	**R1**	1026-1030	BB	1	55
56.	Volume of solids	**R1**	1030-1049	BB	1	56
57.	Change of variables in double and triple integrals	**R1**	1045-1048	BB	1	57
58.	Change of variables in double and triple integrals	**R1**	1058-1060	BB	1	58
59.	Applications: Moments and centers of mass	**R1**	1060-1065	BB	1	59
60.	Tutorial				1	60

LEARNING OUTCOME:

At the end of unit , the students will be able to

- Understand the concept of Multiple integration.
- Know about the concept of finding area, volume, change of variables.
- To know the application of multiple integrals in moments and centers of mass.

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COURSE OUTCOME

At the end of the course, the student should be able to:

- Use the matrix algebra methods for solving practical problems.
- Apply differential calculus tools in solving various application problems.
- Describe the partial differential equations with initial and Lagrange's method by using certain techniques with engineering applications.
- Carry out the differentiation to solve maxima and minima problems.
- Explain different methods of integration in solving practical problems.
- Determine multiple integral ideas in solving areas, volumes and other practical problems.

CONTENT BEYOND THE SYLLABUS:APPLICATION OF CALCULUS

- Application of calculus.

CONTINUES INTERNAL ASSESSMENT DETAILS

ASSESMENT NUMBER	I	II
UNIT	1^{st},2^{nd} ,3^{rd} (Half)	3^{rd} (Half),4^{th} & 5^{th} Units

ASSIGNMENT DETAILS

ASSIGNMENT	I	II	III	IV	V
DATE OF SUBMISSION	30.11.2021	13.12.2021	21.01.2022	04.02.2022	03.03.2022

ASSIGNMENT NUMBER	UNIT	DESCRIPTIVE QUESTIONS/TOPIC (Minimum of 8 Pages)
1	I	Problems based on Eigen values and Eigen vectors, Cayley Hamilton theorem
2	II	Problems based on limits and continuous
3	III	Problems based on partial differential equations
4	IV	Problems based on Integration and Reduction formula
5	V	Problems based on double integraL

PREPARED BY

Ms.N.VITHYA, AP/MATHS

VERIFIED BY

HOD/S&H

HOD / S&H
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KAIKKURICHI
PUDUKKOTTAI - 622 303.

APPROVED BY

Dr. S.THILAGAVATHI M.E.,Ph.D.,
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PRINCIPAL

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KAIKKURICHI - 622 303.
PUDUKKOTTAI DISTRICT
15/11/21

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DEPARTMENT OF SCIENCE AND HUMANITIES

Ref: SBECW/ S&H/ Course committee meeting / MC/ 2021-2022 (Odd) DATE:22.11.21

COURSE COMMITTEE MEETING-MA3151-MATRICES AND CALCULUS

ACADEMIC YEAR/SEM: 2021-2022/ODD

PROGRAM : BE-CIVIL,ECE&EEE
REGULATION : 2021
SEM : 01

DATE OF MEETING : 22.11.21
TIME : 01.00PM
VENUE : S&H Dept. HoD Cabin

Members Present

Table.1 Course committee members

S.No.	Name of the faculty & Designation, Program	Sem/Sec/Program	Signature
1.	Ms.N.Vithya, AP/MATHS	I SEM/B/S&H	
2.	Ms.R.Divya, AP/MATHS	I SEM/A/S&H	

HOD welcomed all the members present

1. Unit wise syllabus discussed. Nature of qualitative, quantitative, problematic, theoretical concepts etc. have been discussed.

Table.2 Allocation of Period

Number of period per unit	Total number of Peroids	Tutorials
12	60	15

2. Vision and mission of the college, department discussed. POs, PEOs, PSOs discussed.
3. Course outcomes finalized for each units.

Table.2 Course Outcomes

CO	Course Outcomes	POs	PSOs
C102.1	Use the matrix algebra methods for solving practical problems.	1,2,3,4,10,12	2
C102.2	Apply differential calculus tools in solving various application problems.	1,2,3,4,10,12	2
C102.3	Describe the partial differential equations with initial and Lagrange's method by using certain techniques with engineering applications.	1,2,3,4,10,12	2
C102.4	Carry out the differentiation to solve maxima and minima problems.	1,2,3,4,10,12	2
C102.5	Explain different methods of integration in solving practical problems.	1,2,3,4,10,12	2
C102.6	Determine multiple integral ideas in solving areas, volumes and other practical problems.	1,2,3,4,10,12	2

4. Mapping of COs with POs and PSOs is done with suitable correlation levels(1 for low, 2 for medium, 3 for high,"-" for no correlation, before content beyond syllabus)

Table.3 Mapping of COs, C, PSOs with POs- before CBS.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C102.1	3	3	2	2	-	-	-	-	-	1	-	1	-	2	-
C102.2	3	3	2	2	-	-	-	-	-	1	-	1	-	2	-
C102.3	3	3	2	2	-	-	-	-	-	1	-	1	-	2	-
C102.4	3	3	2	2	-	-	-	-	-	1	-	1	-	2	-
C102.5	3	3	2	2	-	-	-	-	-	1	-	1	-	2	-
C102.6	3	3	2	2	-	-	-	-	-	1	-	1	-	2	-
C102	3	3	2	2	-	-	-	-	-	1	-	1	-	2	-

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5. Identification of content beyond syllabus- curricular gaps are identified considering industry needs, employers feedback, alumni feedback, government policy on industrialization, new investments by private/ public sectors, societal needs and level of correlation of COs with POs and PSOs. Accordingly the details of CBS added and its correlation is given below.

Table.4 Identification of content beyond syllabus

Content beyond syllabus added	POs strengthened/Vacant filled	CO/Unit
Applications of integrals calculus	PO4(2) Vacant filled	C102.2 & C102.5/ II&IV

6. Mapping of COs with POs, PSOs- after CBS.

Table.5 Mapping of COs, C, PSOs with POs- after CBS.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C102.1	3	3	2	2	-	-	-	-	-	1	-	1	-	2	-
C102.2	3	3	2	*2	-	-	-	-	-	1	-	1	-	2	-
C102.3	3	3	2	2	-	-	-	-	-	1	-	1	-	2	-
C102.4	3	3	2	2	-	-	-	-	-	1	-	1	-	2	-
C102.5	3	3	2	*2	-	-	-	-	-	1	-	1	-	2	-
C102.6	3	3	2	2	-	-	-	-	-	1	-	1	-	2	-
C102	3	3	2	2	-	-	-	-	-	1	-	1	-	2	-

7. Content beyond syllabus is thus identified based on the above. Plan for handling of CBS by internal/external resource person/ industrial visits are decided. This will be included in the class log book.
8. Lecture schedule should be prepared unit wise, as in the syllabus. Number of periods per unit and total number of periods planned should not be less than, periods allotted in the syllabus of Anna University.
9. Plan for additional Periods for cycle tests, CBS, NPTEL delivery, Seminar, Quiz etc are to be incorporated in the lecture schedule. These periods are added exclusive of number of periods prescribed in the syllabus.
10. Plan for at least three assignments (with level of correlation), seminar topic, quiz questions discussed.
11. Separate tutorial sheets should be prepared and supplied to all students. Minimum Three periods per unit to be planned, totally 15 tutorial periods. Minimum 3 tutorial questions should be set per unit, totally 15 tutorial questions.
12. Bright students and slow learners are to be identified, immediately after cycle test - I. such students may be counselled suitably and the evidence for counselling to be recorded in the attendance cum assessment record. (Sign of students with date and time of counselling, to be strictly recorded and to be attached in the course file).
13. For those students secured less than 60% in the cycle Test, Makeup test should be conducted. Correspondingly root cause analysis for reasons of failure, corrective and preventive action, and follow up action taken should be filed properly.
14. Contents of course file to be reviewed periodically.
15. Lecture schedule, assignment questions, tutorial questions, course materials, AU questions (at least 5) should be supplied within one week after the commencement of classes.
16. Course material should be uploaded in the college website for student's reference.
17. Discrepancy in question paper, if any to be informed to the controller of examinations through web portal entry, after getting approval from the HoD & the Principal. Critically asked questions, if any to be discussed with the students of the next batch.
18. Immediately after the publication of the results, analysis are to be carried out and follow up action to be taken for the failures.
19. Cycle test question papers should be set as per the norms of the college, incorporating marks for learning outcomes and course outcomes. Common question papers should be set.
20. Certificate courses/Workshop/guest lectures may be planned inviting experts from industry/higher learning institutions.
21. After cycle test, an objective type tests may be conducted (3 times in a semester-30 minutes duration-maximum 10 questions). Questions asked in GATE, TANCET, IES or any other Competitive examination can be taken as a reference. This is to facilitate the bright students to prepare for higher level of thinking and to enhance placement and higher studies opportunities.
22. Cycle test papers, assignment papers or any other papers submitted by the students, should be returned to the students within 5 days after correction. Sample paper should be suitably filed.
23. Long absentees of students if any to be informed to the parents through class coordinator, if such students attendance less than 75%.

Course coordinator

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DEPARTMENT OF SCIENCE AND HUMANITIES

Identification of Curricular Gap & Content Beyond Syllabus(CBS)

Name of the Faculty :Ms.N.Vithya **Course Code & Name:MA3151-Matrices nad Calculus**

Degree & Program:B.E-CIVIL,ECE&EEE Semester & Section: I/ B Academic Year: 2021-2022 /ODD

I.Mapping of Course Outcomes with POs & PSOs.(before CBS)

Table.1 Mapping of COs, C, PSOs with POs - before CBS.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C102.1	3	3	2	2	-	-	-	-	-	1	-	1	-	2	-
C102.2	3	3	2	2	-	-	-	-	-	1	-	1	-	2	-
C102.3	3	3	2	2	-	-	-	-	-	1	-	1	-	2	-
C102.4	3	3	2	2	-	-	-	-	-	1	-	1	-	2	-
C102.5	3	3	2	2	-	-	-	-	-	1	-	1	-	2	-
C102.6	3	3	2	2	-	-	-	-	-	1	-	1	-	2	-
C102	3	3	2	2	-	-	-	-	-	1	-	1	-	2	-

II. Identification of content beyond syllabus.

Table.2 Identification of content beyond syllabus

Details of Content Beyond Syllabus(CBS) added	POs strengthened/ vacant filled	CO/Unit
Applications of integrals calculus	PO5(2) Vacant filled	C102.2 & C102.5/ II&IV

III. Mapping of Course Outcomes with POs & PSOs. (After CBS)

Table.3 Mapping of COs, C, PSOs with POs- after CBS.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C102.1	3	3	2	2	-	-	-	-	-	1	-	1	-	2	-
C102.2	3	3	2	2	-	-	-	-	-	1	-	1	-	2	-
C102.3	3	3	2	2	-	-	-	-	-	1	-	1	-	2	-
C102.4	3	3	2	2	-	-	-	-	-	1	-	1	-	2	-
C102.5	3	3	2	2	-	-	-	-	-	1	-	1	-	2	-
C102.6	3	3	2	2	-	-	-	-	-	1	-	1	-	2	-
C102	3	3	2	2	-	-	-	-	-	1	-	1	-	2	-

Signature of the Faculty

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DEPARTMENT OF SCIENCE AND HUMANITIES

Assignment Question Paper

Assignment – 04				Date of Issue:	02.01.2022	Marks	10
Course code	MA3151	Course Title	MATRICES AND CALCULUS				
Year	I	Semester/Section	I / B	Date of Submission:	06.01.2022		

Q.No	Questions	CO
1	For the function $f(x) = 2 + 2x^2 - 4x^4$, find the intervals of increase or decrease, local maximum and minimum values, the intervals of concavity	C102.2
2	Find the local maximum and minimum values of $f(x) = \sqrt{x} - \sqrt[4]{x}$ using both first and second derivatives tests.	C102.2
3	Find the local maximum and local minimum of $f(x) = x^4 - 2x^2 + 3$.	C102.2
4	Calculate the absolute maximum and minimum of the function $f(x) = 3x^4 - 4x^3 - 12x^2 + 1$ in $[-2,3]$.	C102.2

Name and Signature of the Faculty Incharge [N.vithya]

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DEPARTMENT OF SCIENCE AND HUMANITIES

Assignment Answer Sheet

Name of the Student :

AU Register Number:

Assignment – 04				Date of Issue:	02.01.2022	Marks	10
Course code	MA3251	Course Title	MATRICES AND CALCULUS				
Year	I	Semester/Section	I /B	Date of Submission:	06.01.2022		

Q.No	Questions	CO
1	For the function $f(x) = 2 + 2x^2 - 4x^4$, find the intervals of increase or decrease, local maximum and minimum values, the intervals of concavity	C102.2
2	Find the local maximum and minimum values of $f(x) = \sqrt{x} - \sqrt[4]{x}$ using both first and second derivatives tests.	C102.2
3	Find the local maximum and local minimum of $f(x) = x^4 - 2x^2 + 3$.	C102.2
4	Calculate the absolute maximum and minimum of the function $f(x) = 3x^4 - 4x^3 - 12x^2 + 1$ in $[-2,3]$.	C102.2

Mark Allocation

Rubrics	Marks Allocated	Marks obtained
Content Quality	6	5
Presentation Quality	2	2
Timely submission	2	2
Total marks	10	9

Nivitha [N.vithya]
Name and Signature of the Faculty Incharge

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DEPARTMENT OF SCIENCE AND HUMANITIES

Tutorial Question Paper

Tutorial – 02			Date of Issue:	14.12.2021	Marks	10
Course code	MA3151	Course Title	MATRICES AND CALCULUS			
Year	I	Semester/Section	I / B	Date of Submission:	16.12.2021	

Q.No	Questions	CO
1	Using Cayley-Hamilton theorem find $A^{-1}, if\ A = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 2 & 1 \\ -2 & -4 & -4 \end{pmatrix}$	C102.1
2	Use Cayley-Hamilton theorem to find the value of the matrix given by $f(A) = A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 - 2A + I$ $IF\ A = \begin{pmatrix} 2 & -1 & 2 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{pmatrix}$	C102.1
3	Reduce the quadratic form $Q = 6x^2 + 3y^2 + 3z^2 - 4xy - 2yz + 4xz$ canonical form by an orthogonal reduction. Hence find its nature.	C102.1

N. Vithya [N. Vithya]
Name and Signature of the Faculty Incharge

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DEPARTMENT OF SCIENCE AND HUMANITIES

Tutorial Answer Sheet

Name of the Student :

AU Register Number:

Tutorial – 02			Date of Issue:	14.12.2021	Marks	10
Course code	MA3152	Course Title	MATRICES AND CALCULUS			
Year	I	Semester/Section	I/B	Date of Submission:	16.12.2021	

Q.No	Questions	CO
1	Using Cayley-Hamilton theorem find $A^{-1}, if\ A = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 2 & 1 \\ -2 & -4 & -4 \end{pmatrix}$	C102.1
2	Use Cayley-Hamilton theorem to find the value of the matrix given by $f(A) = A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 - 2A + I\ IF\ A = \begin{pmatrix} 2 & -1 & 2 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{pmatrix}$	C102.1
3	Reduce the quadratic form $\boldsymbol{Q = 6x^2 + 3y^2 + 3z^2 - 4xy - 2yz + 4xz}$ canonical form by an orthogonal reduction. Hence find its nature.	C102.1

Mark Allocation

Rubrics	Marks Allocated	Marks obtained
Problem solving approach	6	5
Correctness of Answer	2	2
Timely submission	2	2
Total marks	10	9

Name and Signature of the Faculty Incharge N.Vithya / N.Vithya

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IQAC Academic Audit Form

ACADEMIC YEAR: 2021-2022 ODD SEMESTER

Name of Department :	CIVIL, ECE, EEE.	Year / Sem / Sec :	I / I / B	No. of Students Registered :	22
Details of Examination :	CT–1 / CT-2 / CT-3				

S.No.	Course Code	List of Reg.No Verified	Course Log Book Verified (Y / N)	Course File Verified (Y / N)	No of students Passed	No of Absenteees	No of Failures	Pass %	Remarks
1.	HS3151	912621106001	Y	Y	22	-	-	100%	-
2.	GE3151	912621106001	Y	Y	22	-	-	100%	-
3.	MA3151	912621106004	Y	Y	15	03	04	78%	-
4.	PH3151	912621106008	Y	Y	20	-	02	90%	-
5.	CY3151	912621106004	Y	Y	19	-	03	86%	-

Verified by

External Member Name and Signature:	Gr. Sugapriya [Sugapriya]
Internal Member Name and Signature:	R. Sathya [R. SARATHA]

Overall Remarks:

Try to improve Pass percentage in MA3151

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IQAC Co ordinator 18/2/22

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Principal 18/2/22

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DEPARTMENT OF SCIENCE AND HUMANITIES

SUBJECT CODE &TITLE : MA3151& Matrices and calculus

YEAR/SEM/SEC : I/I/

SECTION/BRANCH : B /CIVIL,ECE&EEE

STUDENT FEEDBACK ON FACULTY

S.NO.	DESCRIPTION	SCORED OUT OF 4	SCORED OUT OF 100
1.	Syllabus coverage as prescribed by university	3.5	87
2.	Technical knowledge of the teacher	3.7	92
3.	Teacher's communication skill	3.8	96
4.	Regularity in taking classes	3.6	89
5.	Helping the students in conducting the experiment through set of instruction and demonstrations	3.8	96
6.	Tendency of inviting opinion and question on subject matter from students	3.7	93
7.	Knowledge of the Teacher in latest development of field	3.8	96
8.	Perfectness of valuation	3.8	95
	OVERALL SCORE	3.7	93

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REPORT SHEET

S .NO	REG.NO	NAME	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
1.	912621103001	AKILA.G	4	3	4	3	4	3	4	4
2.	912621103002	GAYATHRI.G	3	4	4	4	4	3	4	4
3.	912621103003	JAYABHARATHI.R	3	4	4	3	4	4	4	4
4.	912621103004	JAYA MANOHARI.B	4	4	4	4	4	4	3	4
5.	912621103005	PRIYADHARSHINI.A	3	3	4	4	3	4	4	4
6.	912621103006	RABIA BANU.M	3	4	4	3	4	4	4	4
7.	912621103007	SHERLIN KAVYA.B	4	4	4	4	4	3	4	4
8.	912621106001	AMRIN. M	4	4	4	4	4	4	4	4
9.	912621106002	BHUVANESWARI.C	3	4	4	3	4	4	4	4
10.	912621106003	DHANYASHREE.A	4	3	4	3	4	4	3	3
11.	912621106004	KALAIVANI.R	3	4	3	3	3	4	3	4
12.	912621106005	KAVIYA.K	4	4	3	4	4	4	4	4
13.	912621106006	KEERTHANA.V	4	4	4	4	4	3	4	4
14.	912621106007	PAVITHRA.P	4	3	4	4	4	4	4	3
15.	912621106008	RAJESHWARI.R	3	3	4	3	4	4	4	4
16.	912621106009	SUBALAKSHMI.M	3	4	4	4	4	4	4	3
17.	912621106010	SUGUNA.C	4	3	4	3	4	4	4	4
18.	912621105001	GOKULA PRAVEENA.A	4	4	3	3	4	4	4	4
19.	912621105002	RAFEEQA.N	3	4	4	4	4	3	3	3
20.	912621105003	RAJESWARI. A	4	4	3	3	3	4	4	4
21.	912621105004	SUMITHRA.S	3	4	4	4	4	4	4	4

EXCELLENT	VERY GOOD	GOOD	AVERAGE	POOR
4	3	2	1	0

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Circular Date: 30.12.2021

The Cycle test I will be conducted from 07.01.2022 to 12.01.2022 for the I semester (I year) students.

The following instructions are to be followed by the faculty members.

- Total marks for which the question paper to be set will be for 60 marks. (**PART A** 10X2=20 **PART B** 2X16=32 & 1X8=8)
- It is the responsibility of the question paper setter to take the Xerox copies of the required number of question papers and it should be handed over to the Exam cell Coordinator Mr. J. Sathyaraj AP/ EEE / Mrs. G. Bhuvaneswari AP/CSE on or before 05.01.2022.
- The Exam Coordinators (exam cell) are requested to make necessary arrangements (hall arrangements, invigilation duty etc.,) for conducting the test.
- Faculty members are requested to handover the valued answer scripts to the students on or before 17.01.2022 and the class in-charges are requested to send the consolidated mark sheet on or before 17.01.2022.

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30/12/21

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Cc:

- All faculty
- Exam cell
- Office file

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Circular

Date: 30.12.2021

The Cycle test I will be conducted from 07.01.2022 to 12.01.2022 for the I semester (I year) B.E students for 60 marks as per the time table given below. Students are directed to prepare well and score good marks.

Date	10.00 am -12.00 pm
07.01.2022	HS3151- Professional English - I
08.01.2022	GE3151- Problem Solving and Python Programming
10.01.2022	MA3151- Matrices and Calculus
11.01.2022	PH3151- Engineering Physics
12.01.2022	CY3151- Engineering Chemistry

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30/12/21

Cc:

- All I year B.E Classes
- All faculty
- Exam cell
- Notice Board
- Office file

Register Number: | | | | | | | | | | |

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Cycle test - I			Date/Session	10.01.22/AN	Marks	100
Course code	MA3151	Course Title	MATRICES AND CALCULUS			
Regulation	2021	Duration	3 hours	Academic Year	2021-2022	
Year	I	Semester/Sec	I/B	Department	CIVIL,ECE,EEE	

COURSE OUTCOMES

C102.1	Use the matrix algebra methods for solving practical problems.
C102.2	Apply differential calculus tools in solving various application problems.
C102.3	Describe the partial differential equations with initial and Lagrange's method by using certain techniques with engineering applications.
C102.4	Carry out the differentiation to solve maxima and minima problems.
C102.5	Explain different methods of integration in solving practical problems.
C102.6	Determine multiple integral ideas in solving areas, volumes and other practical problems.

Q.No.	Question	CO	BTS
	PART A (Answer all the Questions 10 x 2 = 20 Marks)		
1	Find the Eigenvalues of the matrix $\begin{bmatrix} 1 & -2 \\ -5 & 4 \end{bmatrix}$.	C102.1	K3
2	Find the sum and product of all Eigenvalues of the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 2 & 4 \\ 1 & 2 & 7 \end{bmatrix}$ Is the matrix singular?	C102.1	K3
3	Verify Cayley- Hamilton theorem for $A = \begin{pmatrix} 3 & -1 \\ -1 & 5 \end{pmatrix}$.	C102.1	K3
4	If 3 and 2 are the two eigenvalues of $A = \begin{bmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{bmatrix}$ then find A^{-1}	C102.1	K3
5	State Cayley -Hamilton Theorem.	C102.1	K1
6	Find the eigenvalues of $3A + 2I$, where $A = \begin{pmatrix} 5 & 4 \\ 0 & 2 \end{pmatrix}$	C102.1	K3
7	Define differentiation.	C102.2	K1
8	Differentiate the following function $y = x^7 + e^x$.	C102.2	K2
9	Find y', y'' and y''' if $y = x^3 - 6x^2 - 5x + 3$.	C102.2	K3
10	Find $\frac{dy}{dx}$ if $x = at^2, y = 2at$.	C102.2	K3
	PART B (Answer all the Questions 2 x 10 = 20 Marks)		
11a	**(i)** Find all the Eigenvalues and Eigenvectors of the matrix $\begin{pmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{pmatrix}$. **(ii)** The Eigenvalues of a real symmetric matrix are real numbers.	C102.1	K3
	OR		
11b	Verify Cayley-Hamilton theorem find A^{-1} when $A = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 4 & 5 \\ 3 & 5 & 6 \end{pmatrix}$.	C102.1	K3
12a	Use Cayley-Hamilton theorem to find the value of the matrix given by (i) $f(A) = A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 - 2A + I$. (ii) $g(A) = A^8 - 5A^7 + 7A^6 - 3A^5 + 8A^4 - 5A^3 + 8A^2 - 2A + I$ if the matrix $A = \begin{pmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{pmatrix}$.	C102.1	K3

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	OR		
12b	Let $A = \begin{pmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{pmatrix}$ find the matrix P such that $P^{-1}AP$ is a diagonal matrix	**C102.1**	K3
13a	Reduce the quadratic form $Q = 6x^2 + 3y^2 + 3z^2 - 4xy - 2yz + 4zx$ into canonical form by an orthogonal transformation.	**C102.1**	K3
	OR		
13b	**i)**Sketch the graph of the function $f(x) = \begin{cases} 1+x & ; \quad x < -1 \\ x^2 & ; \quad -1 \le x \le 1 \\ 2-x & ; \quad x \ge 1 \end{cases}$ and use it to determine the value of 'a' for which $\lim_{x \to a} f(x)$ exist. **ii)** Evaluate $\lim_{x \to \frac{\pi}{2}} \frac{1+\cos 2x}{(\pi - 2x)^2}$.	**C102.2**	K3
14a	**i)** If $f(x) = \begin{cases} \frac{x^3-8}{x-2} & ,x < 2 \\ ax^2 - bx + 3 & ,2x \le x < 3 \\ 2x - a + b & ,x \ge 3 \end{cases}$ is continuous for all real x,find the value a and b **ii)** Find the domain where the function f is continuous. Also find the numbers at which the function f is discontinuous, where $f(x) = \begin{cases} 1+x^2 & ; \quad x \le 0 \\ 2-x & ; \quad 0 \le x \le 2 \\ (x-2)^2 & ; \quad x \ge 2 \end{cases}$	**C102.2**	K3
	OR		
14b	**i)** Find the value of the constant c is the function f continuous at $(-\infty, \infty)$ $f(x) = \begin{cases} cx^2 + 2x & ; \quad x < 2 \\ 2-x & ; \quad 0 \le x \le 2 \\ (x-2)^2 & ; \quad x \ge 2 \end{cases}$ ii)Find $\frac{dy}{dx}$ if $y = x^2 e^{2x} (x^2+1)^4$.	**C102.2**	K3
15a	(i)Find the local maxima of the function $f(x) = 2x^3 + 3x^2 - 36x$, using first derivative test ii)Find the local maximum and minimum of $f(x) = \sqrt{x} - \sqrt[4]{x}$.	**C102.2**	K3
	OR		
15b	i) Find the interval of concavity and the inflexion points $f(x) = 2x^3 + 3x^2 - 36x$.	**C102.2**	K3

Course Faculty

(Name /Sign / Date)

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Internal Assessment Exam - I

MA3151 - MATRICES AND CALCULUS

PART - A

1.

Ans:

The characteristic equation

$\lambda^2 - c_1\lambda + c_2 = 0$, $c_1 = -3$, $c_2 = -6$ $\longrightarrow$ (1)

$\therefore$ eigen value $\lambda = -3, 2$ $\longrightarrow$ (1)

2.

Ans:

Sum of E.V = 10 $\longrightarrow$ (1)

Product of E.V = -6 $\longrightarrow$ (1)

3.

Ans:

C-R equation : $\lambda^2 - c_1\lambda + c_2 = 0$, $c_1 = 8$, $c_2 = 14$

$\therefore \lambda^2 - 8\lambda + 14 = 0$ $\longrightarrow$ (1)

$\therefore$ The C.H. equation : $A^2 - 8A + 14\lambda = 0$ $\longrightarrow$ (2)

4.

Ans:

Let $\lambda_1 = 3$, $\lambda_2 = 2$, $\lambda_3 = ?$

Sum of e.v $= \lambda_1 + \lambda_2 + \lambda_3 = 1 + 2 + 3$

$3 + 2 + \lambda_3 = 6$

$5 + \lambda_3 = 6$

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$\lambda_3 = 6 - 5$

$\lambda_3 = 1 \longrightarrow (1)$

$\therefore A^{-1} = 1/\lambda_1 , 1/\lambda_2 , 1/\lambda_3$

$\therefore A^{-1} = 1/3 , 1/2 , 1 \longrightarrow (2)$

5. Ans:

Every square matrix satisfies its own characteristic equation. $\longrightarrow$ (2)

6. Ans:

$$3A + 2I = 3\begin{pmatrix} 5 & 4 \\ 0 & 2 \end{pmatrix} + 2\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$$

$$= \begin{pmatrix} 17 & 12 \\ 0 & 4 \end{pmatrix} \longrightarrow (2)$$

7. Ans:

A Function f From a set A to a set B is a rule that assigns to each element $x \in A$ a unique element y in B. $\longrightarrow$ (2)

8. Ans:

$y' = 7x^6 + e^x \longrightarrow (2)$

9. Ans:

$y' = 3x^2 - 12x - 5 \longrightarrow (2)$

$y'' = 6x - 12$

$y''' = 6$

10. Ans:

$dy/dx = dy/dt \,/\, dx/dt \longrightarrow (2)$

$dy/dx = 5$

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PART - B

11. a) i) Ans:

C.R Equation : $\lambda^3 - c_1\lambda^2 + c_2\lambda - c_3 = 0$ ⟶ (2)

$c_1 = 6,\ c_2 = 11,\ c_3 = 6$

$\therefore \lambda^3 - 6\lambda^2 + 11\lambda - 6 = 0$ ⟶ (2)

$\therefore$ The E.V = 1, 2 and 3 ⟶ (2)

$\therefore (A - \lambda I)X = 0$

$\therefore$ The E.vector : $X_1 = \begin{pmatrix} 1 \\ -1 \\ 0 \end{pmatrix},\ X_2 = \begin{pmatrix} -2 \\ 1 \\ 2 \end{pmatrix},\ X_3 = \begin{pmatrix} -1 \\ 1 \\ 2 \end{pmatrix}$ ⟶ (2)

(ii) Ans:

$\therefore AX = \lambda X$ ⟶ (2)

$\Rightarrow \bar{X}'AX = \lambda \bar{X}'X$ ⟶ (2)

Taking conjugate : $X'\bar{A}\bar{X} = \bar{\lambda} X'\bar{X}$ ⟶ (2)

Hence $\bar{X}'AX = \lambda \bar{X}'X$ (Taking Transpose)

$\therefore \lambda$ is real. ⟶ (2)

11. b) (i) Ans:

C.R. equation : $\lambda^3 - c_1\lambda^2 + c_2\lambda - c_3 = 0$ ⟶ (2)

$c_1 = 11,\ c_2 = -4,\ c_3 = -1$ ⟶ (2)

$\therefore \lambda^3 - 11\lambda^2 - 4\lambda + 1 = 0$ ⟶ (3)

$\therefore$ C.H. equation : $A^3 - 11A^2 - 4A + I = 0$ ⟶ (2)

$\therefore A^{-1} = -A^2 + 11A + 4I$ ⟶ (3)

$$A^{-1} = \begin{pmatrix} 134 & 250 & 310 \\ 250 & 454 & 560 \\ 310 & 560 & 196 \end{pmatrix}$$ ⟶ (4)

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12) a) i)

$\therefore$ C-R equation : $\lambda^3 - 5\lambda^2 + 7\lambda - 3 = 0$ ⟶ (2)

(i) $f(A) = (A^5 + A)(A^3 - 5A^2 + 7A - 3) + (A^2 + A + I)$ ⟶ (4)

$\therefore f(A) = A^2 + A + I$ ⟶ (2)

$$\therefore \quad f(A) = \begin{pmatrix} 8 & 5 & 5 \\ 0 & 3 & 0 \\ 5 & 5 & 8 \end{pmatrix} \longrightarrow (4)$$

(ii)

$$f(B) = -11 \begin{pmatrix} 6 & 5 & 5 \\ 0 & 1 & 0 \\ 5 & 5 & 6 \end{pmatrix} \longrightarrow (4)$$

12. b)

C-R equation : $\lambda^3 - 12\lambda^2 + 36\lambda - 32 = 0 \longrightarrow (2)$

$\therefore$ Eigen value : $\lambda = 2, 2$ and $8 \longrightarrow (2)$

$\therefore$ Eigen vector : $x_1 = \begin{pmatrix} 2 \\ -1 \\ 1 \end{pmatrix}, x_2 = \begin{pmatrix} 1 \\ 0 \\ -2 \end{pmatrix}, x_3 = \begin{pmatrix} 1 \\ 2 \\ 0 \end{pmatrix} \longrightarrow (2)$

$$P^{-1} = [P_{ij}] = \frac{1}{|P|} \text{adj } P = \frac{1}{12} \begin{bmatrix} 4 & -2 & 2 \\ 2 & -1 & -5 \\ 2 & 5 & 1 \end{bmatrix} \longrightarrow (4)$$

$$\therefore \quad D = P^{-1} A P = \begin{pmatrix} 8 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{pmatrix} \longrightarrow (3+3)$$

13.

$$Q.F = \begin{pmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{pmatrix} = \begin{pmatrix} \text{co-eff } x_1^2 & \frac{1}{2}\text{co-eff } x_1x_2 & \frac{1}{2}\text{co-eff } x_1x_3 \\ \frac{1}{2}\text{co-eff } x_2x_1 & \text{co-eff } x_2^2 & \frac{1}{2}\text{co-eff } x_2x_3 \\ \frac{1}{2}\text{co-eff } x_3x_1 & \frac{1}{2}\text{co-eff } x_3x_2 & \text{co-eff } x_3^2 \end{pmatrix}$$

$\longrightarrow (2)$

$\therefore$ C-R. equation : $\lambda^3 - 12\lambda^2 + 36\lambda - 32 = 0 \longrightarrow (4)$

$\therefore$ Eigen value : 2, 2, 8 $\longrightarrow (2)$

$\therefore$ Eigen vector : $x_1 = \begin{pmatrix} 2 \\ -1 \\ 1 \end{pmatrix}, x_2 = \begin{pmatrix} 0 \\ 1 \\ 1 \end{pmatrix}, x_3 = \begin{pmatrix} 1 \\ 1 \\ -1 \end{pmatrix} \longrightarrow (2)$

$$N = \begin{pmatrix} 2/\sqrt{6} & 0 & 1/\sqrt{3} \\ 1/\sqrt{6} & 1/\sqrt{2} & 1/\sqrt{3} \\ 1/\sqrt{6} & 1/\sqrt{2} & -1/\sqrt{3} \end{pmatrix}, \quad N^T = \begin{pmatrix} 2/\sqrt{6} & -1/6 & 1/\sqrt{6} \\ 0 & 1/\sqrt{2} & 1/\sqrt{2} \\ 1/\sqrt{3} & 1/\sqrt{3} & -1/\sqrt{3} \end{pmatrix} \longrightarrow (2+2)$$

$\therefore \quad D = N^T . A N$

$$D = \begin{pmatrix} 8 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{pmatrix}$$ and canonical form is $8y_1^2 + 2y_2^2 + 2y_3^2 \longrightarrow (3+3)$

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$\therefore Lf(0) \neq Rf(0)$

f is discontinuous $\longrightarrow$ (3)

At $x = 2$

$Lf(2) = 0$, $Rf(2) = 0$

$\therefore Lf(2) = Rf(2)$

$\therefore f$ is continuous. $\longrightarrow$ (3)

14.b) i) Ans:

At $x = 2$

$Lf(2) = 4C + 4$, $Rf(2) = 8 - 2C$ $\longrightarrow$ (3+3)

$\therefore Lf(2) = Rf(2)$

$C = 2/3$ $\longrightarrow$ (2)

ii) Ans:

$dy/dx = 2xe^{2x}(x^2+1)^3(x^3+5x^2+x+1)$ $\longrightarrow$ (4)

$\therefore d/dx(uvw) = u'vw + uv'w + uvw'$ $\longrightarrow$ (4)

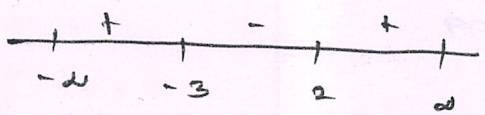
15. a)(i) Ans:-

$f(x) = 2x^3 + 3x^2 - 36x$

$f'(x) = 6x^2 + 6x - 36$

$\therefore f'(x) = 0$

$\therefore x = -3, 2$ (critical point) $\longrightarrow$ (2)



$\longrightarrow$ (2)

Interval	$f'(x)$	Monotonicity
$(-\infty, -3)$	+	increasing
$(-3, 2)$	-	decreasing
$(2, \infty)$	+	increasing

At $x = -3$

$\therefore f(-3) = 81$ $\longrightarrow$ (2)

At $x = 2$

$f(2) = -44$ $\longrightarrow$ (2)

$\therefore$ Local Maximum : 81, Local Minimum : -44

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13.b i)

$y = 1 + x \Rightarrow$ x : −2 −3 −4 If $x < -1 \longrightarrow (2)$

y : −1 −2 −3

$y = x^2 \Rightarrow$ x : −1 0 1 If $-1 \le x \le 1 \longrightarrow (2)$

y : 1 0 1

$y = 2 - x \Rightarrow$ x : 1 2 3 If $x > 1 \longrightarrow (2)$

y : 1 0 −1

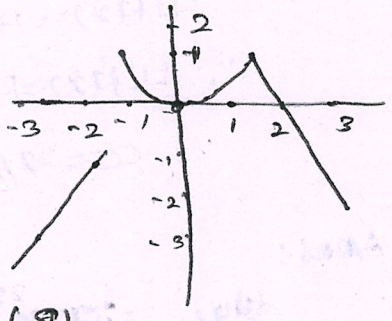
At $x = -1$

$Lf(-1) \neq Rf(-1)$

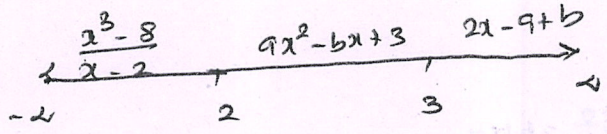
At $x = 1$

$Lf(1) = Rf(1)$

$\therefore$ f is continuous $\longrightarrow (2)$



14.a) i) Ans:



$\longrightarrow (2)$

At $x = 2$

$Lf(2) = 12, \quad Rf(2) = 4a - 2b + 3$

$\therefore Lf(2) = Rf(2) \longrightarrow (2)$

$\therefore 4a - 2b = a$

At $x = 3$

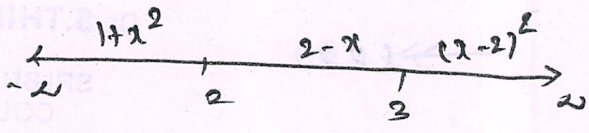
$Lf(3) = 9a - 3b + 3, \quad Rf(3) = b - a + b$

$\therefore Lf(3) = Rf(3) \longrightarrow (2)$

$\therefore 10a - 4b = 3$

$\therefore a = -15/2, \quad b = -39/2 \longrightarrow (2)$

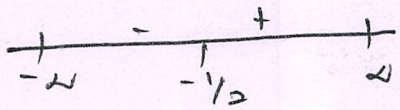
ii) Ans:



$\longrightarrow (2)$

At $x = 0$

$Lf(0) = 1, \quad Rf(0) = 2 \longrightarrow (2)$



Interval	$f''(x)$	concavity
$(-\infty, -1/2)$	-ve	concave downward → (1)
$(-1/2, \infty)$	+ve	concave upward

Point of inflection :-

Put $x = -1/2$ in $f(x)$

$\therefore f(x) = 37/2$

$\therefore$ Inflection Point $(-1/2, 37/2)$ → (2)

R.Dhivya

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(ii) Ans:

$f(x) = \sqrt{x} - 4\sqrt{x}$

$f'(x) = 1/2\, x^{-1/2} - 1/4\, x^{-3/4}$ ⟶ (2)

$\therefore f'(x) = 0$

Then $x = 1/16$ ⟶ (2)

$f''(x) = -1/4\, x^{-3/2} + 3/16\, x^{-7/4}$

Put $x = 1/16$ ⟶ (2)

$f''(x) = 8 > 0$

$\therefore$ Local minimum value is $-1/4$ ⟶ (2)

(5b) Ans:

$f(x) = 2x^3 + 3x^2 - 36x$

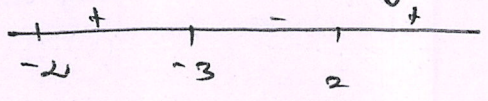
$f'(x) = 6x^2 + 6x - 36$

$f''(x) = 12x + 6$

(a) (critical Point):

$x = 2, -3$ ⟶ (2)

(b) Interval of f, increasing / decreasing



⟶ (2)

Interval	$f'(x)$	increasing / decreasing
$(-\infty, -3)$	+	increasing
$(-3, 2)$	-ve	decreasing
$(2, \infty)$	+ve	increasing

⟶ (2)

(c) Local extrema :-

At $x = -3$

$\therefore f(-3) = 81$ (maximum) ⟶ (2)

At $x = 2$

$f(2) = -44$ (minimum) ⟶ (2)

(d) Concavity Point :-

$f''(x) = 0$, $x = -1/2$ ⟶ (2)

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Cycle Test Answer Book

Name	B. sherlin kaviya			**Year/ Semester**	I/I
Reg No.	912621103007	**Date/Session**	10/01/22/AN	**Department**	civil
Course code	MA3151	**Course Title**	Matries and calculus		
Cycle Test (Put a tick mark)	**CT 1** ☑	**CT 2** ☐	**CT 3** ☐	**Model** ☐	
Name and Signature of the Invigilator with date	S. Bej 10/11/22 [S.RENUGADEVI]				

Instruction to the Student: Put tick mark to the question attended in the column against question.

Part A			Part B / Part C						Total Marks
Q. No.	✓	Marks	Q. NO.	✓	a	✓	b		
					Marks		Marks		
1	✓	2	11			✓	16		16
2	✓	2	12			✓	12		12
3	✓	2	13			✓	16		16
4	✓	2	14	✓	6				6
5	✓	2	15			✓	10		10
6	✓	2	16						
7	✓	2	Grand Total						60
8	✓	2	80/100						
9	✓	2							
10	✓	2							
Total		20	Grand Total				Name and Signature of the Examiner with date		

10/11/22

To be filled by the examiner							
Course Outcomes	1	2	3	4	5	6	Total
Marks allotted	60	40					100
Marks Obtained	50	30					80

IQAC Audit - Remarks

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18/2/22

Name and Signature of the IQAC member

(Mrs. B. PRIYA)

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KAIKKURICHI,PUDUKKOTTAI-622 303
ACADEMIC YEAR 2021-2022-- ODD SEMESTER
STUDENTS MARK STATEMENT –CO BASED
SECTION -B
CYCLE TEST-I

PROGRAM : B.E / CIVIL,ECE&EEE
YEAR/SEM : I/I
SUBJECT CODE & TITLE : MA3151-MATRICES AND CALCULUS
DATE : 10.01.2022

SI .NO	REG.NO	NAME	CO 1 (60)	CO 2 (40)	MARKS (100)
1	912621103001	AKILA.G	48	20	68
2	912621103002	GAYATHRI.G	-	-	**AB**
3	912621103003	JAYABHARATHI.R	52	20	72
4	912621103004	JAYA MANOHARI.B	60	27	87
5	912621103005	PRIYADHARSHINI.A	46	27	73
6	912621103006	RABIA BANU.M	30	25	55
7	912621103007	SHERLIN KAVYA.B	50	30	80
8	912621106001	AMRIN. M	56	37	93
9	912621106002	BHUVANESWARI.C	-	-	**AB**
10	912621106003	DHANYASHREE.A	38	37	75
11	912621106004	KALAIVANI.R	30	25	55
12	912621106005	KAVIYA.K	30	15	**45**
13	912621106006	KEERTHANA.V	43	15	58
14	912621106007	PAVITHRA.P	-	-	**AB**
15	912621106008	RAJESHWARI.R	20	10	**30**
16	912621106009	SUBALAKSHMI.M	37	49	86
17	912621106010	SUGUNA.C	36	18	54
18	912621105001	GOKULA PRAVEENA.A	29	14	**43**
19	912621105002	RAFEEQA.N	-	-	AB
20	912621105003	RAJESWARI. A	46	31	77
21	912621105004	SUMITHRA.S	47	23	70
22	912621105005	VINOTHA.V	36	20	56

MARK RANGE:

<20	20-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
-	01	01	01	05	02	05	02	01

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Total Number of Students Present	**18**
Total Number of Students Absent	**03**
Total Number of Candidates Pass	**15**
Total Number of Candidates Fail	**04**
Percentage of Pass	**78%**

SIGNATURE OF THE FACULTY

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PUDUKKOTTAI DISTRICT

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PRINCIPAL
SRI BHARATHI ENGINEERING
COLLEGE FOR WOMEN
Kaikkurchi - 622 303, Pudukkottai Dt.

SRI BHARATHI ENGINEERING COLLEGE FOR WOMEN

(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

Kaikkurichi, Pudukkottai, Tamil Nadu – 622 303, India

DEPARTMENT OF SCIENCE AND HUMANITIES

ROOT CAUSE ANALYSIS

Name of the Faculty :Ms.N.VITHYA
Degree & Program :B.E-CIVIL,ECE&EEE
Cycle Test : I
Target : 100%

Course Code & Name :MA3151-Matrices and calculus
Semester & Section :I & B
Month & Year :January -2022
Achieved : 78%

S.NO	BATCH NO	NAME OF THE STUDENT	CAUSES FOR FAILURE	CORRECTIVE ACTION TAKEN	PREVENTIVE ACTION TAKEN	FOLLOWUP STATUS
1.	912621103002	GAYATHRI.G	Absent	Advised to avoid absent for cycle test	More assignment sums given	Encourage student to Prepare well
2.	912621106002	BHUVANESWARI.C	Absent	Advised to avoided absent for cycle test	writing weekly test	Encourage student to prepare well
3.	912621106005	KAVIYA.K	Not well Prepared	Instructed to Study well	More tutorial sums given	Encourage student to Prepare well
4.	912621106007	PAVITHRA.P	Absent	Advised to atten for cycle test	more Home work sums given	Encourage student to Prepare well
5.	912621106008	RAJESHWARI.R	Not well Prepared	Instructed to Study well	writing weekly test	Encourage student to Prepare well
6.	912621105001	GOKULA PRAVEENA.A	Due to careless mistakes	Instructed to Prepare well	more assignment sums given	Encourage student to Prepare well
7.	912621105002	RAFEEQA.N	Absent	Instructed the student to atten the test with well preperation.	writing home test and weekly test	Encourage student to Prepare well

Signature of the Faculty Member

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Signature of the HoD/S&H

HoD/S&H
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KAIKKURICHI
PUDUKKOTTAI - 622 303.

21-22-ODP-R

SRI BHARATHI ENGINEERING COLLEGE FOR WOMEN
KAIKKURICHI, PUDUKKOTTAI – 622 303.

Circular Date: 17.01.2022

Retest for Cycle test I will be conducted from 19.01.2022 to 24.01.2022 for the I semester (I year) students.

The following instructions are to be followed by the faculty members.

The following instructions are to be followed by the faculty members.

- Total marks for which the question paper to be set will be for 50 marks. **(PART A** 5X2=10, **PART B** 2X13=26 **& PART C** 1X14=14)
- It is the responsibility of the **question paper** setter to take the Xerox copies of the required number of question papers.
- Concerned Faculty members are requested to conduct the examination as per the scheduled and handover the valued answer scripts to the students on or before 25.01.2022.

PRINCIPAL

17/01/22

Cc:
- All faculty
- Exam cell
- Office file

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Circular

Date: 17.01.2022

Retest for Cycle test I will be conducted from 19.01.2022 to 24.01.2022 for the I semester (I year) B.E students for 50 marks as per the time table given below. Students are directed to prepare well and score good marks.

Date	04.00 pm -5.30 pm
19.01.2022	HS3151- Professional English - I
20.01.2022	GE3151- Problem Solving and Python Programming
21.01.2022	MA3151- Matrices and Calculus
22.01.2022	PH3151- Engineering Physics
24.01.2022	CY3151- Engineering Chemistry

PRINCIPAL

17/01/22

Cc:

- All I year B.E Classes
- All faculty
- Exam cell
- Notice Board
- Office file

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Register Number: | | | | | | | | | | | |

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Cycle test – I(RETEST)			Date/Session	21.01.2022/AN	Marks	50
Course code	MA3151	Course Title	MATRICES AND CALCULUS			
Regulation	2021	Duration	1.30 hours	Academic Year	2021-22	
Year	I	Semester/Sec	I/B	Department	CIVIL,ECE,EEE	

COURSE OUTCOMES

C102.1	Use the matrix algebra methods for solving practical problems.
C102.2	Apply differential calculus tools in solving various application problems.
C102.3	Describe the partial differential equations with initial and Lagrange's method by using certain techniques with engineering applications.
C102.4	Carry out the differentiation to solve maxima and minima problems.
C102.5	Explain different methods of integration in solving practical problems.
C102.6	Determine multiple integral ideas in solving areas, volumes and other practical problems.

Q.No.	Question	CO	BTS
	PART A **(Answer all the Questions 9 x 2 = 18 Marks)**		
1	Find the Eigenvalues of the matrix $\begin{bmatrix} 1 & -2 \\ -5 & 4 \end{bmatrix}$.	C102.1	K3
2	The product of two eigenvalues of the matrix $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ is 16. Find the third eigenvalue	C102.1	K3
3	What is the nature of the quadratic form $x^2 + y^2 + z^2$ in three variables?	C102.1	K2
4	If $\mathbf{A} = \begin{bmatrix} 1 & 0 \\ 0 & 5 \end{bmatrix}$, then find $2A^2 - 12A + 10I$.	C102.1	
5	If $x^2 + y^2 = 25$, then find $\frac{dy}{dx}$.	C102.2	K3
6	Sketch the graph of function $\|x\| = \begin{cases} x & ,if\ x > 0 \\ -x, & if\ x < 0 \end{cases}$	C102.2	K1
7	If $f(x) = xe^x$ then find expression for $f''(x)$.	C102.2	K3
8	Find the critical point of $y = 5x^3 - 6x$	C102.2	K3
9	State the extreme value theorem.	C102.2	K1
	PART B **(Answer all the Questions 2 x 16= 32 Marks)**		
11a	(i) Find the Eigenvalues and Eigenvectors of the matrix $\begin{bmatrix} 2 & -2 & 2 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$.	C102.1	K3
	(ii) Find cayley- Hamilton theorem and find its inverse of $\begin{pmatrix} 1 & 2 & -2 \\ 2 & 5 & -4 \\ 3 & 7 & -5 \end{pmatrix}$		
	OR		
11b	Diagonalise the matrix $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$ and hence find A^4.	C102.1	K3
	OR		

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12a	(i)Find the local maxima of the function $f(x) = 2x^3 + 3x^2 - 36x$, using first derivative test ii)Find the local maximum and minimum of $f(x) = \sqrt{x} - \sqrt[4]{x}$.	C102.2	K3
	OR		
12b	ii) Find the interval of concavity and the inflexion points $f(x) = 2x^3 + 3x^2 - 36x$.	C102.2	K3

Course Faculty

(Name /Sign / Date)

HoD

(Name /Sign / Date)

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KAIKURICHI,PUDUKKOTTAI -622 303

ACADEMIC YEAR 2021-2022--- ODD SEMESTER

ATTENDANCE SHEET FOR RETEST

SECTION -B

RETEST FOR CYCLE TEST-I

PROGRAM : B.E / CIVIL.ECE,EEE.
YEAR/SEM : I/I
SUBJECT CODE & TITLE : MA3151-MATRICES AND CALCULUS
DATE : 21.01.2022

SI .NO	REG.NO	NAME	SIGNATURE
1.	912621103002	GAYATHRI.G	G Gayathri
2.	912621106002	BHUVANESWARI.C	C.Bhuvaneshwari
3.	912621106005	KAVIYA.K	K.Kaviya
4.	912621106007	PAVITHRA.P	P. Pavithra
5.	912621106008	RAJESHWARI.R	R
6.	912621105001	GOKULA PRAVEENA.A	A Gokula Praveena
7.	912621105002	RAFEEQA.N	N. Rafeeqa

SIGNATURE OF THE FACULTY **HoD/S&H** **PRINCIPAL**

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SRI BHARATHI ENGINEERING COLLEGE FOR WOMEN

KAIKKURICHI,PUDUKKOTTAI-622 303

ACADEMIC YEAR 2021-2022-- ODD SEMESTER

STUDENTS MARK STATEMENT –CO BASED

SECTION -B

RETEST FOR CYCLE TEST-I

PROGRAM : **B.E / CIVIL,ECE&EEE**
YEAR/SEM : **I/I**
SUBJECT CODE & TITLE : **MA3151-MATRICES AND CALCULUS**
DATE : 21.01.22

SI .NO	REG.NO	NAME	C102.1 (24)	C102.2 (26)	MARKS (50)
1	912621103002	GAYATHRI.G	20	18	38
2	912621106002	BHUVANESWARI.C	18	16	34
3	912621106005	KAVIYA.K	19	12	31
4	912621106007	PAVITHRA.P	20	16	36
5	912621106008	RAJESHWARI.R	14	19	33
6	912621105001	GOKULA PRAVEENA.A	21	17	38
7	912621105002	RAFEEQA.N	22	20	42

MARK RANGE:

<20	20-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
-	-	06	01	-	-	-	-	-

Total Number of Students Present	**07**
Total Number of Students Absent	**NIL**
Total Number of Candidates Pass	**07**
Total Number of Candidates Fail	**NIL**
Percentage of Pass	**100%**

SIGNATURE OF THE FACULTY

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DEPARTMENT OF SCIENCE AND HUMANITIES

ACADEMIC YEAR 2021 – 2022 (ODD SEMESTER)

FINAL INTERNAL STUDENTS MARK STATEMENT(Out of 20)

SUBJECT CODE &TITLE : MA3151 &Matrices and calculus

YEAR/SEM : I/I

SECTION/BRANCH : B /CIVIL,ECE&EEE

S.NO	REG NO	STUDENT NAME	TOTAL (40)
1.	912621103001	AKILA.G	33
2.	912621103002	GAYATHRI.G	32
3.	912621103003	JAYABHARATHI.R	34
4.	912621103004	JAYA MANOHARI.B	35
5.	912621103005	PRIYADHARSHINI.A	35
6.	912621103006	RABIA BANU.M	34
7.	912621103007	SHERLIN KAVYA.B	36
8.	912621106001	AMRIN. M	35
9.	912621106002	BHUVANESWARI.C	30
10.	912621106003	DHANYASHREE.A	32
11.	912621106004	KALAIVANI.R	32
12.	912621106005	KAVIYA.K	36
13.	912621106006	KEERTHANA.V	36
14.	912621106007	PAVITHRA.P	33
15.	912621106008	RAJESHWARI.R	36
16.	912621106009	SUBALAKSHMI.M	33
17.	912621106010	SUGUNA.C	33
18.	912621105001	GOKULA PRAVEENA.A	32
19.	912621105002	RAFEEQA.N	39
20.	912621105003	RAJESWARI. A	32
21.	912621105004	SUMITHRA.S	37

Faculty Incharge **HoD/S&H** **Principal**

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DEPARTMENT OF SCIENCE AND HUMANITIES

ACADEMIC YEAR 2021– 2022 (ODD SEMESTER)

ANNA UNIVERSITY RESULT STATEMENT NOV/DEC-2021

SUBJECT CODE &TITLE: MA3151& Matrices and calculus

YEAR/SEM : I/I

SECTION/BRANCH : B /CIVIL,ECE&EEE

S.NO	REG NO	STUDENT NAME	GRADE
1.	912621103001	AKILA.G	B
2.	912621103002	GAYATHRI.G	U
3.	912621103003	JAYABHARATHI.R	B
4.	912621103004	JAYA MANOHARI.B	B
5.	912621103005	PRIYADHARSHINI.A	B
6.	912621103006	RABIA BANU.M	B
7.	912621103007	SHERLIN KAVYA.B	B+
8.	912621106001	AMRIN. M	B
9.	912621106002	BHUVANESWARI.C	U
10.	912621106003	DHANYASHREE.A	C
11.	912621106004	KALAIVANI.R	C
12.	912621106005	KAVIYA.K	B
13.	912621106006	KEERTHANA.V	B+
14.	912621106007	PAVITHRA.P	B
15.	912621106008	RAJESHWARI.R	B
16.	912621106009	SUBALAKSHMI.M	U
17.	912621106010	SUGUNA.C	B
18.	912621105001	GOKULA PRAVEENA.A	U
19.	912621105002	RAFEEQA.N	A+
20.	912621105003	RAJESWARI. A	U
21.	912621105004	SUMITHRA.S	B+

STAFF INCHARGE **HOD/S&H** **PRINCIPAL**

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SRI BHARATHI ENGINEERING COLLEGE FOR WOMEN-KAIKKURICHI

Department of Science and Humanities

Internal Assessment -Attainment of Course Outcomes (Through Direct Assessment)

ACADEMIC YEAR - 2021 - 22							BATCH	2021-2025					
COURSE CODE/TITLE	MA3151-MATRICES AND CALCULUS						COURSE OUTCOME	1	2	3	4	5	6
CLASS/SEM	I / I						TARGET(%)	65	65	65	65	65	65
COURSE COORDINATOR							TOTAL STRENGTH	22					
ATTAINMENT LEVEL	Level	Range											
	1	UP TO 60% of the students scored more than target											
	2	61 - 79% of the students scored more than target											
	3	80% & ABOVE of the students scored more than target											

S.NO	REG NO	NAME OF THE STUDENT	IAT 1 - MARKS ALLOTED						IAT 2 - MARKS ALLOTED						IAT 3 - MARKS ALLOTED						Assignment / Mini Project /Tutorial / Seminar						TOTAL COURSE OUTCOME					
			C1	C2	C3	C4	C5	C6	C1	C2	C3	C4	C5	C6	C1	C2	C3	C4	C5	C6	C1	C2	C3	C4	C5	C6	C1	C2	C3	C4	C5	C6
			40	30	30							40	30	30								10	10		10	10	40	40	40	40	40	40
1	912621103001	AKIL.A G	32.8	24.6	24.6							34	25.5	25.5								9	9		9	9	32.8	34	33.6	34	34.5	34
2	912621103002	GAYATHRI G	31.2	23.4	23.4							33.2	24.9	24.9								9	9		9	9	31	32	32.4	33.2	32	33.9
3	912621103003	JAYABHARATHI R	32.4	24.3	24.3							34.8	26.1	26.1								9	9		9	8	32.4	33	33.3	35	36	36
4	912621103004	JAYA MANOHARI B	34	25.5	25.5							36	27	27								9	9		9	9	34	34.5	34.5	36	38	38
5	912621103005	PRIYADHARSHINI A	35.2	26.4	26.4							34.4	25.8	25.8								9	9		9	8	35.2	35.4	35.4	34	31	31
6	912621103006	RABIA BANU M	32.8	24.6	24.6							35.6	26.7	26.7								9	9		9	9	32.8	33.6	33.6	35.6	38	35.7
7	912621103007	SHERLIN KAVYA B	35.2	26.4	26.4							36.8	27.6	27.6								9	9		9	9	35.2	35.4	35.4	37	30	30
8	912621106001	AMRIN. M	34	25.5	26.4							35.2	26.4	26.4								9	9		9	8	34	35	35.4	35	35.4	34
9	912621106002	BHUVANESWARI.C	28.8	21.6	24							32	24	24								8	9		9	8	29	30	33	32	32	32
10	912621106003	DHANYASHREE.A	30	22.5	26.1							34.8	26.1	26.1								9	8		8	9	30	32	34.1	35	36	36
11	912621106004	KALAIVANI.R	32	24	24.6							32.8	24.6	24.6								9	8		8	9	32	33	32.6	33	38	38
12	912621106005	KAVIYA.K	36	27	26.4							35.2	26.4	26.4								9	8		8	9	36	36	34.4	35	31	31
13	912621106006	KEERTHANA.V	36	27	27							36	27	27								8	9		9	9	36	35	36	36	38	36
14	912621106007	PAVITHRA.P	32	24	25.8							34.4	25.8	25.8								8	9		9	8	32	32	34.8	34	30	30
15	912621106008	RAJESHWARI.R	36.8	27.6	26.7							35.6	26.7	26.7								8	9		9	8	37	36	35.7	36	30	30
16	912621106009	SUBALAKSHMI.M	32.4	24.3	25.5							34	25.5	25.5								9	9		9	8	32	33	34.5	34	38	33.5

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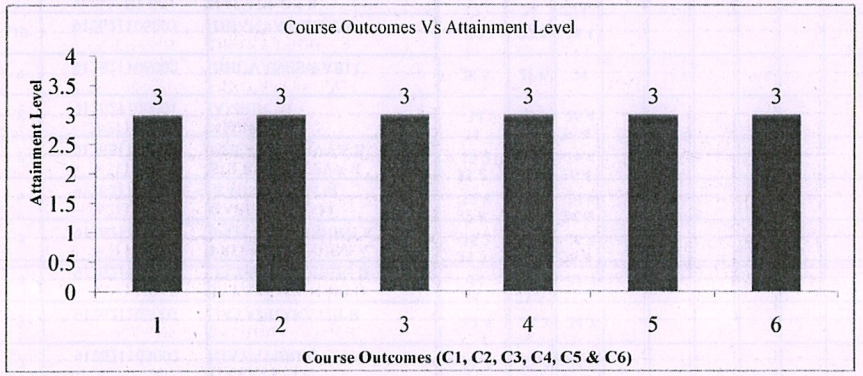
17	912621106010	SUGUNA.C	31.6	23.7	26.1							34.8	26.1	26.1								9	9		9	8	**32**	**33**	**35.1**	**35**	**33**	**34.1**
18	912621105001	GOKULAPRAVEENA A	31	24	24							33	25	25								8	7		9	8	**31**	**32**	**31**	**33**	**34**	**33**
19	912621105002	RAFEEQA N	40	29	29							39	29.1	29.1								8	7		8	7	**40**	**37**	**36**	**39**	**37**	**36**
20	912621105003	RAJESWARI A	31	22	22							35	25	25								9	9		8	8	**31**	**31**	**31**	**35**	**33**	**33**
21	912621105004	SUMITHRA S	35	27	27							39	28.5	28.5								7	9		8	8	**35**	**34**	**36**	**39**	**37**	**37**
22	912621105005	VINOTHA V	28	22	22							0	0	0								8	8		0	0	**28**	**30**	**30**	**0**	**0**	**0**

CO's Target Value	26.0	26.0	26.0	26.0	26.0	26.0
No. of Students scored above CO's Target Value	22	22	22	21	21	21
Percentage of Students scored above Target	100.0	100.0	100.0	95.5	95.5	95.5
CO Attainment	3	3	3	3	3	3
CO attainment Values to plot the Graph	3	3	3	3	3	3



Faculty Incharge

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SRI BHARATHI ENGINEERING COLLEGE FOR WOMEN

DEPARTMENT OF S&H

COURSE OUTCOME ATTAINMENT - UNIVERSITY EXAMINATION

ACADEMIC YEAR : 2021 - 2022 (ODD SEM)

CLASS /SEM: I CIVIL,ECE &EEE/ I **Batch:2021-2025**

SUBJECT :MA8151 (C102) / MATRICES AND CALCULUS

CO Attainment Level: 1 - (UPTO 60%) 2- (61%-79%) 3-(80% and Above)

TOTAL STRENGTH : 22

S.NO	Register No	NAME	Univ. Grade
1	912621103001	AKILA G	B
2	912621103002	GAYATHRI G	U
3	912621103003	JAYABHARATHI R	B
4	912621103004	JAYA MANOHARI B	B
5	912621103005	PRIYADHARSHINI A	B
6	912621103006	RABIA BANU M	B
7	912621103007	SHERLIN KAVYA B	B+
8	912621106001	AMRIN. M	B
9	912621106002	BHUVANESWARI.C	U
10	912621106003	DHANYASHREE.A	C
11	912621106004	KALAIVANI.R	C
12	912621106005	KAVIYA.K	B
13	912621106006	KEERTHANA.V	B+
14	912621106007	PAVITHRA.P	B
15	912621106008	RAJESHWARI.R	B
16	912621106009	SUBALAKSHMI.M	U
17	912621106010	SUGUNA.C	B
18	912621105001	GOKULAPRAVEENA A	U
19	912621105002	RAFEEQA N	A+
20	912621105003	RAJESWARI A	U
21	912621105004	SUMITHRA S	B+
22	912621105005	VINOTHA V	U

No. of O Grade	0	0
No. of A+ Grade	1	1
No. of A Grade	0	0
No.of B+ Grade	3	3
No. of BGrade	10	10
No. of C Grade	2	2
No. of U Grade	6	6
No. of UA Grade	0	0
Target for course outcome Attainment	60	22
No of students above the target	14	
CO-Attainment University (%)	63.64	

Faculty

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Overall Attainment Sheet – COs - POs & PSOs attainment calculation

CO	CO-Attainment Internal (CO-INT) (Avg. Attainment of All section) (%)	CO-Attainment University (CO-UNI) (Avg. Attainment of All section) (%)	Direct CO Attainment (0.20xCO-INT + 0.80xCO-UNI) (%)	CO Attainment Level
C102.1	100.0	54.55	63.6	2
C102.2	100.0	54.55	63.6	2
C102.3	100.0	54.55	63.6	2
C102.4	95.5	54.55	62.7	2
C102.5	95.5	54.55	62.7	2
C102.6	95.5	54.55	62.7	2

Closure of the Quality Loop:

CO	CO-Target for Academic Year						CO Attainment Gap for (%) 16-17	Action Proposed to Bridge the Gap
	14-15		15-16		16-17			
C102.1	65	79.71	65	69	65	63.6	-	-
C102.2	65	79.71	65	71.17	65	63.6	-	-
C102.3	65	79.71	65	63.15	65	63.6	-	-
C102.4	65	79.71	65	75.11	65	62.7	-	-
C102.5	65	79.71	65	73.57	65	62.7	-	-
C102.6	65	79.71	65	68.44	65	62.7	-	

Expected CO-PO Level

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C102.1	3	3	2	2	-	-	-	-	-	1	-	1	-	2
C102.2	3	3	2	2	-	-	-	-	-	1	-	1	-	2
C102.3	3	3	2	2	-	-	-	-	-	1	-	1	-	2
C102.4	3	3	2	2	-	-	-	-	-	1	-	1	-	2
C102.5	3	3	2	2	-	-	-	-	-	1	-	1	-	2
C102.6	3	3	2	2	-	-	-	-	-	1	-	1	-	2
C102	3	3	2	2	-	-	-	-	-	1	-	1	-	2

PO Attainment Level

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C102.1	2	2	1.33	1.33	-	-	-	-	-	0.67	-	0.67	-	1.33
C102.2	2	2	1.33	1.33	-	-	-	-	-	0.67	-	0.67	-	1.33
C102.3	2	2	1.33	1.33	-	-	-	-	-	0.67	-	0.67	-	1.33
C102.4	2	2	1.33	1.33	-	-	-	-	-	0.67	-	0.67	-	1.33
C102.5	2	2	1.33	1.33	-	-	-	-	-	0.67	-	0.67	-	1.33
C102.6	2	2	1.33	1.33	-	-	-	-	-	0.67	-	0.67	-	1.33
C102	2	2	1.33	1.33	-	-	-	-	-	0.67	-	0.67	-	1.33

Attainment of POs and PSOs:

Course Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C102	3	3	2	2	-	-	-	-	-	1	-	1	-	2
Attainment	2	2	1.33	1.33	-	-	-	-	-	0.67	-	0.67	-	1.33

Comments by Program Coordinator	1. 2.	Remarks by HoD	

Name and Signature of the Faculty Member

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