



CENTRAL UNIVERSITY OF KERALA
केरल केन्द्रीय विश्वविद्यालय

Sl: No :	Program me name	Program Code	Name Of Student	Register Number	Year of Admissio n	Title Of Thesis	Guide	Type Of Wor k	Plac e Of Wor k
1	PG Degree	MAT(M. Sc. Mathematic s)	ABDUL MAJID P K	PMA0519 01	2019	FREE GROUPS	Dr. Ali Akbar K	Proje ct	CUK
2	PG Degree	MAT(M. Sc. Mathematic s)	ABDULLA MIDLAJ J R	PMA0519 02	2019	Stochastic processes	Dr. Gnanavel Soundararajan	Proje ct	CUK
3	PG Degree	MAT(M. Sc. Mathematic s)	ABHIJITH A G	PMA0519 03	2019	FINITE ABELIAN GROUP AND DIRICHLET CHARACTERS	Dr. V. Vilfred	Proje ct	CUK
4	PG Degree	MAT(M. Sc. Mathematic s)	AHSAN JAWAD P	PMA0519 04	2019	A Study on Fibonacci Numbers and Golden Ratio	Dr. Manikandan Rangaswamy	Proje ct	CUK
5	PG Degree	MAT(M. Sc. Mathematic s)	AISWARYA K	PMA0519 05	2019	Elementary properties of semi groups	Dr. V. Vilfred	Proje ct	CUK



6	PG Degree	MAT(M. Sc. Mathematics)	AISWARYALAKSH MI M A	PMA051906	2019	NOETHERIAN AND ARTINIAN RING	Dr. K. A Germina	Project	CUK
7	PG Degree	MAT(M. Sc. Mathematics)	AJMAL O	PMA051907	2019	OPTIMAL CONTROL THEORY	Dr. Gnanavel Soundararajan	Project	CUK
8	PG Degree	MAT(M. Sc. Mathematics)	AMAL V	PMA051909	2019	A STUDY ON ALEGEBRAIC GEOMETRY	Dr. Ali Akbar K	Project	CUK
9	PG Degree	MAT(M. Sc. Mathematics)	AMRUTH NATH V S	PMA051910	2019	A STUDY ON SIGNED GRAPHS AND INTEGER ADDITIVE SET-INDEXER	Dr. V. Vilfred	Project	CUK



10	PG Degree	MAT(M. Sc. Mathematics)	ANAND CHRISTOPHER B	PMA0519 11	2019	ALIQUOT SUM AND ALIQUOT SEQUENCES	Dr. Shaini P	Project	CUK
11	PG Degree	MAT(M. Sc. Mathematics)	ANGITHA T	PMA0519 12	2019	MATROID THEORY	Dr. Manikandan Rangaswamy	Project	CUK
12	PG Degree	MAT(M. Sc. Mathematics)	ANNETTE SONY SEBASTIAN	PMA0519 13	2019	INTRODUCTION TO TOPOLOGICAL GROUPS	Dr. Ali Akbar K	Project	CUK
13	PG Degree	MAT(M. Sc. Mathematics)	ANUSREE P	PMA0519 14	2019	A STUDY ON SPECTRA GROUPS	Dr. K. A Germina	Project	CUK



14	PG Degree	MAT(M. Sc. Mathematics)	ANVITHA K	PMA051915	2019	MATRIX REPRESENTSTION OF GRAPHS AND GRAPHS IN SWITCHING THEORY	Dr. Manikandan Rangaswamy	Project	CUK
15	PG Degree	MAT(M. Sc. Mathematics)	ASHI PAUL	PMA051917	2019	conservation laws in non-linear partial differential equations	Dr. Gnanavel Soundararajan	Project	CUK
16	PG Degree	MAT(M. Sc. Mathematics)	ASHKAR ALI A T	PMA051918	2019	ENERGY OF GRAPHS	Dr. Manikandan Rangaswamy	Project	CUK
17	PG Degree	MAT(M. Sc. Mathematics)	ASHWINI K	PMA051919	2019	A STUDY ON STOCHASTIC PROCESS AND ITS APPLICATIONS	Dr. Manikandan Rangaswamy	Project	CUK



CENTRAL UNIVERSITY OF KERALA
केरल केन्द्रीय विश्वविद्यालय

18	PG Degree	MAT(M. Sc. Mathematics)	ATHIRA BHASKAR B	PMA0519 20	2019	A STUDY ON GRAPH COLOURING	Dr. K. A Germina	Project	CUK
19	PG Degree	MAT(M. Sc. Mathematics)	ATHIRA HARIHARAN	PMA0519 21	2019	A STUDY ON SOFT SETS	Dr. K. A Germina	Project	CUK
20	PG Degree	MAT(M. Sc. Mathematics)	ATHUL G DEV	PMA0519 22	2019	Homotopy	Dr. Ali Akbar K	Project	CUK
21	PG Degree	MAT(M. Sc. Mathematics)	BIYA THOMAS	PMA0519 23	2019	Galois theory and Inverse Galois problem	Dr. Ali Akbar K	Project	CUK



CENTRAL UNIVERSITY OF KERALA
केरल केन्द्रीय विश्वविद्यालय

22	PG Degree	MAT(M. Sc. Mathematics)	DEEPAK JOY	PMA0519 24	2019	Topological vector space and its normability	Dr. Ali Akbar K	Project	CUK
23	PG Degree	MAT(M. Sc. Mathematics)	DELINA DAVIS PARAVALAPPIL	PMA0519 25	2019	A STUDY ON LEECH LABELLING ON GRAPH THEORY	Dr. Gnanavel Soundararajan	Project	CUK
24	PG Degree	MAT(M. Sc. Mathematics)	DELNA GEORGE	PMA0519 26	2019	AN ANALYSIS OF CLASSICAL THEOREM ON GROUPS IN CASE OF SEMIGROUPS	Dr. Gnanavel Soundararajan	Project	CUK
25	PG Degree	MAT(M. Sc. Mathematics)	DIASE J KAPPEN	PMA0519 27	2019	A STUDY ON PUBLIC KEY CRYPTOSYSTEM	Dr. Manikandan Rangaswamy	Project	CUK



CENTRAL UNIVERSITY OF KERALA
केरल केन्द्रीय विश्वविद्यालय

26	PG Degree	MAT(M. Sc. Mathematics)	DZUVINO JUDITH KUOTSU	PMA0519 28	2019	A study on Balance in signed graph	Dr. K. A Germina	Project	CUK
27	PG Degree	MAT(M. Sc. Mathematics)	FIDA	PMA0519 29	2019	FRACTALS	Dr. Shaini P	Project	CUK
28	PG Degree	MAT(M. Sc. Mathematics)	HARITHA V	PMA0519 30	2019	BILINEAR FORMS	Dr. Shaini P	Project	CUK
29	PG Degree	MAT(M. Sc. Mathematics)	JISNA E P	PMA0519 31	2019	A STUDY ON MAGIC GRAPH	Dr. Manikandan Rangaswamy	Project	CUK
30	PG Degree	MAT(M. Sc. Mathematics)	JISNA JOHNSON	PMA0519 32	2019	A STUDY ON MAGIC GRAPHS	Dr. Shaini P	Project	CUK



CENTRAL UNIVERSITY OF KERALA
केरल केन्द्रीय विश्वविद्यालय

31	PG Degree	MAT(M. Sc. Mathematics)	JITHIN T	PMA0519 33	2019	A STUDY ON FINITE ABELIAN GROUPS	Dr. V. Vilfred	Project	CUK
32	PG Degree	MAT(M. Sc. Mathematics)	KARTHICK N	PMA0519 34	2019	A STUDY ON SPECTRAL THEORY OF BOUNDED OPERATORS ON HILBERT SPACES	Dr. Ali Akbar K	Project	CUK
33	PG Degree	MAT(M. Sc. Mathematics)	KARTHIKA K S	PMA0519 35	2019	REPRESENTATION OF INTEGERS AS SUM OF POWERS	Dr. V. Vilfred	Project	CUK
34	PG Degree	MAT(M. Sc. Mathematics)	MIDHUN T A	PMA0519 36	2019	INTRODUCTION TO LATTICE THEORY , MEASURES AND PROPERTIES	Dr. Manikandan Rangaswamy	Project	CUK



35	PG Degree	MAT(M. Sc. Mathematics)	MUBASIL P	PMA0519 37	2019	A STUDY OF VANDERMONDE MATICES AND CONSTRUCTION OF MDS MATRICES	Dr. Ali Akbar K	Project	CUK
36	PG Degree	MAT(M. Sc. Mathematics)	RESHMA K	PMA0519 38	2019	Properties of Regular semi groups.	Dr. V. Vilfred	Project	CUK
37	PG Degree	MAT(M. Sc. Mathematics)	ROSHNI ISSAC	PMA0519 39	2019	INTRODUCTION TO TIME DELAY INDUCED HOPF BIFURCATION	Dr. Gnanavel Soundararajan	Project	CUK
38	PG Degree	MAT(M. Sc. Mathematics)	SARANYA V	PMA0519 40	2019	GOLDEN RATIO	Dr. Shaini P	Project	CUK
39	PG Degree	MAT(M. Sc. Mathematics)	SAUBHAGYA	PMA0519 41	2019	MATRIX GROUPS	Dr. Shaini P	Project	CUK



40	PG Degree	MAT(M. Sc. Mathematics)	SHILPA N M	PMA051942	2019	A STUDY ON EULER GRAPHS AND ITS APPLICATIONS	Dr. K. A Germina	Project	CUK
41	PG Degree	MAT(M. Sc. Mathematics)	SHUBHAM KUMAR	PMA051943	2019	ANT COLONY OPTIMIZATION PROBLEM (OPERATIONALRESEARCH)	Dr. Gnanavel Soundararajan	Project	CUK
42	PG Degree	MAT(M. Sc. Mathematics)	SIDDANT PRABHAKAR GAIKWAD	PMA051944	2019	HOLDER AND LOCALLY HOLDER CONTINUOUS FUNCTIONS AND OPEN SETS OF CLASS C^k , C^k LEMBDA	Dr. Gnanavel Soundararajan	Project	CUK

A STUDY ON FREE GROUPS

Dissertation submitted to
CENTRAL UNIVERSITY OF KERALA, KASARAGOD

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF SCIENCE IN MATHEMATICS

By

ABDUL MAJID. P K

Register No: PMA051901

Year of study 2019-21




DEPARTMENT OF MATHEMATICS
CENTRAL UNIVERSITY OF KERALA

DECLARATION

I hereby declare the project titled 'A STUDY ON FREE GROUPS' is a bonafide work done by me under the guidance of Dr Ali Akbar faculty guide, Department of mathematics Central University of Kerala also declared that this study has not been submitted to any other university or institution for the award of any degree.

ABDUL MAJID. PK


08-09-21

Place: Manjeri

Date: 13.04.2021

ABDUL MAJID. PK

CENTRAL UNIVERSITY OF KERALA, KASARAGOD



CERTIFICATE

This is to verify that the dispersion entitled **A STUDY ON FREE GROUPS** being submitted by **ABDUL MAJID PK** to the Central University of Kerala Periya during the period 2019-21 in the partial fulfilment of the degree of Master of Science in mathematics, is bonifide record of the studies carried out at the department of mathematics, central University Of Kerala Periya by him under the supervision and guidance of Dr Ali Akbar. K. The content of this dissertation has not been included in any other projects submitted previously.


Dr Ali Akbar. K
(Research Supervisor)
Assistant Professor
Department of Mathematics
Central university of Kerala
Kasaragod


Dr.K.A Germina
(Head of the department)
Department of Mathematics
Central university of Kerala
Kasaragod

2
HEAD
Department of Mathematics
School of Mathematical & Physical Sciences
Central University of Kerala
Tejaswini Hills, Periyar - 671316
Kasaragod, Kerala

STOCHASTIC PROCESSES

DISSERTATION SUBMITTED

By

ABDULLA MIDLAJ J R

(Reg. No. PMA051902)

Under the guidance of

Dr. GNANAVEL SOUNDARARAJAN

The project submitted in partial fulfilment of the

requirements for the degree of

MASTER OF SCIENCE IN MATHEMATICS

(Batch 2019-2021)



CENTRAL UNIVERSITY OF KERALA

APRIL 2021

DEPARTMENT OF MATHEMATICS

SCHOOL OF PHYSICAL SCIENCES

CENTRAL UNIVERSITY OF KERALA

PERIYA, P.O. KASARAGOD – 671320

KERALA, INDIA

DECLARATION

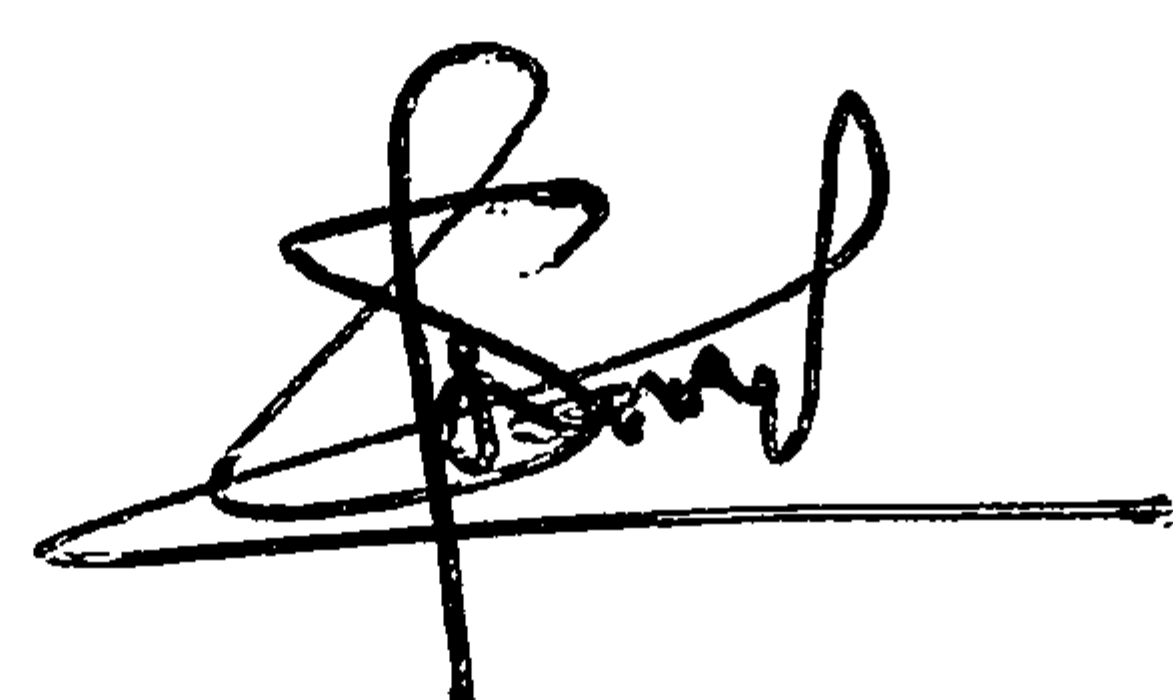
I, **Abdulla Midlaj J R**, hereby declare that the project entitled **Stochastic Processes** is an original piece of record of studies and bonafide work carried out by me under the guidance and supervision of **Dr. Gnanavel Soundararajan**, Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala and has not been submitted by me elsewhere for the award of any degree, diploma, title or recognition before.

midlaj
Abdulla Midlaj J R
(PMA051902)

Department of Mathematics
Central University of Kerala
Kasaragod

CERTIFICATE

I, **Dr.Gnanavel Soundararajan** ,Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala, hereby certify that the project entitled “ **Stochastic Processes** ” is a record of bonafide study carried out by **Abdulla Midlaj J R** under my guidance and supervision in partial fulfilment of the requirement for the master degree in Mathematics.



Dr.Gnanavel Soundararajan

Assistant Professor

Department of Mathematics

Central University of Kerala, Kasaragod, Kerala.


25/4/2021
Dr. Germina K.A

Head, Department of Mathematics

Central University of Kerala

Kasaragod, Kerala.

FINITE ABELIAN GROUP AND DIRICHLET CHARACTERS

DISSERTATION SUBMITTED
BY

ABHIJITH A G (Reg.No. PMA051903)
Under the guidance of

Dr. V.Vilfred

*The project submitted in partial fulfillment of the requirement for
the degree of*

MASTER OF SCIENCE IN MATHEMATICS
(Batch 2019-2021)
at



CENTRAL UNIVERSITY OF KERALA
APRIL 2021
DEPARTMENT OF MATHEMATICS
SCHOOL OF MATHEMATICAL AND PHYSICAL SCIENCES
PERIYE P.O, KASARAGOD-671316
KERALA, INDIA

DECLARATION

I, ABHIJITH A G, here by declare that the dissertation entitled **Finite Abelian group and Dirichlet characters** submitted by me to Central University of Kerala, Kasaragod in partial fulfillment for the award of the Degree of Masters of Science in mathematics is a record of bonafide work carried out by me under the guidance of Dr. V.Vilfred, Associative professor, Department of mathematics, Central university of Kerala. I further declare that the dissertation has not been submitted, in part or full, for the award of any other degree or diploma in this University or any other University or Institute.

Date: April 2021

(ABHIJITH A G)

Place: Periyar

Reg.No. PMA051903

CERTIFICATE

This is to certify that the dissertation entitled, **Finite Abelian group and Dirichlet characters** submitted by ABHIJITH A G (Reg.No.PMA051903) is a bonafide work carried out in the Department of mathematics, Central university of Kerala, Kasaragod under my guidance in partial fulfillment for the award of the degree of Master of Science in Mathematics.

Dr. V. Vilfred (Research Supervisor)
Associative professor,
Department of Mathematics
Central University of Kerala
Kasaragod.



Dr. K.A. Germina

Head,
Department of Mathematics
Central University of Kerala
Kasaragod.

**A STUDY ON FIBONACCI NUMBERS, GOLDEN
RATIO AND IT'S APPLICATIONS**

DISSERTATION SUBMITTED
by

AHSAN JAWAD P
(PMA051904)

Under the guidance of

Dr. Manikandan Rangaswamy

The project submitted in partial fulfilment of the
requirements for the degree of

MASTERS OF SCIENCE IN MATHEMATICS
Batch (2019-2021)



CENTRAL UNIVERSITY OF KERALA

APRIL 2021

DEPARTMENT OF MATHEMATICS
SCHOOL OF PHYSICAL SCIENCES
CENTRAL UNIVERSITY OF KERALA
PERIYA (P.O), KASARAGOD- 671320
KERALA,INDIA

Declaration

I, **AHSAN JAWAD P**, hereby declare that the project entitled **A Study on Fibonacci Numbers, Golden Ratio and it's Applications** is an original piece of record of studies and bonafide work carried out by me under the guidance and supervision of **Dr. Manikandan Rangaswamy**, Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala and has not been submitted by me elsewhere for the award of any degree, diploma, title or recognition before.

Department of Mathematics
Central University of Kerala,
Kasaragod

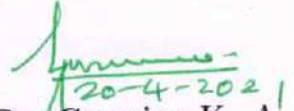
AHSAN JAWAD P
PMA051904

CERTIFICATE

I, **Dr. Manikandan Rangaswamy** Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala, hereby certify that the project entitled "**A STUDY ON FIBONACCI NUMBERS, GOLDEN RATIO AND IT'S APPLICATIONS**" is a record of bonafide study carried out by **AHSAN JAWAD P** under my guidance and supervision in partial fulfillment of the requirements for the Master degree in Mathematics.



Dr. Manikandan Rangaswamy
Assistant Professor
Department of Mathematics
Central University of Kerala Kasaragod, Kerala.


20-4-2021

Dr. Germina K. A
Head, Department of Mathematics
Central University of Kerala
Kasaragod, Kerala

ELEMENTARY PROPERTIES OF SEMIGROUPS

DISSERTATION SUBMITTED
BY

AISWARYA K
Reg.No. PMA051905

Under the guidance of

Dr. V. Vilfred

The project submitted in partial fulfillment of the requirements for
the degree of

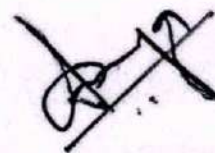
MASTER OF SCIENCE IN MATHEMATICS
(Batch 2019-2021)
at



CENTRAL UNIVERSITY OF KERALA
APRIL 2021
DEPARTMENT OF MATHEMATICS
SCHOOL OF MATHEMATICAL AND PHYSICAL SCIENCES
PERIYE P.O., KASARAGOD - 671316
KERALA, INDIA

DECLARATION

I, AISWARYA K, hereby declare that the dissertation entitled, '**Elementary Properties Of Semi Groups**' submitted by me to Central University of Kerala, Kasaragod in partial fulfillment for the award of the Degree of Masters of Science in Mathematics is a record of bonafide work carried out by me under the guidance of Dr. V. Vilfred, Associate Professor, Department of Mathematics, Central University of Kerala. I further declare that the dissertation has not been submitted, in part or full, for the award of any other degree or diploma in this University or any other University or Institute.



Date: 26.04.2021

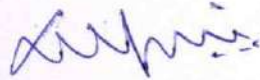
Place: Periyar

(AISWARYA K)

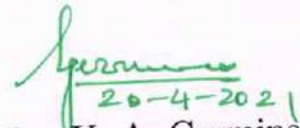
Reg.No. PMA051905

CERTIFICATE

This is to certify that the Dissertation entitled, '**Elementary Properties of Semi Groups**' submitted by AISWARYA K, Reg.No. PMA051905 is a bonafide work carried out in the Department of Mathematics, Central University of Kerala, Kasaragod under my guidance in partial fulfillment for the award of the Degree of Masters of Science in Mathematics.



Dr. V. Vilfred (Supervisor)
Associate Professor,
Department of Mathematics,
Central University of Kerala,
Kasaragod - 671 316.


20-4-2021

Dr. K. A. Germina
Head,
Department of Mathematics,
Central University of Kerala,
Kasaragod - 671 316.



Signature of the External Examiner

A STUDY ON NOETHERIAN AND ARTINIAN RINGS

Dissertation Submitted by
AISWARYALAKSHMI M A
(Reg.No. PMA051906)

Under the guidance of
Dr. K A GERMINA

The project submitted in partial fulfillment of the requirements for the
degree of

MASTER OF SCIENCE IN MATHEMATICS
(Batch 2019- 2021)
at

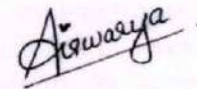


CENTRAL UNIVERSITY OF KERALA
APRIL 2021

DEPARTMENT OF MATHEMATICS
SCHOOL OF MATHEMATICAL AND PHYSICAL SCIENCES
PERIYE P.O, KASARAGOD - 671316
KERALA, INDIA

DECLARATION

I, AISWARYALAKSHMI M A, declare that the dissertation entitled **A Study On Noetherian and Artinian Rings** submitted by me to the Central University of Kerala, Kasaragod in partial fulfillment for the award of the Degree of Master of Science in Mathematics is a record of bonafide study carried out by me under the guidance of **Dr. K A Germina**, Head of the Department, Department of Mathematics, Central University of Kerala. I further declare that the dissertation has not been submitted, in part or full, for the award of any other degree or diploma in this University or any other University or Institute.

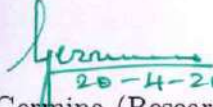


Place : Kasaragod
Date : 20-04-2021

Aiswaryalakshmi M A
(Reg. No. PMA051906)

CERTIFICATE

This is to certify that the project entitled **A Study On Noetherian and Artinian Rings** submitted to the Department of Mathematics in partial fulfillment of the requirement for the award of the M.Sc Degree programme in Mathematics, is a bonafide record of original research study done by **Ms. AISWARYALAKSHMI M A (Reg.No. PMA051906)** during the period of her study in the Department of Mathematics, Central University of Kerala, Kasaragod, under my supervision and guidance during the year 2019-2021.


20-4-2021
Dr K A Germina (Research Supervisor)
Head of the Department,
Central University Of Kerala,
Kasaragod



Signature of the External :

CONTROL THEORY

Dissertation submitted

by

AJMAL O

Reg.no:PMA051907

Under the guidance of

Dr.GNANAVEL SOUNDRARAJAN

*The project submitted in partial fulfilment of the requirement for the
degree of*

Masters of Science in Mathematics

Batch 2019-2021

at



Central University of Kerala

April 2021

Department of Mathematics

School of Physical Science

Central University of Kerala

Periya PO , Kasaragod -671316

Kerala ,India

DECLARATION

I, **Ajmal O** hereby declared that the project work entitled ” **Control Theory**” is an original record of studied and bonafide work carried out by me under the guidance of **Dr .Gnanavel Soundrarajan** , Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, India, and has not been submitted by me elsewhere for the award of any degree, diploma, title or recognition before.

Department of Mathematics
Central University of Kerala
Kasaragod



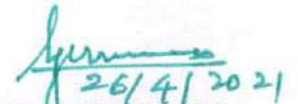
Ajmal O
April 2021

CERTIFICATE

I, Dr. Gnanavel Soundrarajan, hereby certify that the project work entitled Control Theory is a record of bonafide study carried out by Ajmal O under my supervision and guidance in partial fulfilment of the requirements for the Master degree in Mathematics of Central University of Kerala.



Dr. Gnanavel Soundrarajan
Assistant Professor,
Department of Mathematics,
Central University of Kerala,
Kasaragod.


26/4/2021

Dr. K.A. GERMINA
Head of the Department,
Department of Mathematics
Central University of Kerala,
Kasaragod.

Signature of the External Examiner

A STUDY ON BASIC ALGEBRAIC GEOMETRY

**AMAL V
(PMA051909)**

A report submitted in partial fulfilment of
the requirements for the degree of
M.Sc MATHEMATICS(Batch 2019-21)
DISSERTATION MAT 5490
Supervised by: Dr. ALI AKBAR
CENTRAL UNIVERSITY OF KERALA,
KASARGOD

DECLARATION

I, **Amal V**, hereby declare that the project entitled **A Study on Basic Algebraic Geometry** is an original piece of record of studies and bonafide work carried out by me under the guidance and supervision of **Dr. Ali Akbar k**, Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala and has not been submitted by me elsewhere for the award of any degree, diploma, title or recognition before.

Department of Mathematics
Central University of Kerala,
Kasaragod

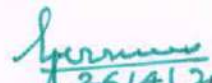
Amal V
(PMA051909)

CERTIFICATE

I, Dr. Ali Akbar K, hereby certify that the project work entitled "A STUDY ON BASIC ALGEBRAIC GEOMETRY" is a record of bonafide study carried out by Mr. Amal V under my supervision and guidance in partial fulfilment of the requirements for the Master degree in Mathematics of Central University of Kerala.

 26/04/2021

Dr. Ali Akbar K (Research Supervisor)
Assistant professor
Department of Mathematics
Central University of Kerala, Kasaragod


26/4/2021
Dr. K.A. GERMINA

Head, Department of Mathematics
Central University of Kerala, Kasaragod.



**A STUDY ON SIGNED GRAPHS AND INTEGER
ADDITIVE SET-INDEXER**

DISSERTATION SUBMITTED

BY

AMRUTH NATH V S
(REG.No PMA051910)

Under the guidance of

Dr. V. VILFRED

The project submitted in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN MATHEMATICS

(Batch 2019-2021)

at



CENTRAL UNIVERSITY OF KERALA

APRIL 2021

**DEPARTMENT OF MATHEMATICS
SCHOOL OF MATHEMATICAL AND PHYSICAL SCIENCES
PERIYE P.O, KASARAGOD - 671316
KERALA, INDIA**

DECLARATION

I, **AMRUTH NATH V S** (PMA051910) hereby declare that the project work entitled "**A STUDY ON SIGNED GRAPHS AND INTEGER ADDITIVE SET-INDEXER**" is an original record of studies and bonafide work carried out by me under the guidance of **Dr. V. VILFRED**, Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala, India and has not been submitted by me elsewhere for the award of any degree, diploma, title or recognition before.

Department Of Mathematics,
Central University Of Kerala,
Kasaragod

AMRUTH NATH V S

CERTIFICATE

I, **Dr.V. VILFRED**, Assistant Professor, Department of Mathematics, Central University of Kerala, hereby certify that the project work entitled "**A STUDY ON SIGNED GRAPHS AND INTEGER ADDITIVE SET INDEXER**" is a record of bonafide study carried out by **AMRUTH NATH V S** under my guidance and supervision in partial fulfillment for the Master degree in Mathematics of Central University of Kerala.

Dr. V. VILFRED
Assistant Professor,
Department of Mathematics,
Central University of Kerala,
Kasaragod.



Dr. K.A. GERMINA
Head of the Department,
Department of Mathematics
Central University of Kerala,
Kasargod.

Signature of the External Examiner

**SOME ASPECTS OF
ALIQUOT SUM AND ALIQUOT SEQUENCES**

DISSERTATION SUBMITTED

By

Anand Christopher B

(Reg. No. PMA051911)

Under the guidance of

Dr. Shaini P

*The project submitted in partial fulfilment of the
requirements for the degree of*

MASTER OF SCIENCE IN MATHEMATICS

(Batch 2019-2021)



CENTRAL UNIVERSITY OF KERALA

APRIL 2021

DEPARTMENT OF MATHEMATICS
SCHOOL OF PHYSICAL SCIENCES
CENTRAL UNIVERSITY OF KERALA
PERIYA, P.O. KASARAGOD - 671320
KERALA, INDIA

ACKNOWLEDGEMENT

DECLARATION

I, **Anand Christopher B**, hereby declare that the project entitled '**Some Aspects of Aliquot sum and Aliquot sequences**' is an original piece of record of bonafide study carried out by me under the guidance and supervision of **Dr. Shaini P**, Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala and has not been submitted by me elsewhere for the award of any degree, diploma, title or recognition before.



Department of Mathematics
Central University of Kerala
Kasaragod

Anand Christopher B
(PMA051911)

CERTIFICATE

DECLARATION

I, **Dr. Shaini P** Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala, hereby certify that the project entitled '**SOME ASPECTS OF ALIQUOT SUM AND ALIQUOT SEQUENCES**' is a record of bonafide study carried out by **Anand Christopher B** under my guidance and supervision in partial fulfilment of the requirement for the master degree in Mathematics.



Dr. Shaini P

Assistant Professor

Department of Mathematics

Central University of Kerala, Kasaragod, Kerala.



20-4-2021
Dr. Germina K.A

Head, Department of Mathematics

Central University of Kerala

Kasaragod, Kerala.

A STUDY ON MATROID THEORY

DISSERTATION SUBMITTED

By

Angitha T

(Reg. No. PMA051912)

Under the guidance of

Dr. Manikandan Rangaswamy

*The project submitted in partial fulfilment of the
requirements for the degree of*

MASTER OF SCIENCE IN MATHEMATICS

(Batch 2019-2021)



CENTRAL UNIVERSITY OF KERALA

APRIL 2021

DEPARTMENT OF MATHEMATICS
SCHOOL OF PHYSICAL SCIENCES
CENTRAL UNIVERSITY OF KERALA
PERIYA, P.O. KASARAGOD - 671320

KERALA, INDIA

DECLARATION

I, **Angitha T**, hereby declare that the project entitled **A Study on Matroid theory** is an original piece of record of studies and bonafide work carried out by me under the guidance and supervision of **Dr. Manikandan Rangaswamy**, Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala and has not been submitted by me elsewhere for the award of any degree, diploma, title or recognition before.

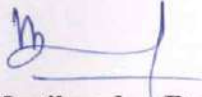
Department of Mathematics
Central University of Kerala
Kasaragod

Angitha T
(PMA051912)

CERTIFICATE

DECLARATION

I, **Dr.Manikandan Rangaswamy** Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala, hereby certify that the project entitled “**A STUDY ON MATROID THEORY** ” is a record of bonafide study carried out by **Angitha T** under my guidance and supervision in partial fulfilment of the requirement for the master degree in Mathematics.

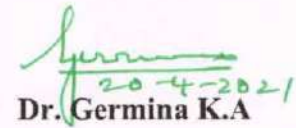


Dr.Manikandan Rangaswamy

Assistant Professor

Department of Mathematics

Central University of Kerala, Kasaragod, Kerala.



Dr. Germina K.A

Head, Department of Mathematics

Central University of Kerala

Kasaragod, Kerala.

INTRODUCTION TO TOPOLOGICAL GROUPS

DISSERTATION SUBMITTED

by

ANNETTE SONY SEBASTIAN

(Reg.No.PMA051913)

Under the guidance of

Dr. ALI AKBAR K

*The project submitted in partial fulfillment of the requirements
for the degree of*

MASTER OF SCIENCE IN MATHEMATICS

(Batch 2019-2021)

at



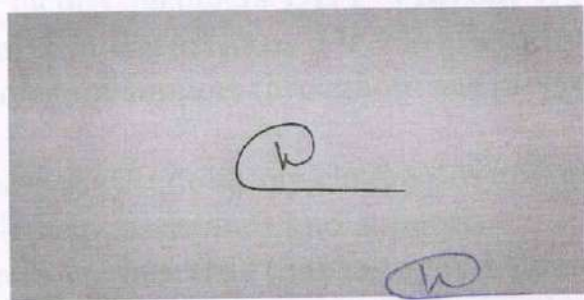
CENTRAL UNIVERSITY OF KERALA

APRIL 2021

DEPARTMENT OF MATHEMATICS
SCHOOL OF PHYSICAL SCIENCES
CENTRAL UNIVERSITY OF KERALA
PERIYA P. O, TEJASWINI HILLS
KASARAGOD, KERALA, PIN-671316.

DECLARATION

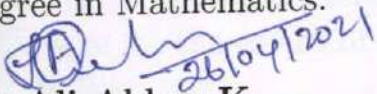
I, **ANNETTE SONY SEBASTIAN** hereby declare that the project entitled "**INTRODUCTION TO TOPOLOGICAL GROUPS**" is a bonafide work carried out by me under the guidance and supervision of **Dr. ALI AKBAR K**, Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala and has not been submitted by me elsewhere for the award of any degree, diploma, title or recognition before.

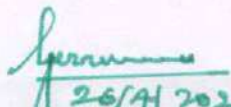


ANNETTE SONY SEBASTIAN

CERTIFICATE

I, Dr. ALI AKBAR K hereby certify that project entitled "INTRODUCTION TO TOPOLOGICAL GROUPS" is a record of bonafide study carried out by ANNETTE SONY SEBASTIAN (PMA051913) under my guidance and supervision in partial fulfillment of the requirements for the Master degree in Mathematics.


26/04/2021
Dr. Ali Akbar K
Assistant Professor
Department of Mathematics
Central University of Kerala
Kasaragod.


26/4/2021
Dr. K.A. GERMINA
Head of the Department
Department of Mathematics
Central University of Kerala



Kasaragod
HEAD
Department of Mathematics
School of Mathematical & Physical
Central University of Kerala
Tejaswini Hills, Periyar
Kasaragod, Kerala

Signature of the External Examiner

A STUDY ON SPECTRA OF GRAPHS

DISSERTATION SUBMITTED

BY

ANUSREE P

(Reg.No. PMA051914)

Under the guidance

of

Dr. K A GERMINA

The project submitted in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN MATHEMATICS

(Batch 2019- 2021)

at



CENTRAL UNIVERSITY OF KERALA

APRIL 2021

DEPARTMENT OF MATHEMATICS
SCHOOL OF MATHEMATICAL AND PHYSICAL SCIENCES
PERIYE P.O, KASARAGOD - 671316
KERALA, INDIA

DECLARATION

I, ANUSREE P, hereby declare that the dissertation entitled **A STUDY ON SPECTRA OF GRAPHS** submitted by me to Central University of Kerala, Kasaragod in partial fulfillment for the award of the Degree of Masters of Science in Mathematics is a record of bonafide study carried out by me under the guidance of Dr. Germina K A, Associate Professor, Department of Mathematics, Central University of Kerala. I further declare that the dissertation has not been submitted by me elsewhere for the award of any other degree or diploma in this University or any other University or Institute.

Date:20-04-2021

Place:Kasaragod

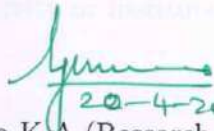


(ANUSREE P)

Reg.No. PMA051914

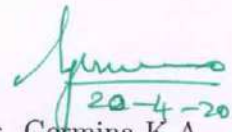
CERTIFICATE

This is to certify that the Dissertation entitled, **A STUDY ON SPECTRA OF GRAPHS** submitted by ANUSREE P(Reg.N0. PMA051914) is a bonafide study carried out in the Department of Mathematics, Central University of Kerala, Kasaragod under my guidance in partial fulfillment for the award of the Degree of Masters of Science in Mathematics.


20-4-2021

Dr. Germina K A (Research Supervisor)
Associate Professor,
Department of Mathematics
Central University of Kerala
Kasaragod.




20-4-2021

Dr. Germina K A
Head,
Department of Mathematics,
Central University of Kerala,
Kasaragod

Signature of the external examiner

**MATRIX REPRESENTATION OF GRAPHS AND GRAPHS IN
SWITCHING THEORY**

DISSERTATION SUBMITTED

By

Anvitha K

(Reg. No. PMA051915)

Under the guidance of

Dr. Manikandan Rangaswamy

*The project submitted in partial fulfilment of the
requirements for the degree of*

MASTER OF SCIENCE IN MATHEMATICS

(Batch 2019-2021)



CENTRAL UNIVERSITY OF KERALA

APRIL 2021

DEPARTMENT OF MATHEMATICS

SCHOOL OF PHYSICAL SCIENCES

CENTRAL UNIVERSITY OF KERALA

PERIYA, P.O. KASARAGOD - 671320

KERALA, INDIA

DECLARATION

L. Anvitha K. hereby declare that the project entitled **Matrix Representation of Graphs and Graphs in Switching Theory** is an original piece of record of studies and bonafide work carried out by me under the guidance and supervision of **Dr. Manikandan Rangaswamy**, Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala and has not been submitted by me elsewhere for the award of any degree, diploma, title or recognition before.

Department of Mathematics
Central University of Kerala
Kasaragod



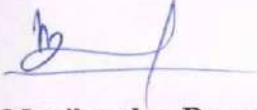
Anvitha K

(PMA051915)

CERTIFICATE

DECLARATION

I, **Dr.Manikandan Rangaswamy** Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala, hereby certify that the project entitled “ **MATRIX REPRESENTATION OF GRAPHS AND GRAPHS IN SWITCHING THEORY** ” is a record of bonafide study carried out by **Anvitha K** under my guidance and supervision in partial fulfilment of the requirement for the master degree in Mathematics.



Dr.Manikandan Rangaswamy

Assistant Professor

Department of Mathematics

Central University of Kerala, Kasaragod, Kerala.



Dr. Germina K.A

Head, Department of Mathematics

Central University of Kerala

Kasaragod, Kerala.

**CONSERVATION LAWS IN NON-LINEAR
PARTIAL DIFFERENTIAL EQUATIONS**

DISSERTATION SUBMITTED

by

ASHI PAUL
(Reg.No.PMA051917)

Under the guidance of

Dr. GNANAVEL SOUNDARARAJAN

*The project submitted in partial fulfillment of the requirements for the
degree of*

MASTER OF SCIENCE IN MATHEMATICS

(Batch 2019-2021)

at



CENTRAL UNIVERSITY OF KERALA

APRIL 2021

DEPARTMENT OF MATHEMATICS
SCHOOL OF PHYSICAL SCIENCES
CENTRAL UNIVERSITY OF KERALA
PERIYA P. O, TEJASWINI HILLS
KASARAGOD, KERALA, PIN-671316.

DECLARATION

I, **ASHI PAUL** hereby declare that the project entitled "**CONSERVATION LAWS IN NON-LINEAR PARTIAL DIFFERENTIAL EQUATIONS**" is a bonafide work carried out by me under the guidance and supervision of **Dr. GNANAVEL SOUNDARARAJAN**, Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala and has not been submitted by me elsewhere for the award of any degree, diploma, title or recognition before.



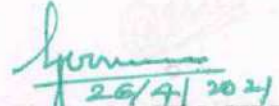
ASHI PAUL

CERTIFICATE

I, Dr. GNANAVEL SOUNDARARAJAN hereby certify that project entitled "CONSERVATION LAWS IN NON-LINEAR PARTIAL DIFFERENTIAL EQUATIONS" is a record of bonafide study carried out by ASHI PAUL (PMA051917) under my guidance and supervision in partial fulfillment of the requirements for the Master degree in Mathematics.



Dr.S.Gnanavel
Assistant Professor
Department of Mathematics
Central University of Kerala
Kasaragod.



Dr. K.A. GERMINA
Head of the Department
Department of Mathematics
Central University of Kerala
Kasaragod

Signature of the External Examiner

**A COMPARATIVE STUDY ON ENERGY OF GRAPH AND
ENERGY OF RANDOM GRAPH**

DISSERTATION SUBMITTED

By

Ashkar ali A T

(Reg. No. PMA051918)

Under the guidance of

Dr. Manikandan Rangaswamy

*The project submitted in partial fulfilment of the
requirements for the degree of*

MASTER OF SCIENCE IN MATHEMATICS

(Batch 2019-2021)



CENTRAL UNIVERSITY OF KERALA

APRIL 2021

DEPARTMENT OF MATHEMATICS

SCHOOL OF PHYSICAL SCIENCES

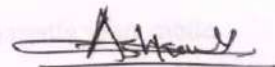
CENTRAL UNIVERSITY OF KERALA

PERIYA, P.O. KASARAGOD – 671320

KERALA, INDIA

DECLARATION

I, **Ashkar ali AT**, hereby declare that the project entitled **A comparative study on energy of graph and energy of random graph** is an original piece of record of studies and bonafide work carried out by me under the guidance and supervision of **Dr. Manikandan Rangaswamy**, Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala and has not been submitted by me elsewhere for the award of any degree, diploma, title or recognition before.



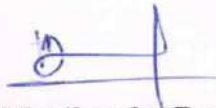
Ashkar ali A T
(PMA051918)

Department of Mathematics
Central University of Kerala
Kasaragod

CERTIFICATE

DECLARATION

I, **Dr.ManikandanRangaswamy** Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala, hereby certify that the project entitled “ **A COMPARATIVE STUDY ON ENERGY OF GRAPH AND ENERGY OF RANDOM GRAPH**” is a record of bonafide study carried out by **Ashkar ali A T** under my guidance and supervision in partial fulfilment of the requirement for the master degree in Mathematics.



Dr.ManikandanRangaswamy

Assistant Professor

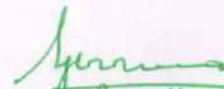
Department of Mathematics

Central University of Kerala, Kasaragod, Kerala.



Ashkar ali A T

(15A051919)



Dr.Germina K.A

20-4-2021

Head, Department of Mathematics

Central University of Kerala

Kasaragod, Kerala.

A Study on Markov Chain and it's Applications

DISSERTATION SUBMITTED

By

Ashwini K

(Reg. No. PMA051919)

Under the guidance of

Dr. Manikandan Rangaswamy

*The project submitted in partial fulfilment of the
requirements for the degree of*

MASTER OF SCIENCE IN MATHEMATICS

(Batch 2019-2021)



CENTRAL UNIVERSITY OF KERALA

APRIL 2021

DEPARTMENT OF MATHEMATICS

SCHOOL OF PHYSICAL SCIENCES

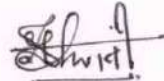
CENTRAL UNIVERSITY OF KERALA

PERIYA, P.O. KASARAGOD - 671320

KERALA, INDIA

DECLARATION

I, **Ashwini K**, hereby declare that the project entitled "**A Study on Markov Chain and it's Applications**" is an original piece of record of studies and bonafide work carried out by me under the guidance and supervision of **Dr. Manikandan Rangaswamy**, Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala and has not been submitted by me elsewhere for the award of any degree, diploma, title or recognition before.




Ashwini K
(PMA051919)

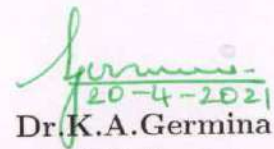
Department of Mathematics
Central University of Kerala ,
Kasaragod

CERTIFICATE

I, **Dr. Manikandan Rangaswamy** Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala, hereby certify that the project entitled "**A Study on Markov Chain and it's Applications**" is a record of bonafide study carried out by **Ashwini K** under my guidance and supervision in partial fulfillment of the requirements for the Master degree in Mathematics..



Dr. Manikandan Rangaswamy
Assistant Professor
Department of Mathematics
Central University of Kerala, Kasaragod, Kerala .



20-4-2021

Dr. K.A. Germina
Head, Department of Mathematics
Central University of Kerala
Kasaragod, Kerala.

A STUDY ON GRAPH COLORING

DISSERTATION SUBMITTED

BY

ATHIRA BHASKAR B (Reg No PMA051920)

Under the guidance of

Dr K A GERMINA

The project submitted in partial requirements for the degree of

MASTER OF SCIENCE IN MATHEMATICS

(Batch 2019-2021)

At



CENTRAL UNIVERSITY OF KERALA

APRIL 2021

DEPARTMENT OF MATHEMATICS

SCHOOL OF PHYSICAL SCIENCE

CENTRAL UNIVERSITY OF KERALA

PERIYA P O

KASARAGOD - 671316, KERALA, INDIA.

DECLARATION

I, ATHIRA BHASKAR B hereby declare that the dissertation entitled **A STUDY ON GRAPH COLORING** submitted by me to Central University of Kerala, Kasaragod in partial fulfillment for the award of the Degree of Masters of Science in Mathematics is a record of bonafide study carried out by me under the guidance of Dr K A GERMINA, Associate Professor, Department of Mathematics, Central University of Kerala. I further declare that the dissertation has not been submitted, in part or full, for the award of any other degree or diploma in this University or any other University or Institute.

Date: 20-04-2021

Place: Kasaragod

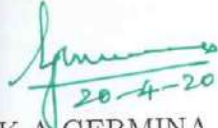


(ATHIRA BHASKAR B)

Reg No PMA051920

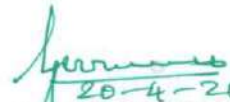
CERTIFICATE

This is to certify that the Dissertation entitled, **A STUDY ON GRAPH COLORING** submitted by **ATHIRA BHASKAR B** (Reg No PMA051920) is a bonafide study carried out in the Department of Mathematics, Central University of Kerala, Kasaragod under my guidance in partial fulfillment for the award of the Degree of Masters of Science in Mathematics.


20-4-2021

Dr K A GERMINA,
Associate Professor,
Department of Mathematics
Central University of Kerala
Kasaragod.




20-4-2021
Dr K A GERMINA

Head,
Department of Mathematics,
Central University of Kerala,
Kasaragod

Signature of the external examiner

A STUDY ON SOFT SETS

DISSERTATION SUBMITTED

BY

ATHIRA HARIHARAN

(Reg no : PMA051921)

Under the guidance of

Dr. K. A Germina

The project submitted in partial fulfillment of the requirements for the degree

of

MASTER OF SCIENCE IN MATHEMATICS

(Batch 2019 - 2021)

at



CENTRAL UNIVERSITY OF KERALA

April 2021

DEPARTMENT OF MATHEMATICS

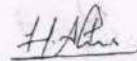
SCHOOL OF PHYSICAL SCIENCES

PERIYE P.O KASARAGOD - 671316

KERALA, INDIA

DECLARATION

I, ATHIRA HARIHARAN, hereby declare that the dissertation entitled **A STUDY ON SOFT SETS** submitted by me to the Central University of Kerala, Kasaragod in partial fulfillment for the award of the Degree of Master of Science in Mathematics is a record of bonafide study carried out by me under the guidance of Dr. K. A Germina, Associate Professor and Head, Department of Mathematics, Central University of Kerala. I further declare that the Dissertation has not been submitted by me elsewhere for the award of any Degree, Diploma, title or recognition before.

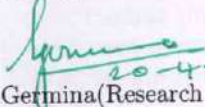


Place : Kasaragod
Date : 20 - 04 - 2021

Athira Hariharan
(Reg no : PMA051921)

CERTIFICATE

This is to certify that the Dissertation entitled, **A STUDY ON SOFT SETS** submitted by **Ms. ATHIRA HARIHARAN**(Reg no : **PMA051921**) is a bonafide study carried out in the Department of Mathematics, Central University of Kerala, Kasaragod under my guidance in partial fulfillment for the award of the Degree of Master of Science in Mathematics.


20-4-2021
Dr. K. A. Germina (Research supervisor)
Head of the Department
Central University of Kerala
Kasaragod.



Signature of the External:

BASICS IN HOMOTOPY

Dissertation Submitted

by

ATHUL G DEV

(Reg.no.PMA051922)

Under the guidance of

Dr.ALI AKBAR K

*The project submitted in partial fulfilment of the requirements
for the degree of*

Master of Science in Mathematics

Batch 2019-2021

at



CENTRAL UNIVERSITY OF KERALA

April 2021

Department of Mathematics

School of Physical Science Central University of Kerala

Periya PO, Kasaragod-671316

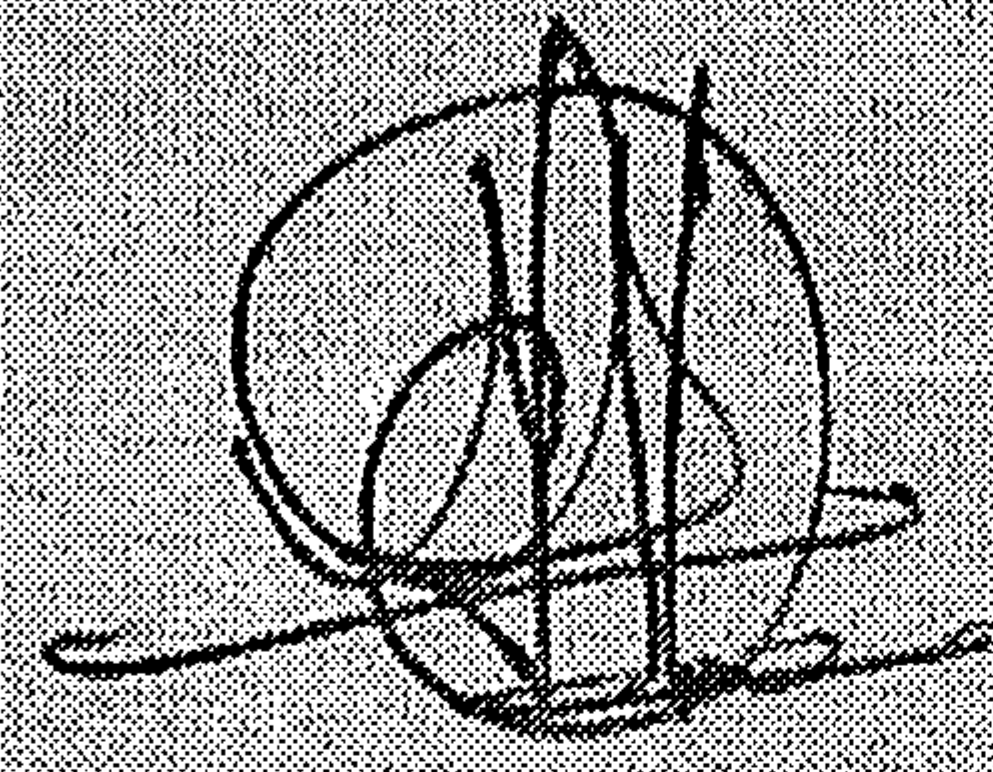
Kerala, India

DECLARATION

I, **Athul G Dev**, hereby declare that the project entitled **Basics in Homotopy** is an original piece of record of studies and bonafide work carried out by me under the guidance and supervision of **Dr. Ali Akbar K**, Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala and has not been submitted by me elsewhere for the award of any degree, diploma, title or recognition before.

Department of Mathematics
Central University of Kerala Kasaragod

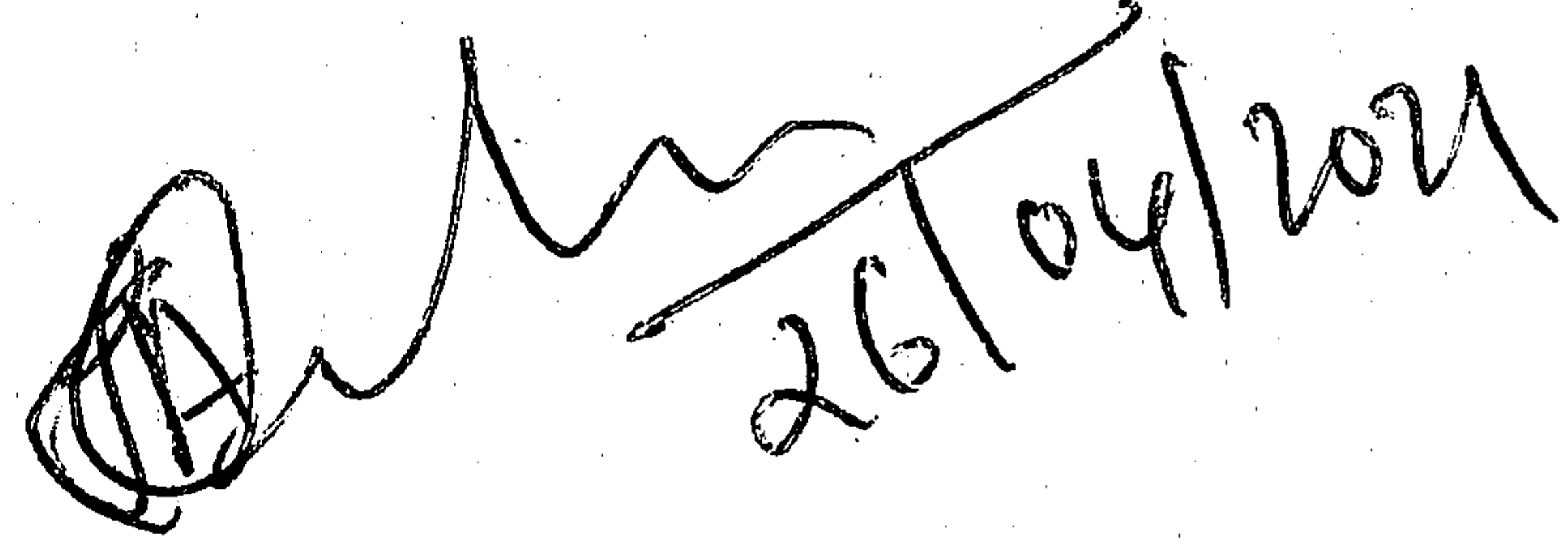
Athul G Dev
PMA051922

A rectangular box containing a handwritten signature in black ink. The signature is stylized and appears to be 'Athul G Dev'.

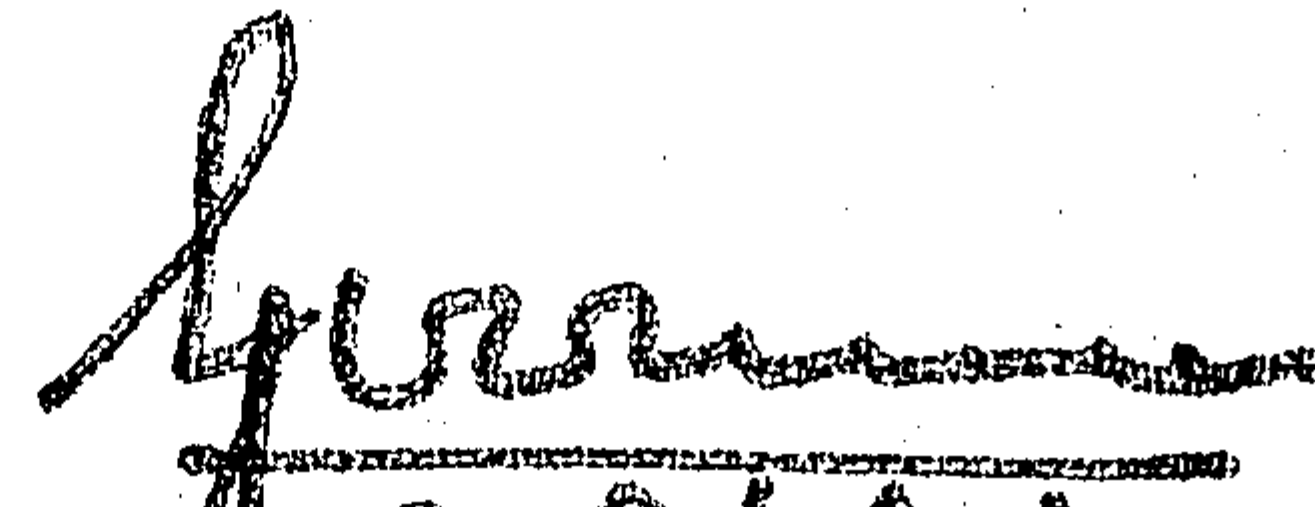
ATHUL G DEV

CERTIFICATE

I, Dr. Ali Akbar K Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala, hereby certify that the project entitled “ **Basics in Homotopy**” is a record of bonafide study carried out by **Athul G Dev** under my guidance and supervision in partial fulfilment of the requirement for the master degree in Mathematics.


26/04/2021

Dr. Ali Akbar K
~~Dr. Manikandan Ranganaswamy~~
(Assistant Professor)
Department of Mathematics
Central University of Kerala
Kasaragod, Kerala


26/4/2021
Dr. Germina K.A
Head, Department of Mathematics
Central University of Kerala
Kasaragod, Kerala



Signature of the external Examiner

GALOIS THEORY AND INVERSE GALOIS PROBLEM

Dissertation submitted

By

BIYA THOMAS

Reg.no: PMA051923

Under the guidance of

Dr ALI AKBAR K

The project submitted in partial fulfillment of the requirements

for the degree of

Master of Science in Mathematics Batch

2019-2021

at



Central University of Kerala

April 2021

Department of Mathematics, School of Physical Science

Central University of Kerala, Periya PO, Kasaragod- 671316 Kerala, India

Declaration

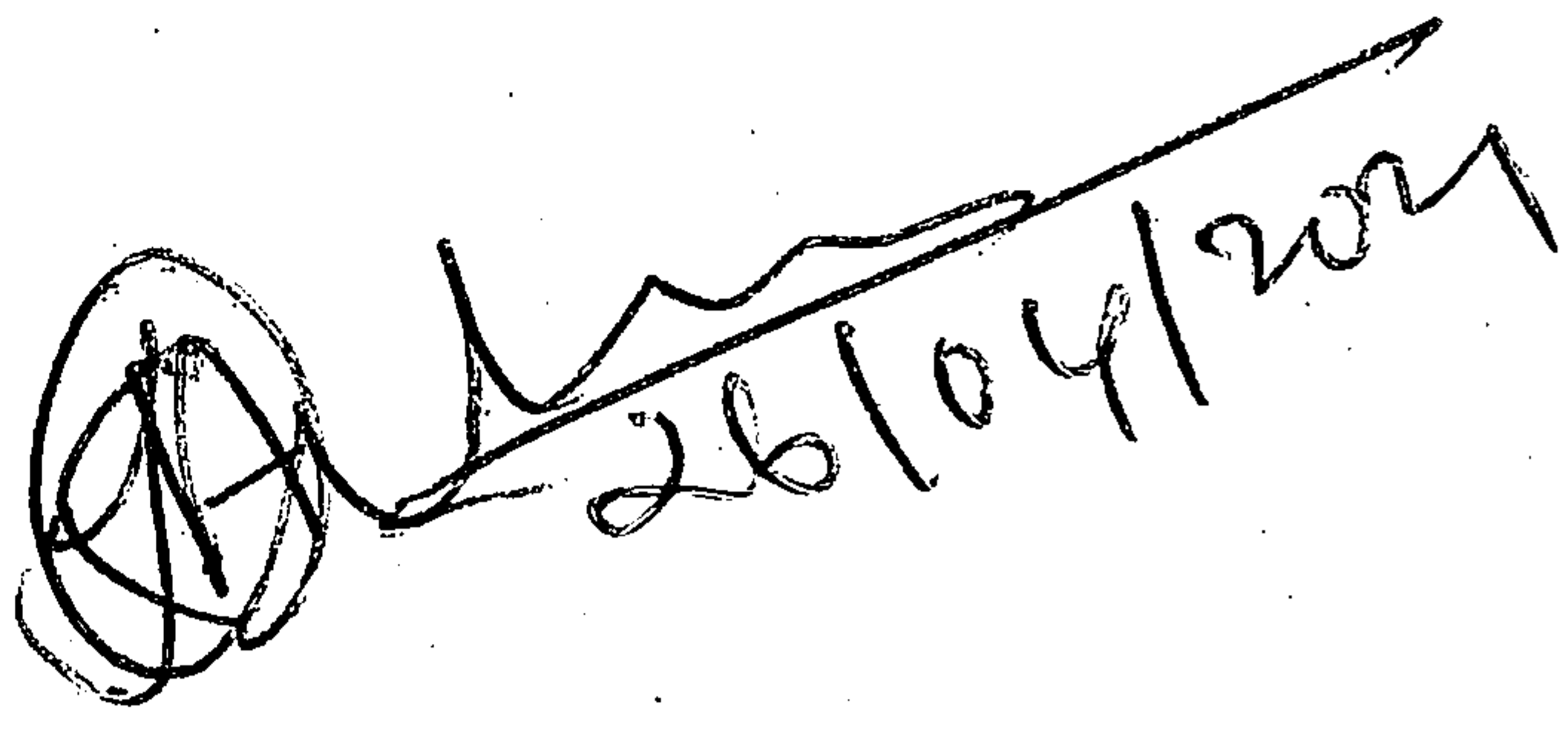
I, **Biya Thomas** hereby declared that the project work entitled "**INVERSE GALOIS PROBLEM** " is an original record of studied and bonafide work carried out by me under the guidance of **Dr. Ali Akbar K**, Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, India, and has not been submitted by me elsewhere for the award of any degree, diploma, title or recognition before.

Department of Mathematics
Central university of Kerala

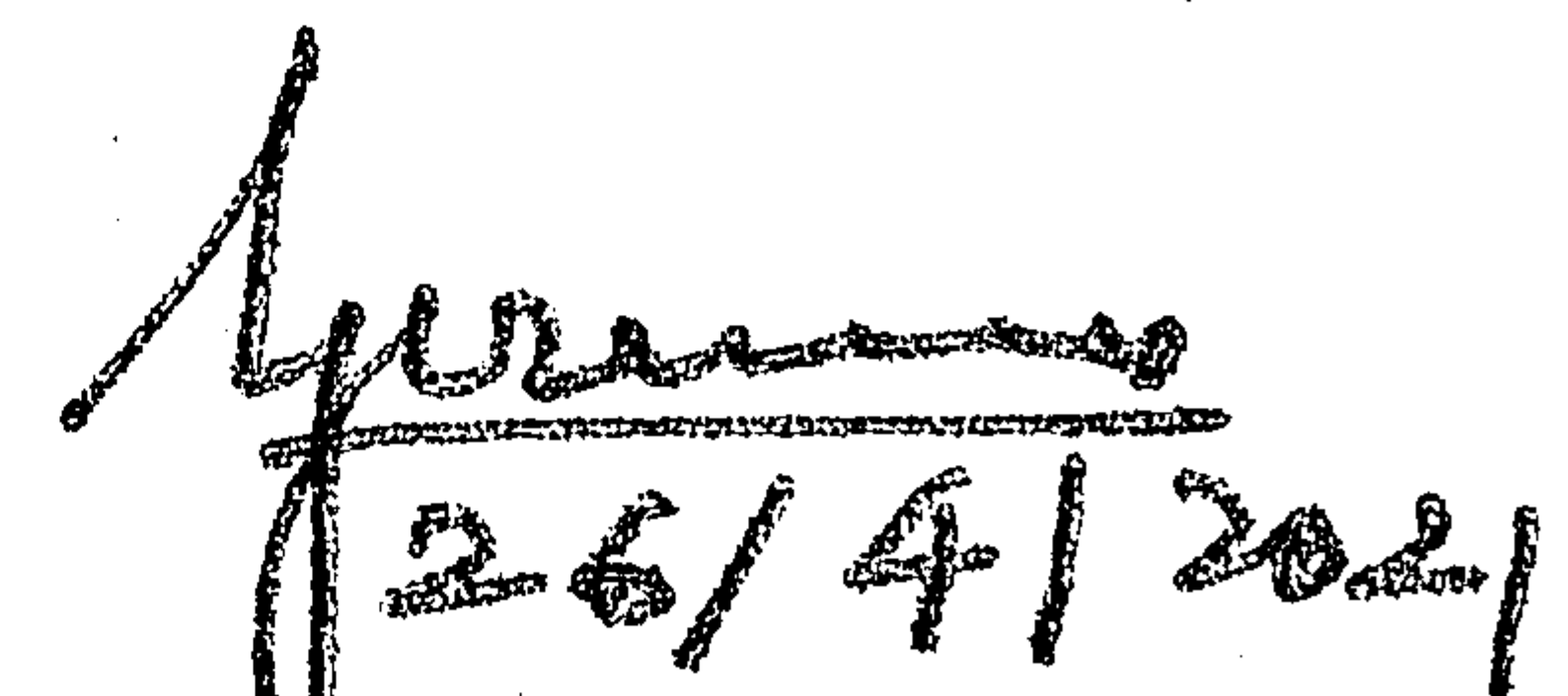
Biya Thomas
April 2021

Certificate

I, Dr. Ali Akbar K, hereby certify that the project work entitled **INVERSE GALOIS PROBLEM** is a record of bonafide study carried out by **Ms Biya Thomas** under my supervision and guidance in partial fulfilment of the requirements for the Master degree in Mathematics of Central University of Kerala.


26/04/2021

Dr. Ali Akbar K
(Research Supervisor)
Assistant professor
Department of Mathematics
Central University of Kerala
Kasaragod


26/4/2021
Dr. K A Germina
Head of the Department
Department of Mathematics
Central university of Kerala
Kasargode



TOPOLOGICAL VECTOR SPACE AND ITS NORMABILITY

Dissertation submitted

By

DEEPAK JOY

Reg.no: PMA051924

Under the guidance of

Dr ALI AKBAR K

The project submitted in partial fulfillment of the requirements

for the degree of

Master of Science in Mathematics Batch

2019-2021

at



Central University of Kerala

April 2021

Department of Mathematics, School of Physical Science

Central University of Kerala, Periya PO, Kasaragod- 671316 Kerala, India

Declaration

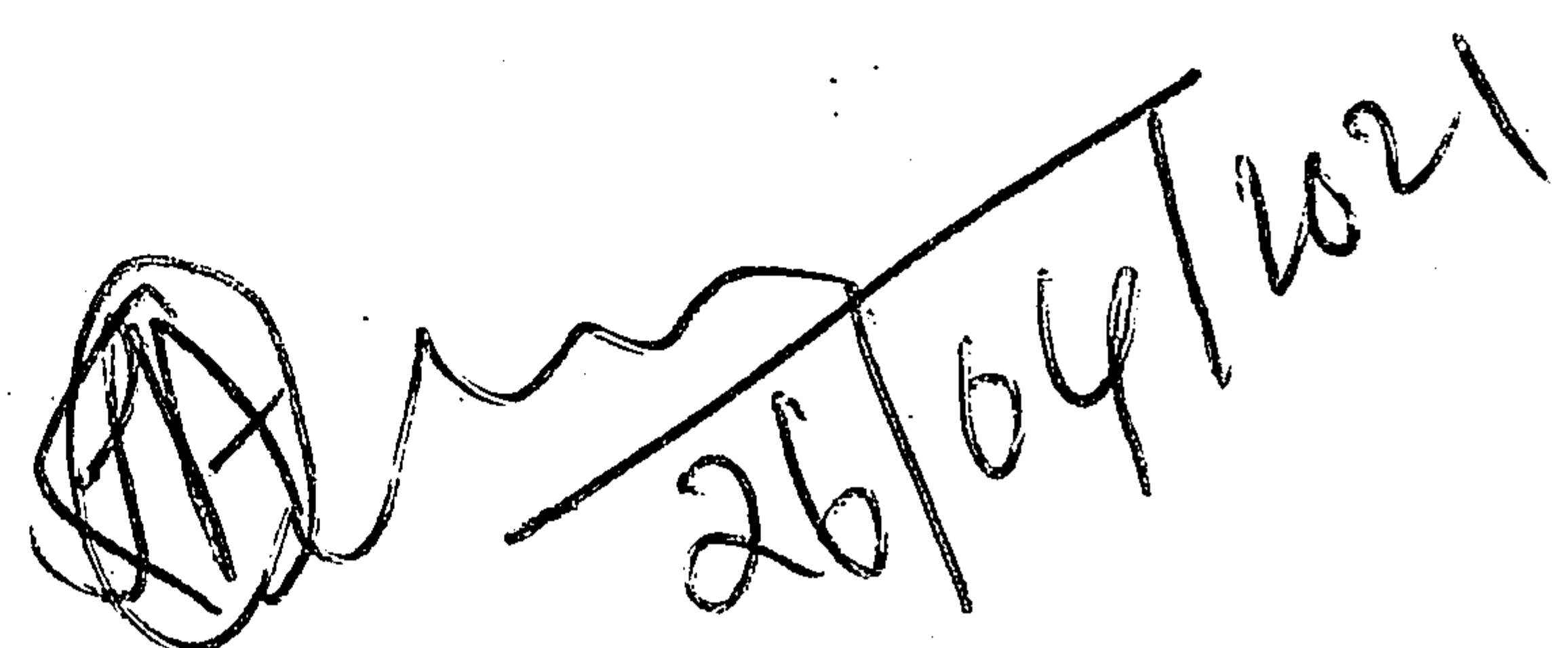
I, **Deepak Joy** hereby declared that the project work entitled **“TOPOLOGICAL VECTOR SPACE AND ITS NORMABILITY”** is an original record of studied and bonafide work carried out by me under the guidance of **Dr. Ali Akbar K**, Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, India, and has not been submitted by me elsewhere for the award of any degree, diploma, title or recognition before.

Department of Mathematics
Central university of Kerala

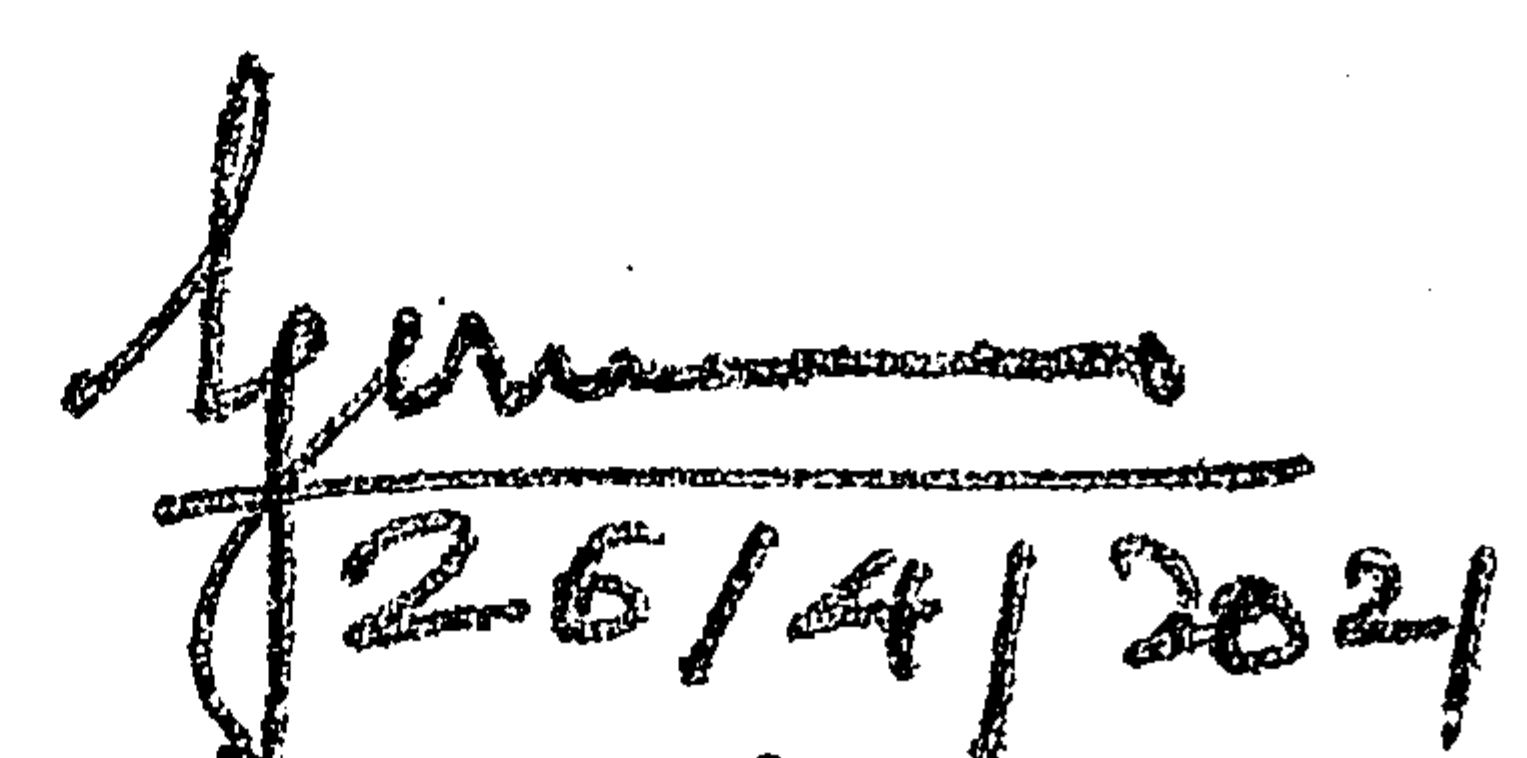
Deepak Joy
April 2021

Certificate

I, Dr. Ali Akbar K, hereby certify that the project work entitled TOPOLOGICAL VECTOR SPACE AND ITS NORMABILITY is a record of bonafide study carried out by Mr Deepak Joy under my supervision and guidance in partial fulfillment of the requirements for the Master degree in Mathematics of Central University of Kerala.


26/04/2021

Dr. Ali Akbar K
(Research Supervisor)
Assistant professor
Department of Mathematics
Central University of Kerala
Kasaragod

Dr. K A Germina 
Head of the Department
Department of Mathematics
Central university of Kerala
Kasargode



A Study on Leech Labelling of Graph Theory

DISSERTATION SUBMITTED

by

Delina Davis

(Reg.No. PMA051925)

Under the guidance of

Dr. Gnanavel Soundararajan

the requirements for the degree of

MASTER OF SCIENCE IN MATHEMATICS

(Batch 2019-2021)



CENTRAL UNIVERSITY OF KERALA

APRIL 2021

DEPARTMENT OF MATHEMATICS

SCHOOL OF PHYSICAL SCIENCES

CENTRAL UNIVERSITY OF KERALA

PERIYA P.O., KASARAGOD- 671320

KERALA, INDIA

DECLARATION

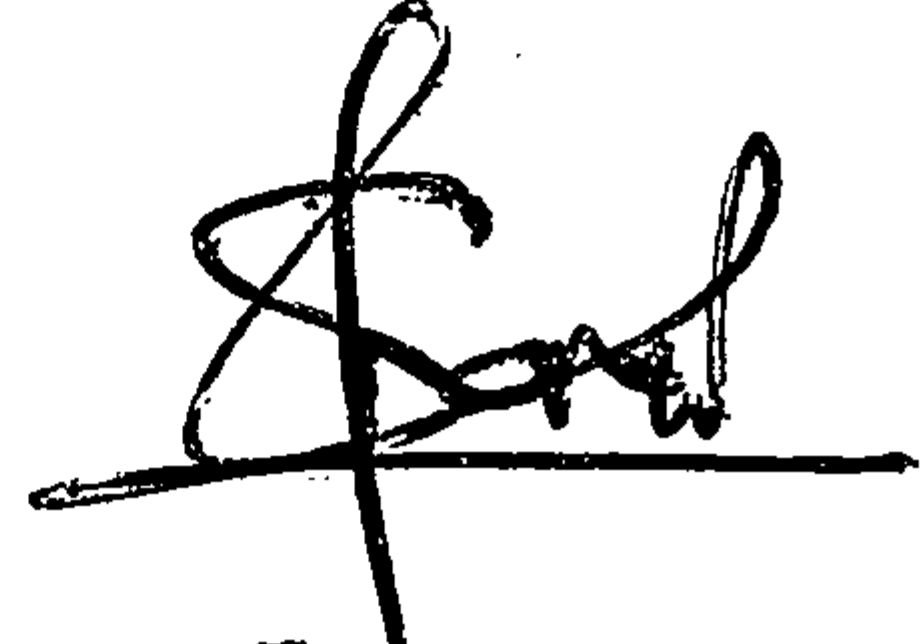
I, **Delina Davis**, hereby declare that the project entitled “**A Study on Leech Labelling of Graph Theory**” is an original piece of record of studies and bonafide work carried out by me under the guidance and supervision of **Dr. Gnanavel Soundararajan**, Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala and has not been submitted by me elsewhere for the award of any degree, diploma, title or recognition before.

Department of Mathematics
Central University of Kerala,
Kasaragod

Delina Davis
(PMA051925)

CERTIFICATE

I, **Dr. Gnanavel Soundararajan** Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala, hereby certify that the project entitled “**A Study on Leech Labelling of Graph Theory**” is a record of bonafide study carried out by **Delina Davis** under my guidance and supervision in partial fulfillment of the requirements for the Master degree in Mathematics.



Dr. Gnanavel Soundarajan

Assistant Professor Department of Mathematics
Central University of Kerala Kasaragod, Kerala.


20/4/2024
Dr. Germina K. A

Head, Department of Mathematics
Central University of Kerala
Kasaragod, Kerala

HEAD
Department of Mathematics
School of Mathematical & Physical Sciences
Central University of Kerala
Tejaswini Hills, Periyar
Kasaragod, Kerala

**AN ANALYSIS OF CLASSICAL THEOREMS ON
GROUPS IN CASE OF SEMIGROUPS**

DISSERTATION SUBMITTED

by

DELNA GEORGE

(Reg.No.PMA051926)

Under the guidance of

Dr. GNANAVEL SOUNDARARAJAN

*The project submitted in partial fulfillment of the requirements for the
degree of*

MASTER OF SCIENCE IN MATHEMATICS

(Batch 2019-2021)

at



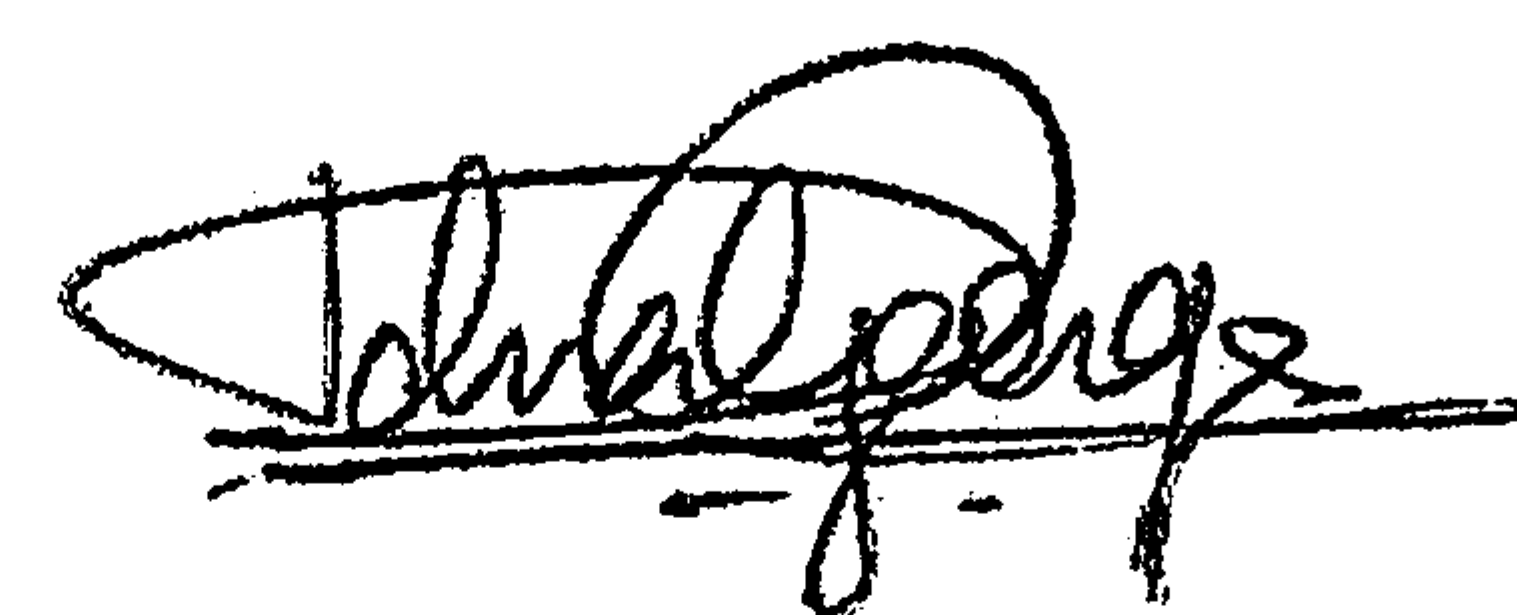
CENTRAL UNIVERSITY OF KERALA

APRIL 2021

DEPARTMENT OF MATHEMATICS
SCHOOL OF PHYSICAL SCIENCES
CENTRAL UNIVERSITY OF KERALA
PERIYA P. O, TEJASWINI HILLS
KASARAGOD, KERALA, PIN-671316.

DECLARATION

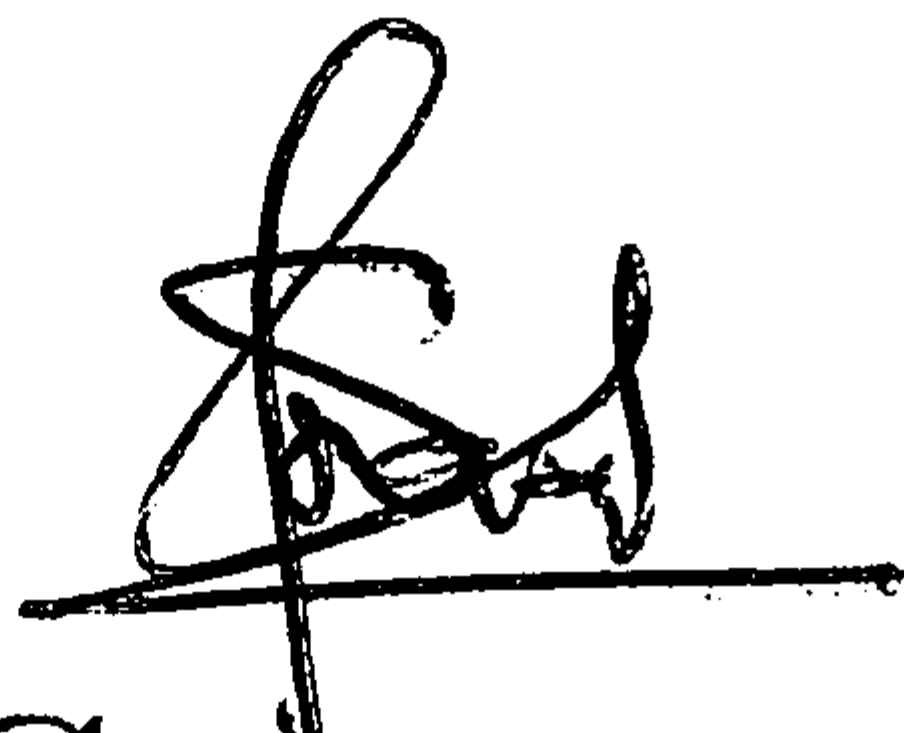
I, **DELNA GEORGE** hereby declare that the project entitled "**AN ANALYSIS OF CLASSICAL THEOREMS ON GROUPS IN CASE OF SEMIGROUPS**" is a bonafide work carried out by me under the guidance and supervision of **Dr. GNANAVEL SOUNDARARAJAN**, Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala and has not been submitted by me elsewhere for the award of any degree, diploma, title or recognition before.



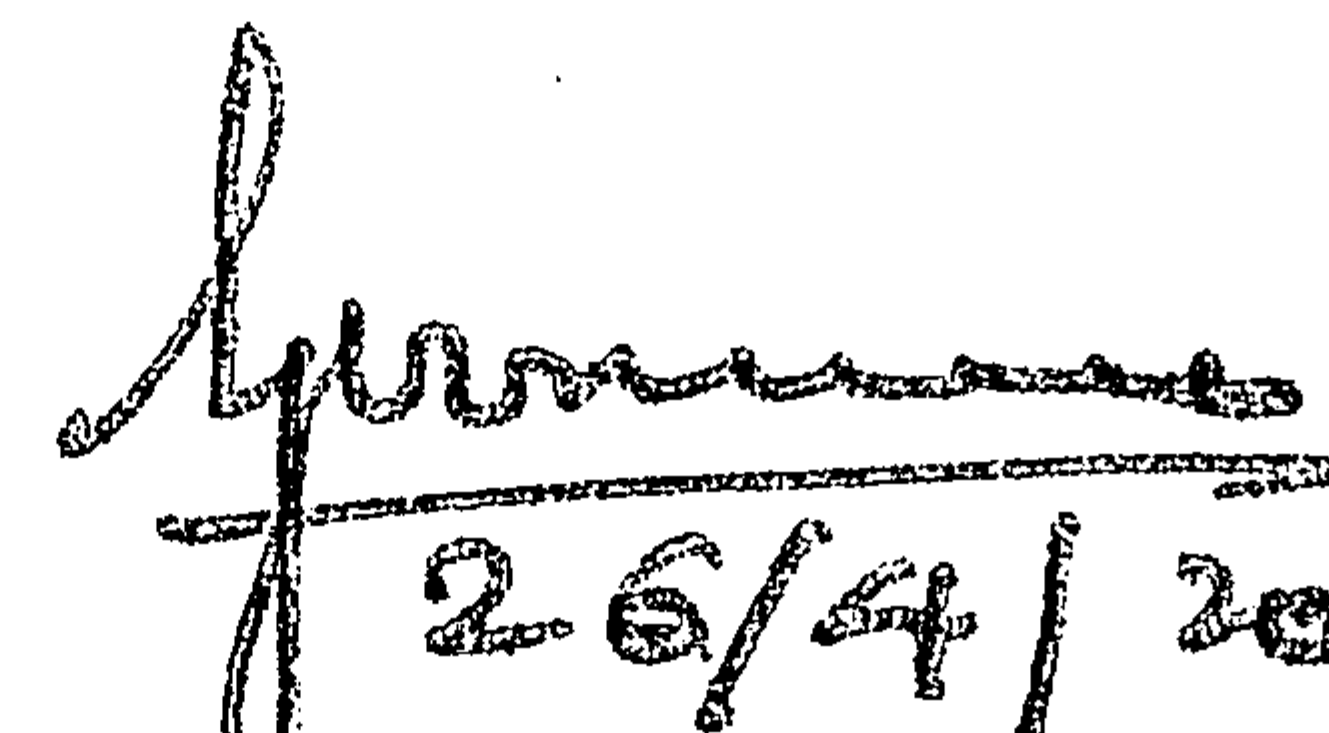
DELNA GEORGE

CERTIFICATE

I, **Dr. GNANAVEL SOUNDARARAJAN** hereby certify that project entitled "AN ANALYSIS OF CLASSICAL THEOREMS ON GROUPS IN CASE OF SEMIGROUPS" is a record of bonafide study carried out by **DELNA GEORGE (PMA051926)** under my guidance and supervision in partial fulfillment of the requirements for the Master degree in Mathematics.



Dr.S.Gnanavel
Assistant Professor
Department of Mathematics
Central University of Kerala
Kasaragod.



Dr. K.A. GERMINA
Head of the Department
Department of Mathematics
Central University of Kerala
Kasaragod



Signature of the External Examiner

A Study on Public Key Cryptosystems

DISSERTATION SUBMITTED

BY

Diase J Kappen

(Regno: PMA051927)

Under the guidance of

Dr. Manikandan Rangaswamy

The project submitted in partial fulfillment of the requirement for the degree of

MASTER OF SCIENCE IN MATHEMATICS

(Batch : 2019-2021)



CENTRAL UNIVERSITY OF KERALA

APRIL 2021

DEPARTMENT OF MATHEMATICS

SCHOOL OF PHYSICAL SCIENCE

CENTRAL UNIVERSITY OF KERALA

PERIYA P.O, KASARGOD- 671320

KERALA, INDIA

DECLARATION

I **Diase J Kappen** do hereby declare that the project entitled "**A Study on Public Key Cryptosystems**" is an original piece of record of studies and bonafide work carried out by me under the guidance and supervision of **Dr. Manikandan Rangaswamy**, Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala and has not been submitted by me elsewhere for the award of any degree, diploma, title or recognition before.

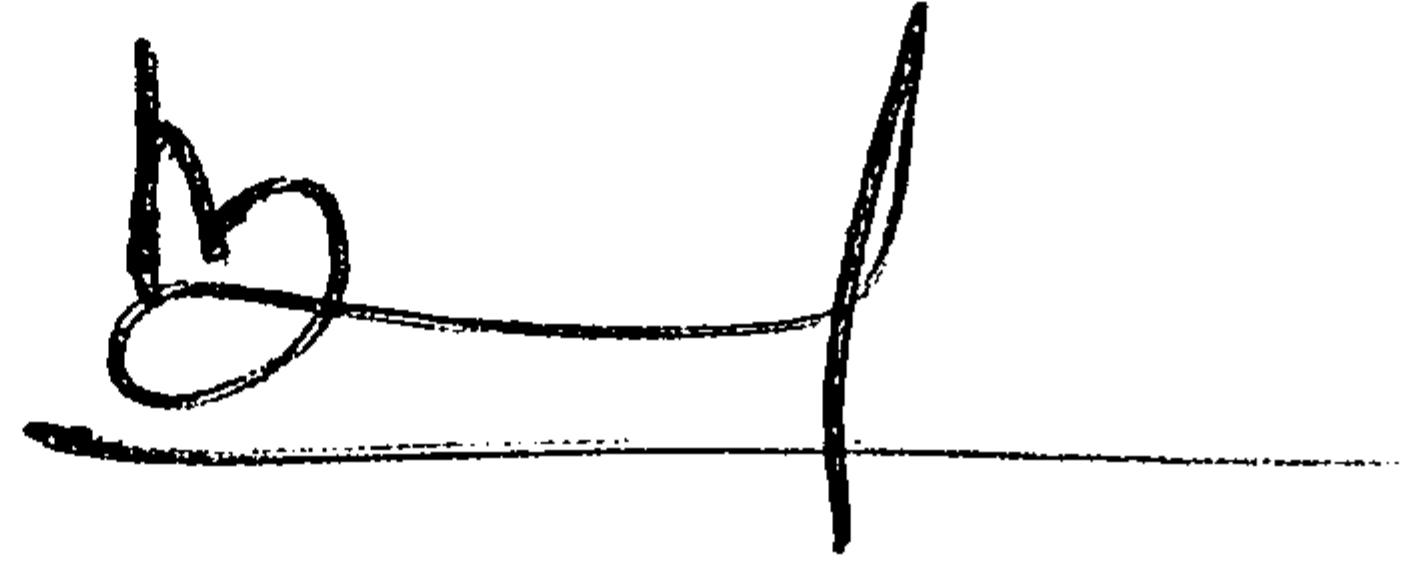
Department of Mathematics
Central University of Kerala,
Kasaragod, Kerala



Diase J Kappen
(PMA051927)

CERTIFICATE

I, **Dr. Manikandan Rangaswamy**, Assistant Professor, Department of Mathematics, Central University of Kerala, Kasargod, Kerala hereby certify that the project entitled "A Study on Public Key Cryptosystems" is a record of bonafide study carried out by **Diase J Kappen** under my guidance and supervision in partial fulfillment of the requirements for the Master degree in Mathematics.




Dr. Manikandan Rangaswamy

Assistant Professor

Department of Mathematics

Central University of Kerala,

Kasaragod, Kerala



Dr. Germina K A

Head of the Department,
Department of Mathematics
Central University of Kerala,
Kasaragod, Kerala

A STUDY ON BALANCE IN SIGNED GRAPH

DISSERTATION SUBMITTED

BY

DZUVINO JUDITH KUOTSU

(Reg.No. PMA051928)

Under the guidance

of

Dr. K A GERMINA

The project submitted in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN MATHEMATICS

(Batch 2019- 2021)

at



CENTRAL UNIVERSITY OF KERALA

APRIL 2021

DEPARTMENT OF MATHEMATICS

SCHOOL OF MATHEMATICAL AND PHYSICAL SCIENCES

PERIYE P.O, KASARAGOD - 671316

KERALA, INDIA

DECLARATION

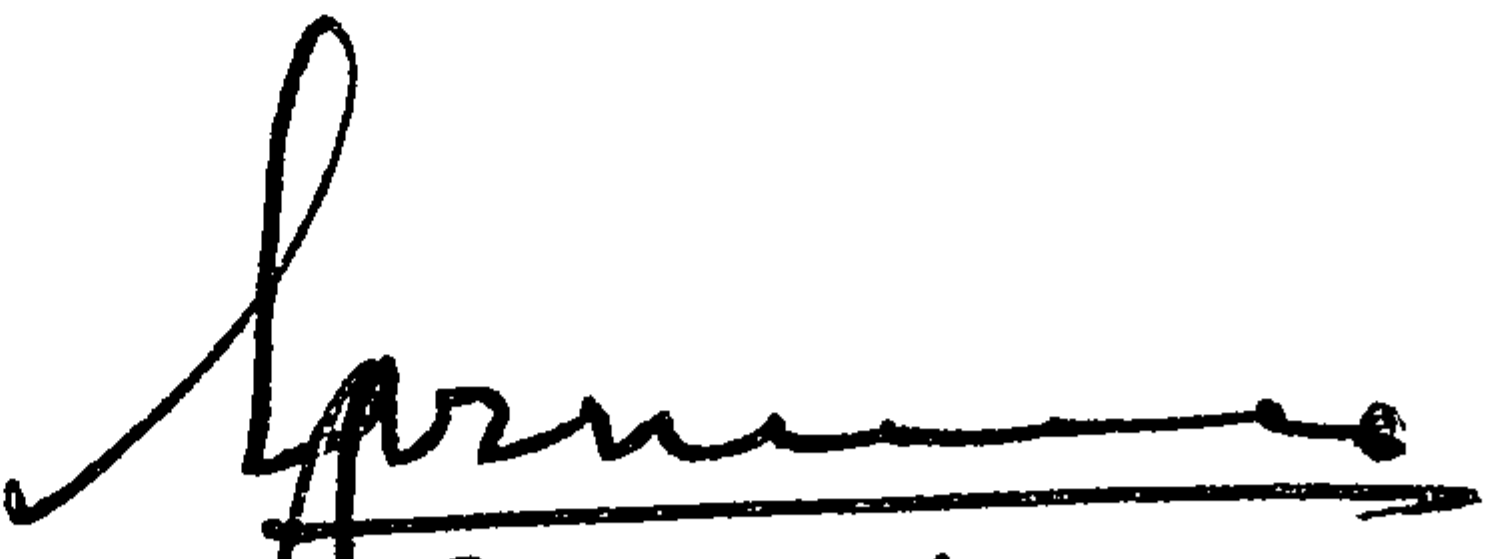
I, **Dzuvino Judith Kuotsu**, hereby declare that the project entitled "**A Study On Balance in Signed Graph**" is an original piece of record of studies and bonafide study carried out by me under the guidance and supervision of **Dr. K A Germina**, Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala and has not been submitted by me elsewhere for the award of any degree, diploma, title or recognition before.

Place:Kasaragod
Place:

Dzuvino Judith Kuotsu
(Reg no.PMA051928)

CERTIFICATE

This is to certify that the project entitled **A Study On Balance in Signed graph** submitted to the Department of Mathematics in partial fulfillment of the requirement for the award of the M.Sc Degree programme in Mathematics, is a bonafide record of research work done by Ms. **DZUVINO JUDITH KUOTSU (Reg.No. PMA051928)** during the period of her study in the Department of Mathematics, Central University of Kerala, Kasaragod, under my supervision and guidance during the year 2019 - 2021.


22-4-2021
Dr K A Gemina (Research Supervisor)
Head of the Department,
Central University Of Kerala,
Kasaragod



Signature of the External :

A STUDY ON FRACTALS AND ITS APPLICATIONS

DISSERTATION SUBMITTED

by
FIDA
(Reg.No.PMA051929)

Under the guidance of

Dr. SHAINI P

The project submitted in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN MATHEMATICS

(Batch 2019-2021)

at



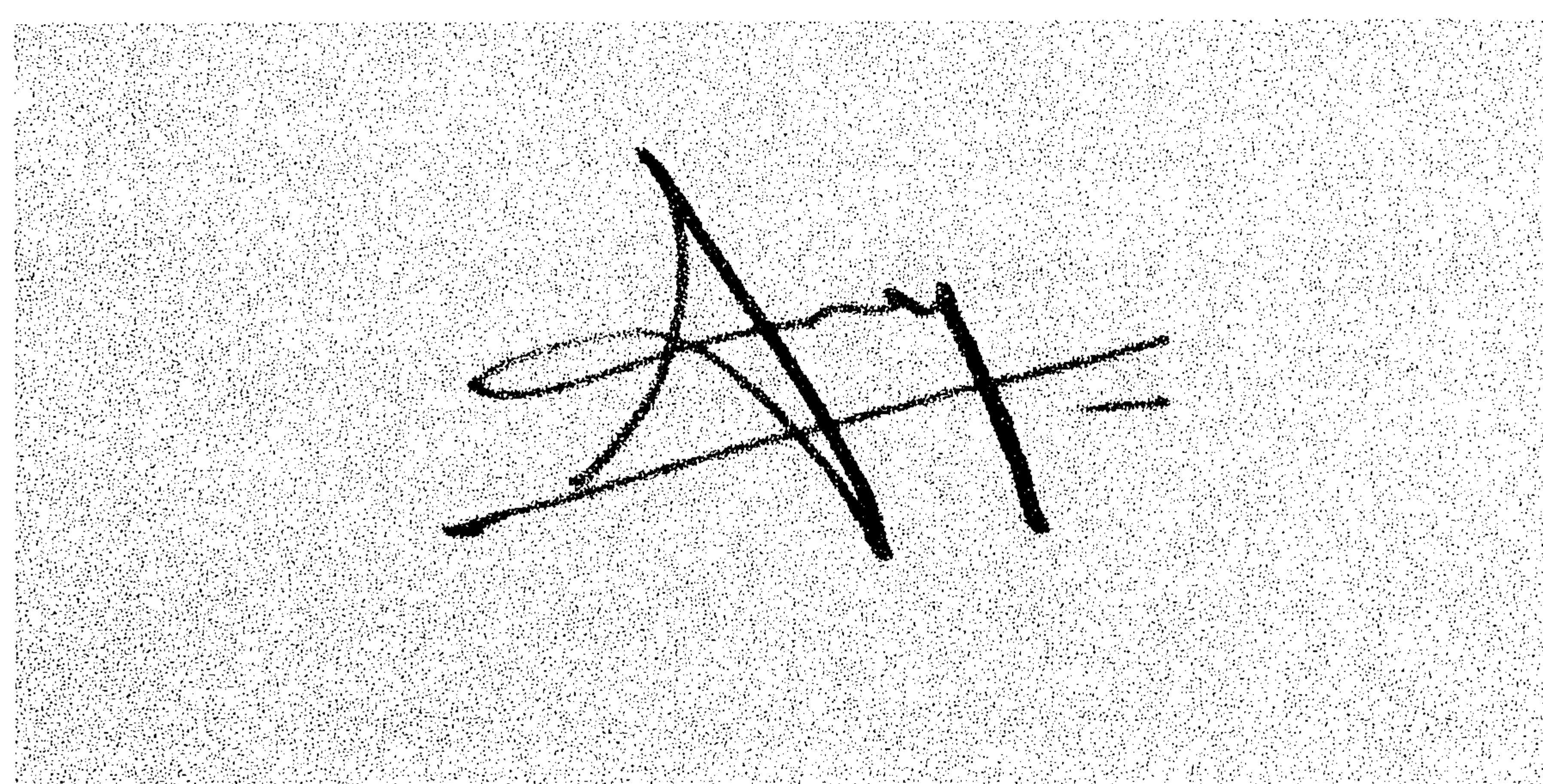
CENTRAL UNIVERSITY OF KERALA

APRIL 2021

DEPARTMENT OF MATHEMATICS
SCHOOL OF PHYSICAL SCIENCES
CENTRAL UNIVERSITY OF KERALA
PERIYA P. O, TEJASWINI HILLS
KASARAGOD, KERALA, PIN-671316.

DECLARATION

I, FIDA hereby declare that the project entitled "A STUDY ON FRACTALS AND ITS APPLICATIONS" is a bonafide study carried out by me under the guidance and supervision of Dr. SHAINI P, Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala and has not been submitted by me elsewhere for the award of any degree, diploma, title or recognition before.

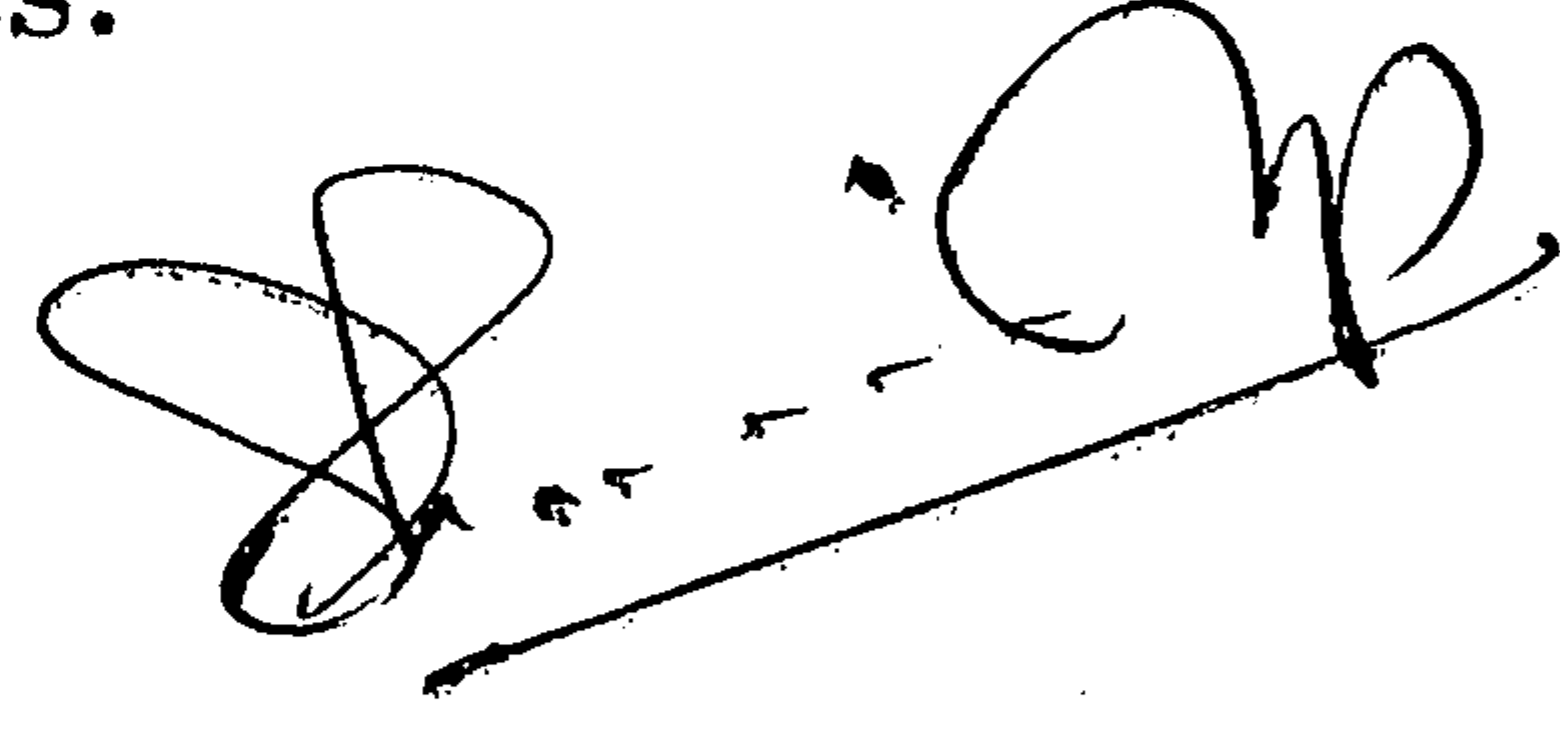
A rectangular box containing a handwritten signature in black ink. The signature is stylized and appears to be the name 'FIDA'.

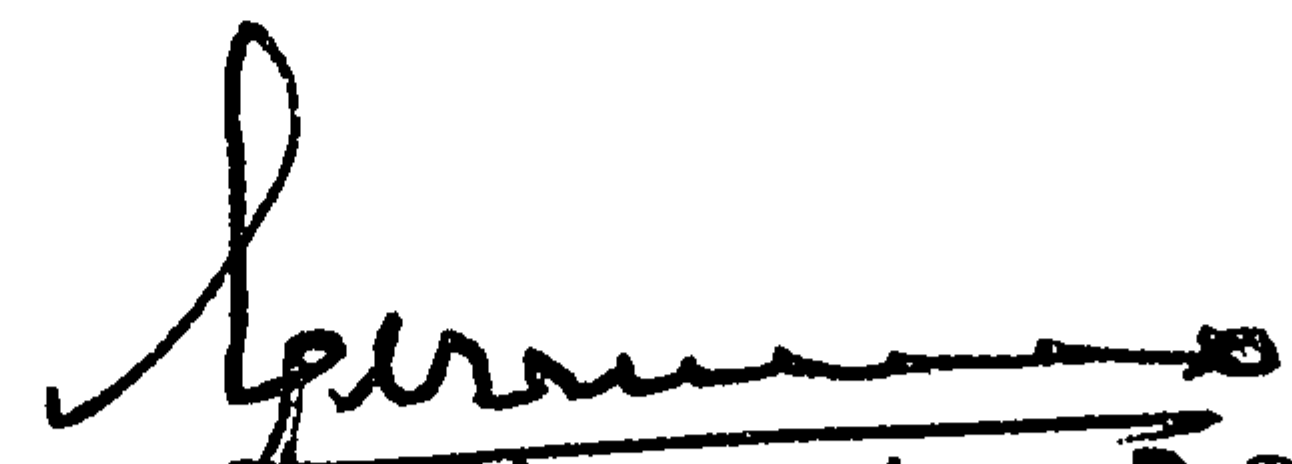
FIDA

CERTIFICATE

I, Dr.SHAINI P hereby certify that project entitled "A STUDY ON FRACTALS AND ITS APPLICATIONS" is a record of bonafide study carried out by FIDA (PMA051929) under my guidance and supervision in partial fulfillment of the requirements for the Master degree in Mathematics.

Dr.SHAINI P
Assistant Professor
Department of Mathematics
Central University of Kerala
Kasaragod.




20-4-2021
Dr. K.A. GERMINA
Head of the Department
Department of Mathematics
Central University of Kerala
Kasaragod

Signature of the External Examiner

A STUDY ON BILINEAR FORMS

DISSERTATION SUBMITTED

by

HARITHA V

(Reg.No.PMA051930)

Under the guidance of

Dr.SHAINI P

The project submitted in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN MATHEMATICS

(Batch 2019-2021)

at



CENTRAL UNIVERSITY OF KERALA

APRIL 2021

DEPARTMENT OF MATHEMATICS
SCHOOL OF PHYSICAL SCIENCES
CENTRAL UNIVERSITY OF KERALA
PERIYA P. O, TEJASWINI HILLS
KASARAGOD, KERALA, PIN-671316.

DECLARATION

I, **HARITHA V** hereby declare that the project entitled “**A STUDY ON BILINEAR FORMS**” is a bonafide study carried out by me under the guidance and supervision of **Dr.SHAINI P**, Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragòd, Kerala and has not been submitted by me elsewhere for the award of any degree, diploma, title or recognition before.

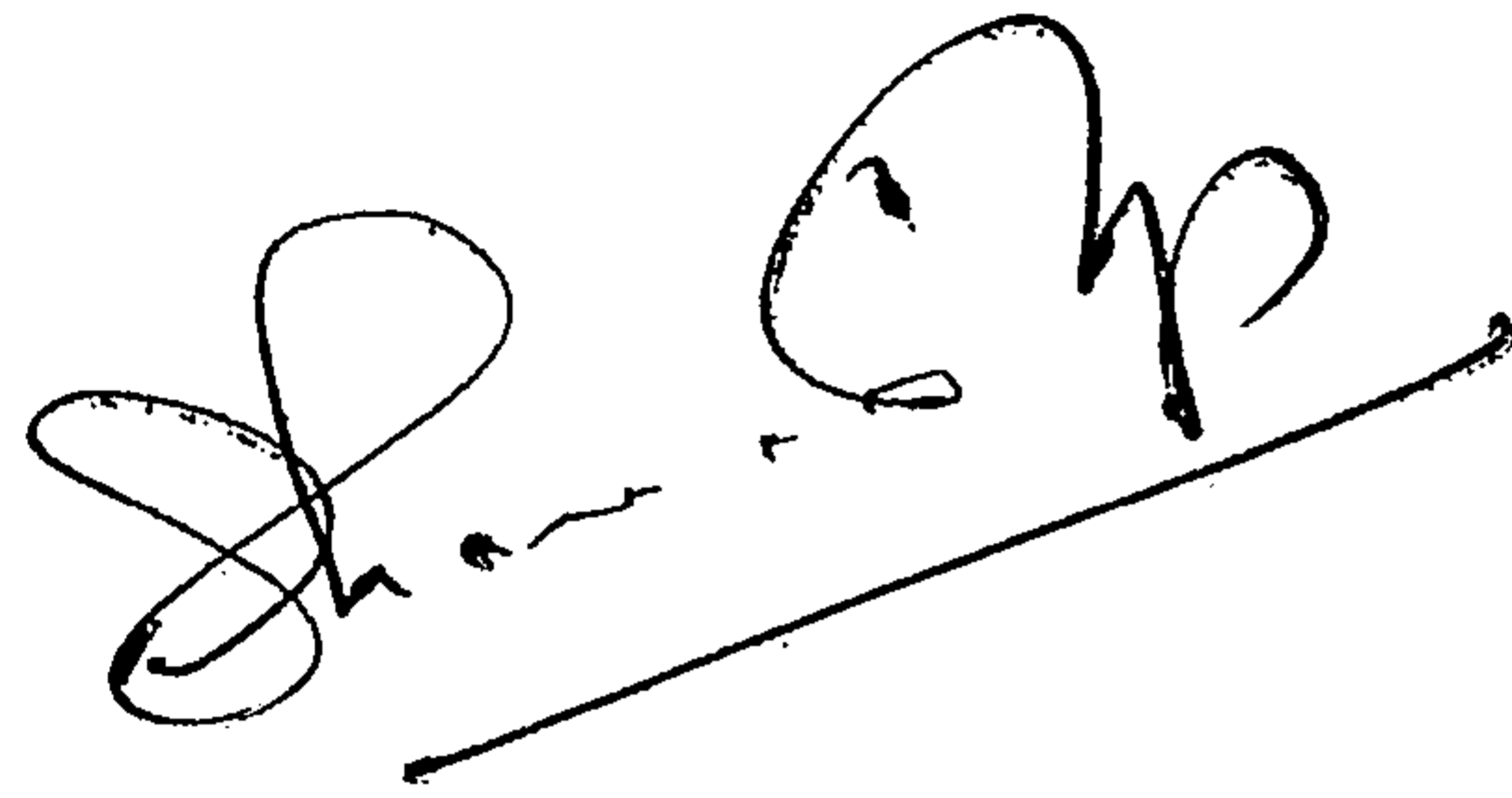


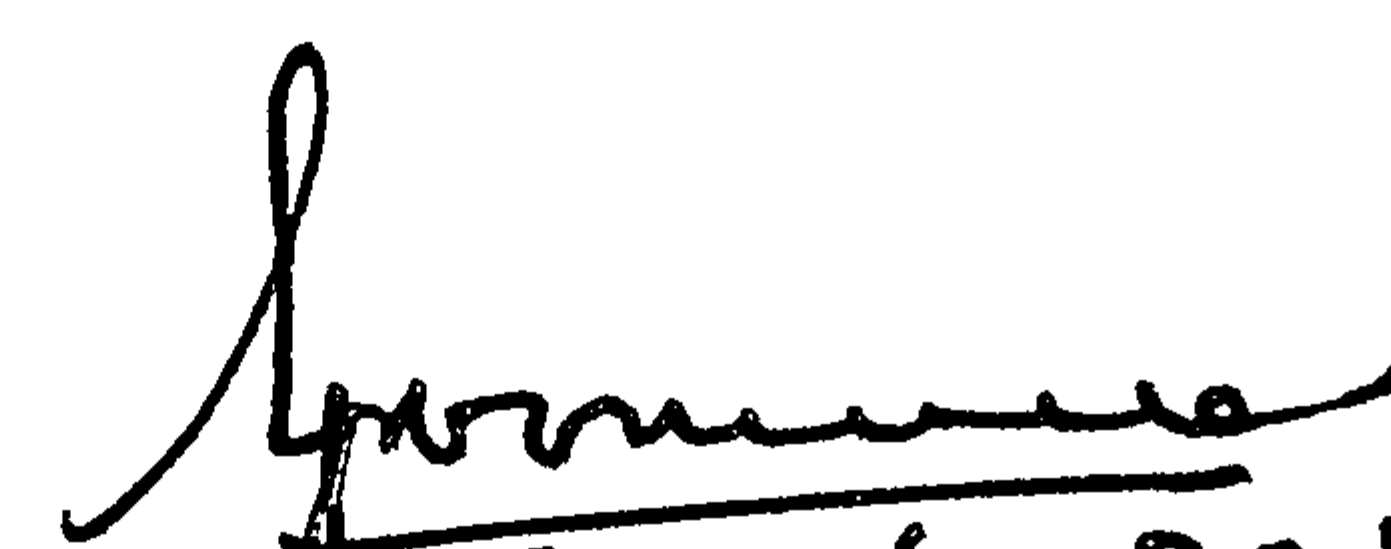
HARITHA V

CERTIFICATE

I, **Dr.SHAINI P** hereby certify that project entitled “**A STUDY ON BILINEAR FORMS**” is a record of bonafide study carried out by **HARITHA V** (PMA051930) under my guidance and supervision in partial fulfillment of the requirements for the Master degree in Mathematics.

Dr.SHAINI P
Assistant Professor
Department of Mathematics
Central University of Kerala
Kasaragod.




20-4-2021
Dr. K.A. GERMINA
Head of the Department
Department of Mathematics
Central University of Kerala
Kasaragod

Signature of the External Examiner

A STUDY ON MAGIC GRAPH

DISSERTATION SUBMITTED

BY

JISNA E P

(REG NO PMA051931)

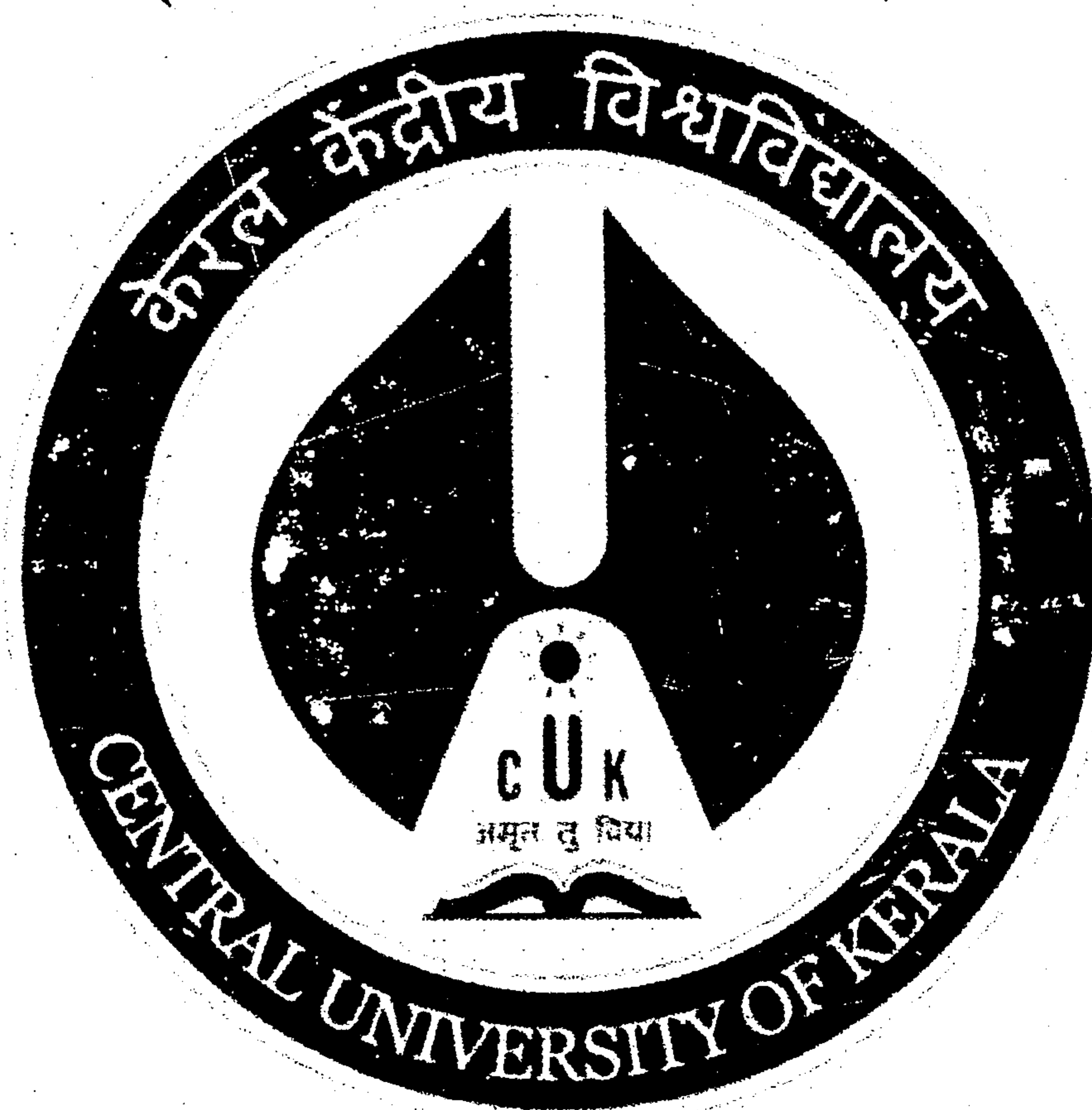
Under the guidance of

Dr. Manikandan Rangaswamy

*The project submitted in partial fulfillment of the
requirements for the degree of*

MASTER OF SCIENCE IN MATHEMATICS

(Batch 2019-2021)



CENTRAL UNIVERSITY OF KERALA

APRIL 2021

DEPARTMENT OF MATHEMATICS

SCHOOL OF PHYSICAL SCIENCES

CENTRAL UNIVERSITY OF KERALA

PERIYA, P.O., KASARAGOD- 671320

KERALA, INDIA

DECLARATION

I, **Jisna E P**, hereby declare that the project work entitled **A study on Magic Graph** is an original piece of record of studies and bonafide work carried out by me under the guidance and supervision of **Dr. Manikandan Rangaswamy**, Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala, and has not been submitted by me elsewhere for the award of any degree, diploma, title or recognition before.

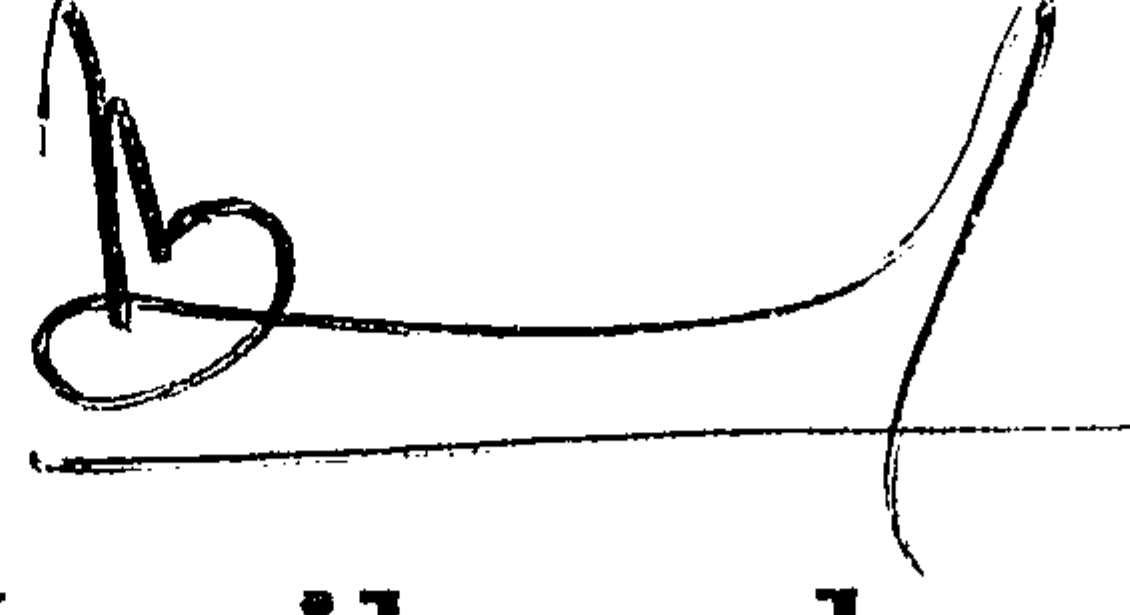
Department of Mathematics
Central University of Kerala Kasaragod



Jisna E P
(PMA051931)

CERTIFICATE

I, Dr. Manikandan Rangaswamy, Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala, hereby certify that the project entitled "A STUDY ON MAGIC GRAPH" is a record of bonafide study carried out by Jisna E P under my guidance and supervision in partial fulfillment of the requirements for the Master Degree in Mathematics.

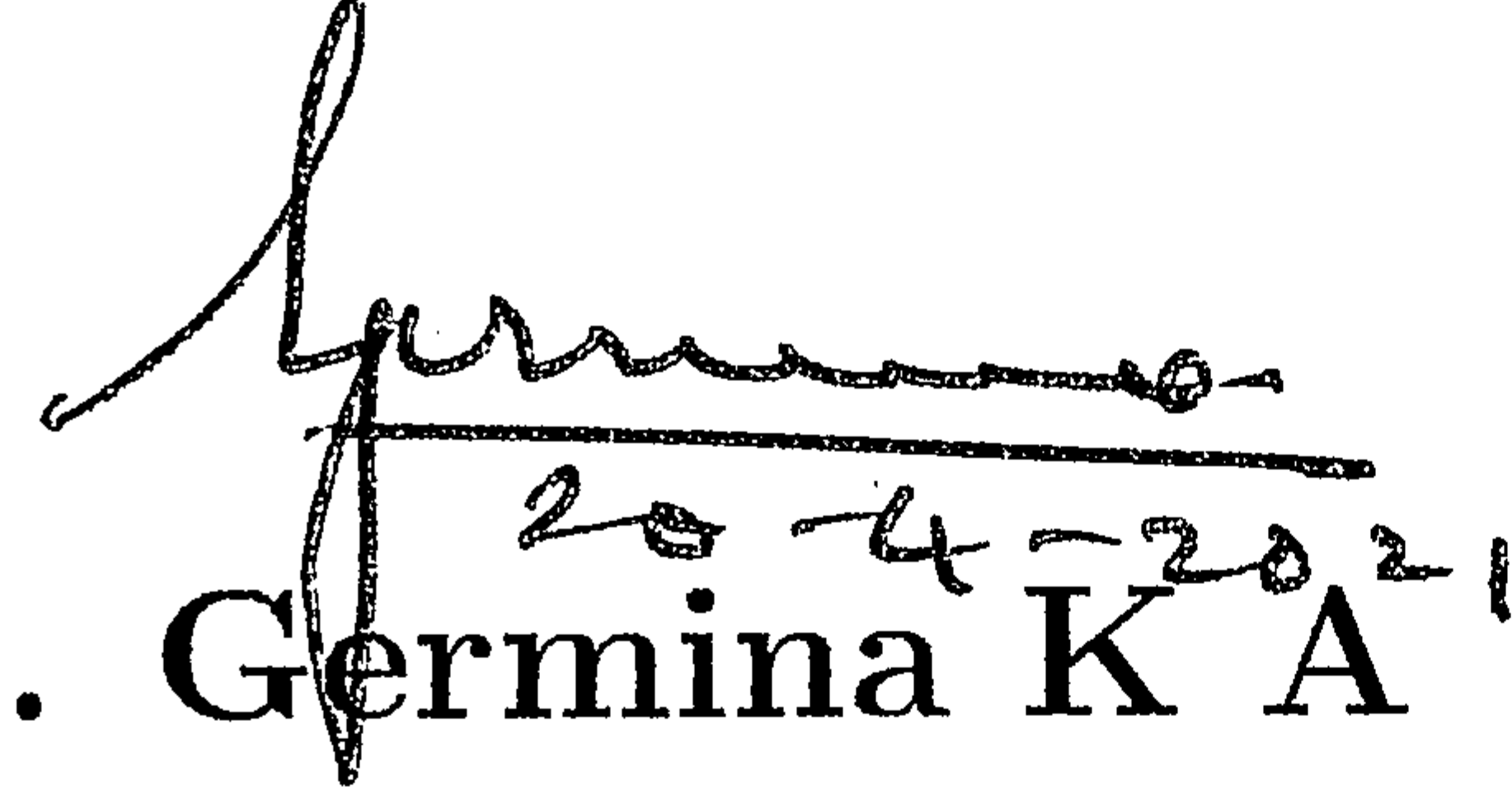


Dr. Manikandan Rangaswamy

Assistant Professor

Department of Mathematics

Central University of Kerala Kasaragod, Kerala



20-4-2021

Dr. Germina K A

Head, Department of Mathematics

Central University of Kerala

Kasaragod, Kerala

APPLICATIONS OF LINEAR ALGEBRA

DISSERTATION SUBMITTED

by

JISNA JOHNSON
(Reg.No.PMA051932)

Under the guidance of

Dr.SHAINI P

The project submitted in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN MATHEMATICS

(Batch 2019-2021)

at



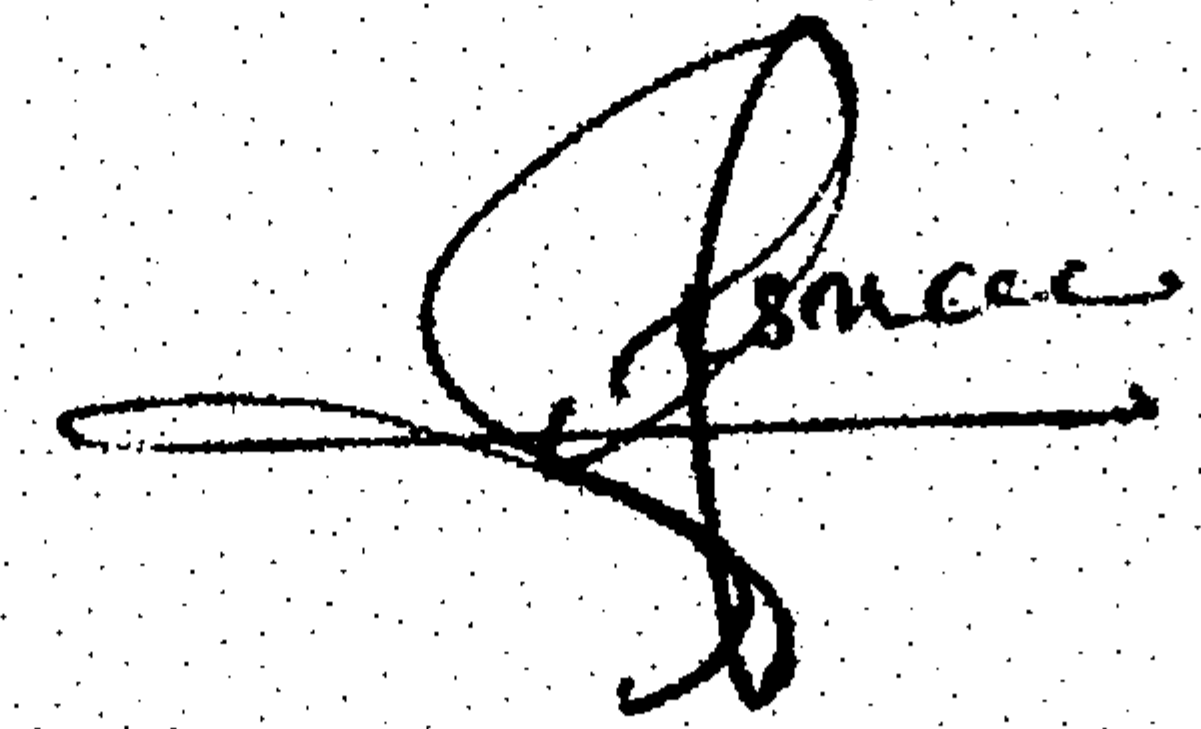
CENTRAL UNIVERSITY OF KERALA

APRIL 2021

DEPARTMENT OF MATHEMATICS
SCHOOL OF PHYSICAL SCIENCES
CENTRAL UNIVERSITY OF KERALA
PERIYA P. O, PIN-671316
TEJASWINI HILLS, KASARAGOD
KERALA, INDIA.

DECLARATION

I, JISNA JOHNSON hereby declare that the project entitled "APPLICATIONS OF LINEAR ALGEBRA" is a bonafide study carried out by me under the guidance and supervision of Dr.SHAINI P, Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala and has not been submitted by me elsewhere for the award of any degree, diploma, title or recognition before.

A handwritten signature in black ink, appearing to read 'Jisna Johnson', is centered within a rectangular area of fine grey stippling.

JISNA JOHNSON

CERTIFICATE

I, Dr. SHAINI P hereby certify that project entitled "APPLICATIONS OF LINEAR ALGEBRA" is a record of bonafide study carried out by JISNA JOHNSON (PMA051932) under my guidance and supervision in partial fulfillment of the requirements for the Master degree in Mathematics.

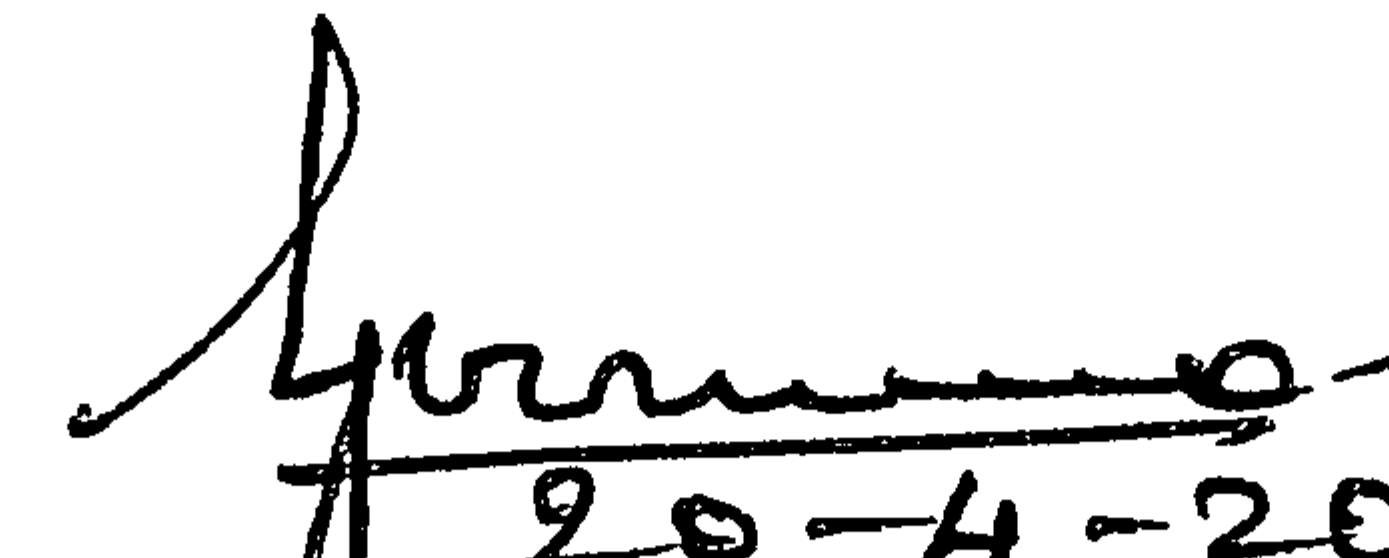
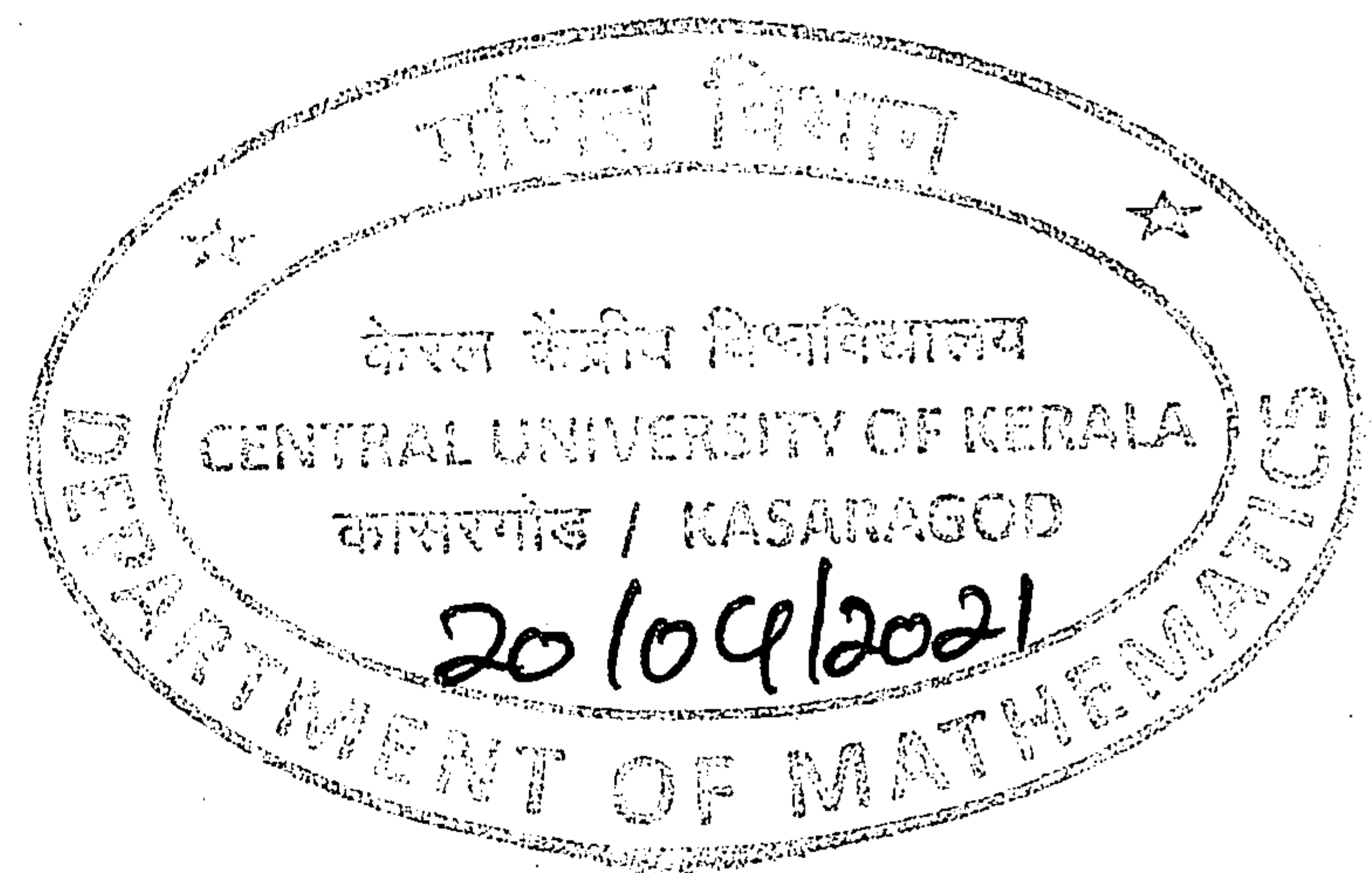
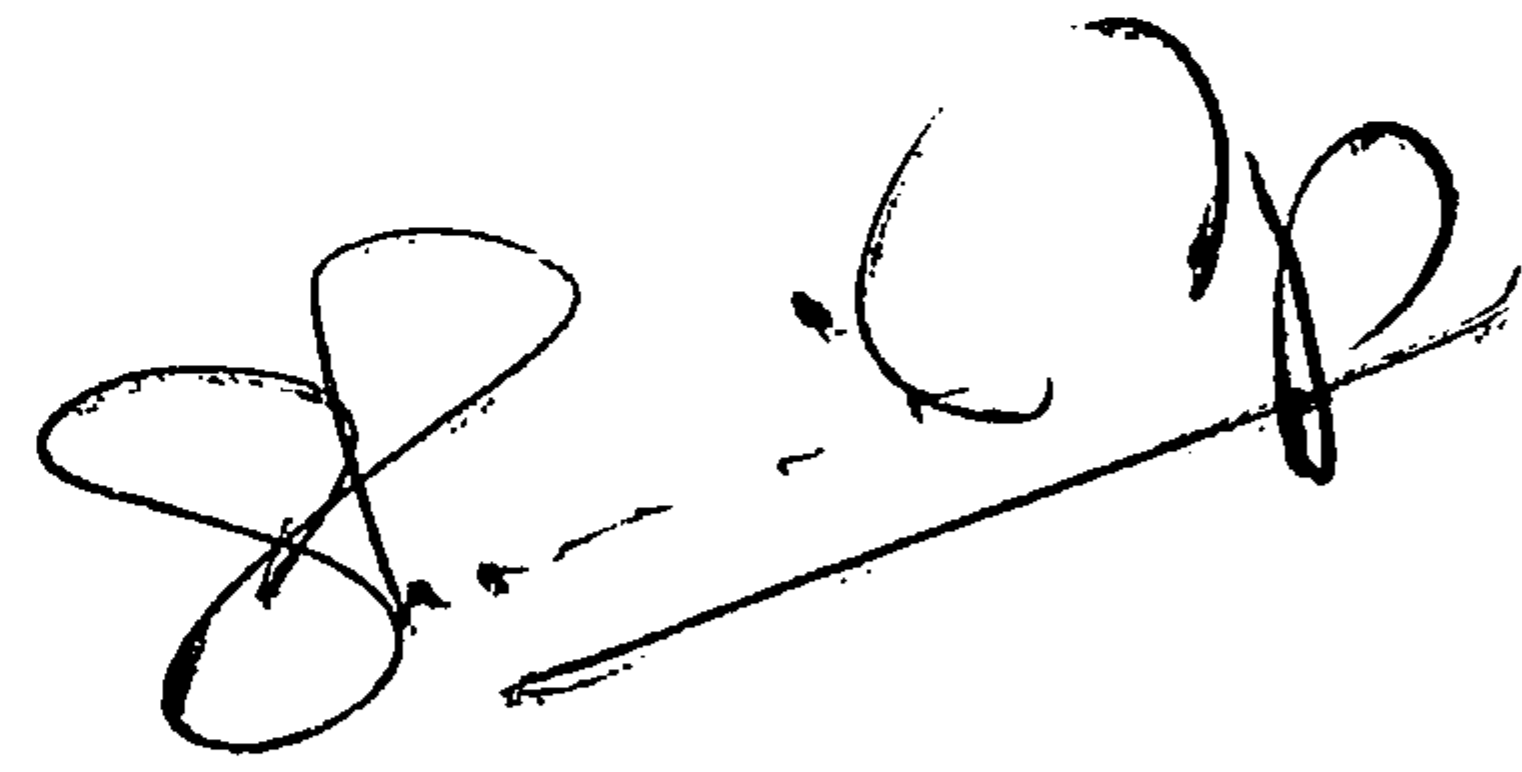
Dr.SHAINI P

Assistant Professor

Department of Mathematics

Central University of Kerala

Kasaragod



Dr. K.A. GERMINA

Head of the Department

Department of Mathematics

Central University of Kerala

Kasaragod

Signature of the External Examiner

A STUDY ON FINITE ABELIAN GROUPS

DISSERTATION SUBMITTED

BY

JITHIN T, Reg. No. PMA051933

Under the guidance of

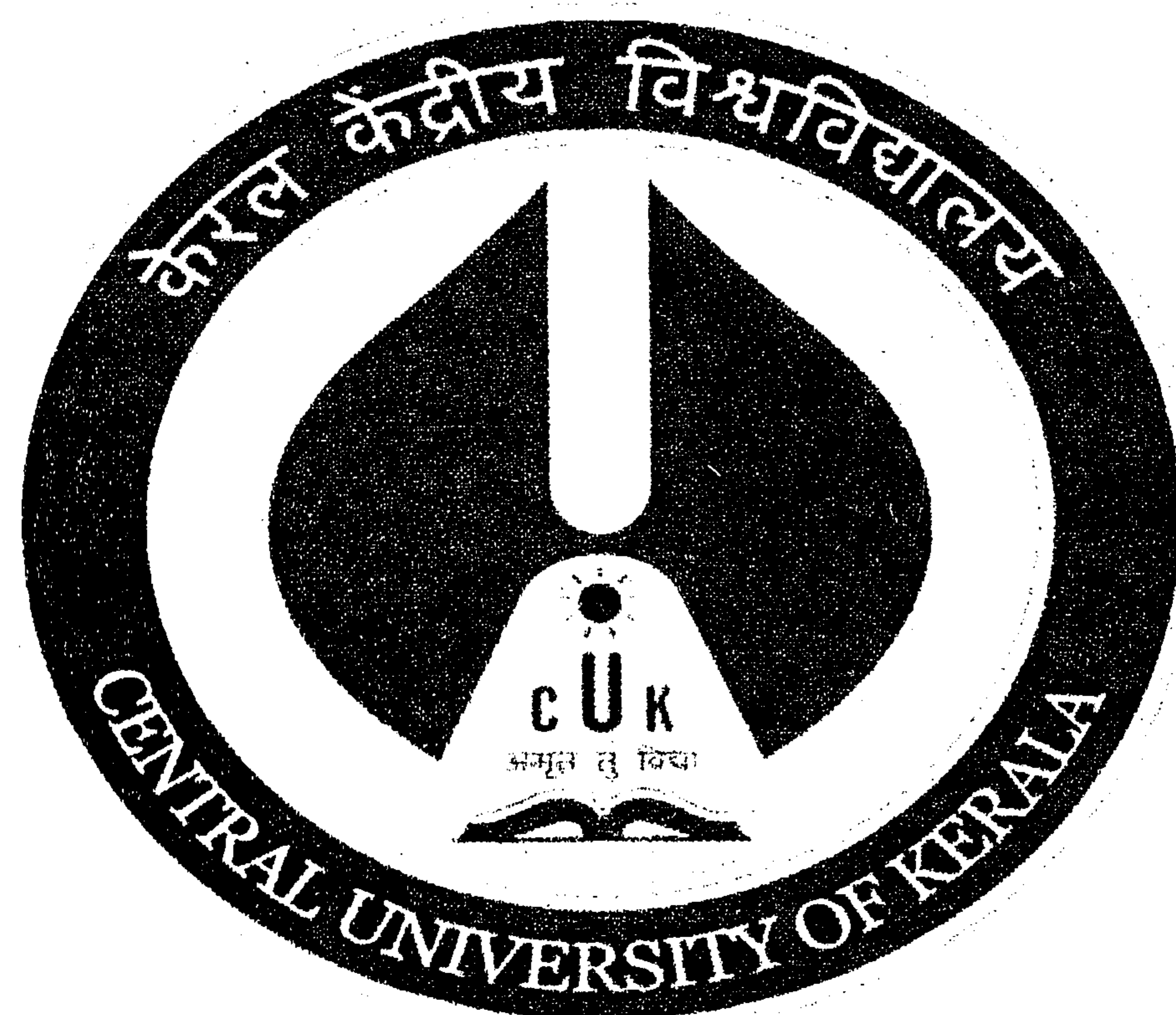
Dr. V. Vilfred

*The project submitted in partial fulfillment of the requirement for
the degree of*

MASTER OF SCIENCE IN MATHEMATICS

(Batch 2019-2021)

at



CENTRAL UNIVERSITY OF KERALA

APRIL 2021

DEPARTMENT OF MATHEMATICS

SCHOOL OF MATHEMATICAL AND PHYSICAL SCIENCES

PERIYE P.O, KASARAGOD-671316

KERALA, INDIA

DECLARATION

I, **JITHIN T**, here by declare that the dissertation entitled, '**A Study On Finite Abelian Groups**' submitted by me to Central University of Kerala, Kasaragod in partial fulfillment for the award of the Degree of Masters of Science in mathematics is a record of bonafide work carried out by me under the guidance of Dr. V. Vilfred, Associative professor, Department of mathematics, Central university of Kerala. I further declare that the dissertation has not been submitted, in part or full, for the award of any other degree or diploma in this University or any other University or Institute.

April 2021

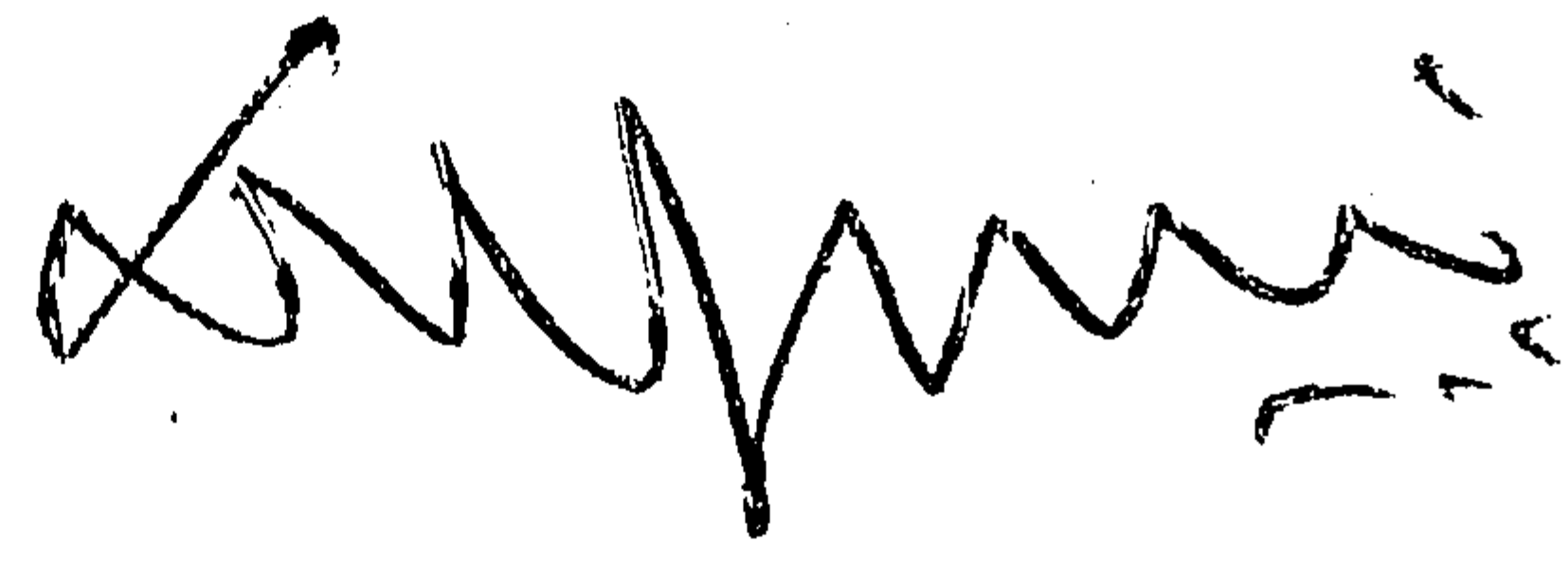
Place: Periyar.

(Jithin T)

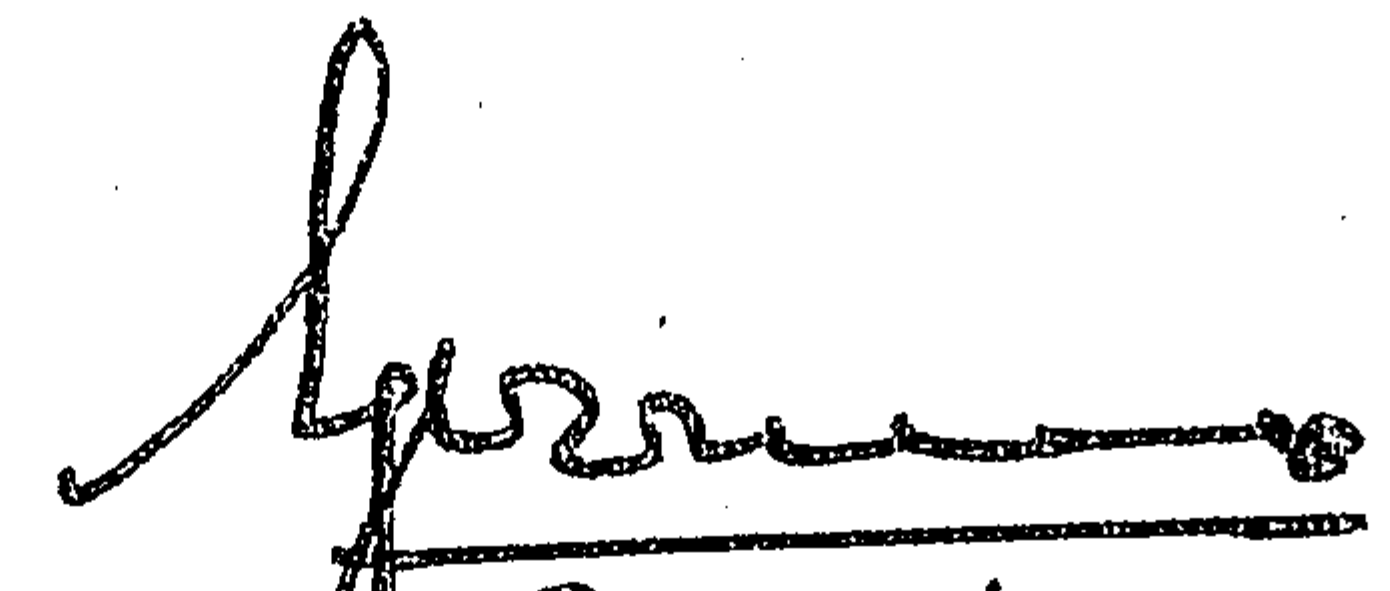
Reg. No. PMA051933

CERTIFICATE

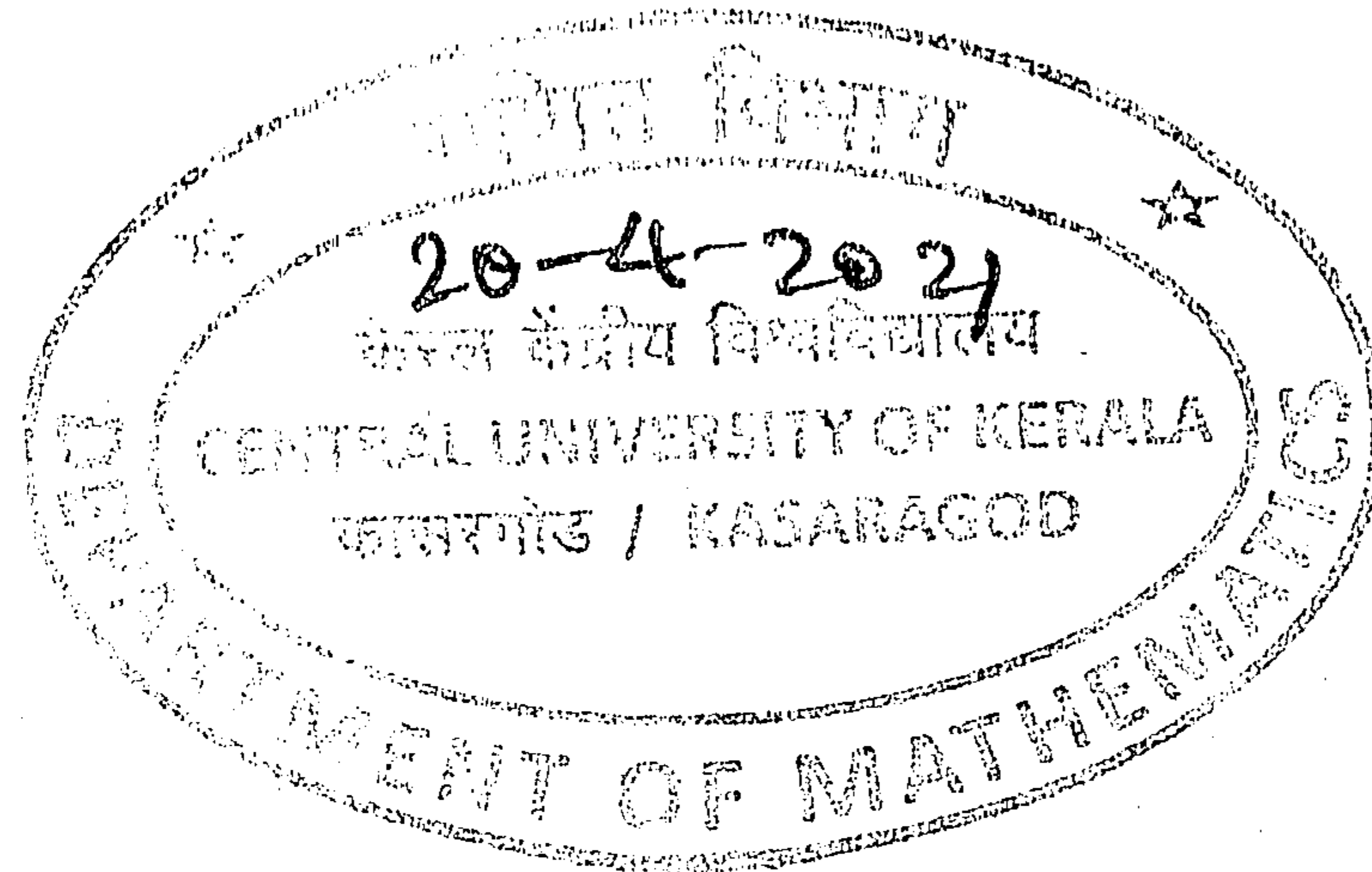
This is to certify that the dissertation entitled, '**A Study On Finite Abelian Groups**' submitted by JITHIN T, Reg. No. PMA051933 is a bonafede work carried out in the Department of mathematics, Central university of Kerala, Kasaragod under my guidance in partial fulfillment for the award of the degree of Master of Science in Mathematics.



Dr. V. Vilfred,
(Research Supervisor)
Associative professor,
Department of Mathematics,
Central University of Kerala,
Kasaragod.



Dr. K. A. Germina,
20-4-2021
Head and
Associative professor,
Department of Mathematics,
Central University of Kerala,
Kasaragod.



A STUDY ON SPECTRAL THEORY OF BOUNDED OPERATORS ON HILBERT SPACES

DISSERTATION SUBMITTED

by
KARTHICK N
(Reg.No.PMA051934)

Under the guidance of
Dr.ALI AKBAR K

The project submitted in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN MATHEMATICS

(Batch 2019-2021)

at



CENTRAL UNIVERSITY OF KERALA

APRIL 2021

DEPARTMENT OF MATHEMATICS
SCHOOL OF PHYSICAL SCIENCES
CENTRAL UNIVERSITY OF KERALA
PERIYA P. O, TEJASWINI HILLS
KASARAGOD, KERALA, PIN-671316.

DECLARATION

I, **KARTHICK N.** hereby declare that the project entitled “**A Study On Spectral Theory Of Bounded Operators On Hilbert Spaces**” is a bonafide work carried out by me under the guidance and supervision of **Dr.ALI AKBAR K.**, Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala and has not been sub- mitted by me elsewhere for the award of any degree, diploma, title or recognition before.

Department of Mathematics
Central University of Kerala
Kasaragod

KARTHICK N
APRIL 2021

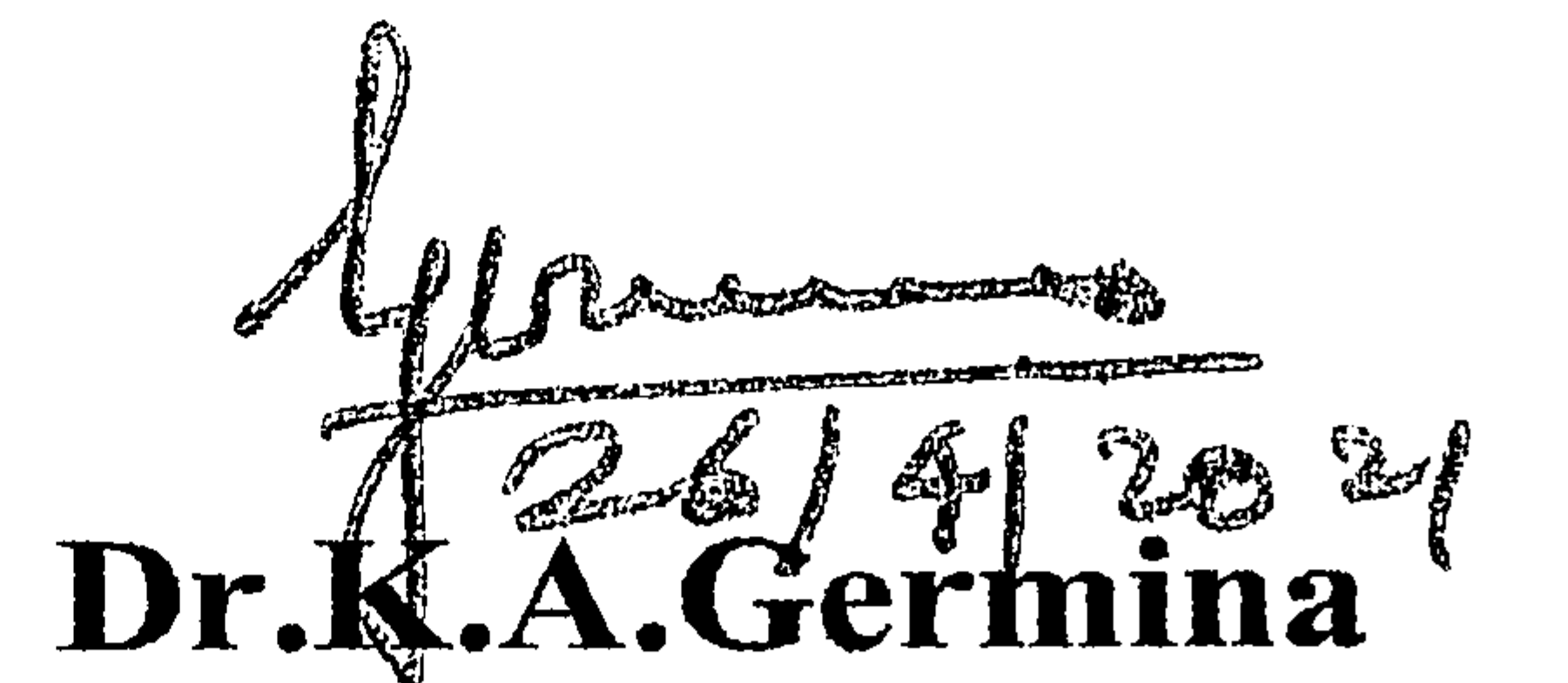
CERTIFICATE

I, **Dr.ALI AKBAR K.** hereby certify that project entitled “**A Study On Spectral Theory Of Bounded Operators On Hilbert Spaces**” is a record of bonafide study carried out by **KARTHICK N. (PMA051934)** under my guidance and supervision in partial fulfillment of the requirements for the Master degree in Mathematics.



Dr.ALI AKBAR K.

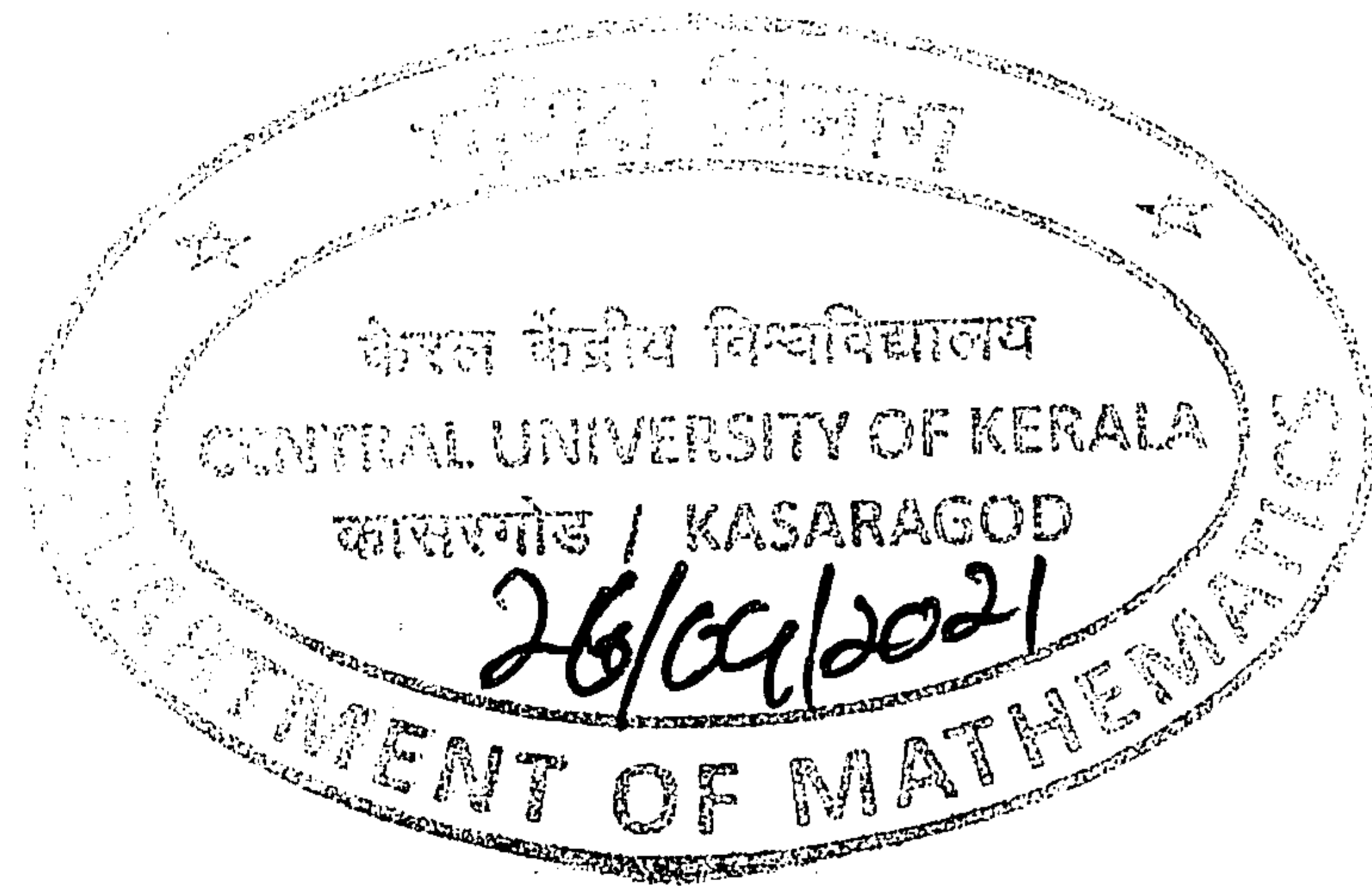
Assistant Professor
Department of Mathematics
Central University of Kerala
Kasaragod.



Dr.K.A.Germina

H.O.D

Department of Mathematics
Central University of Kerala
Kasaragod



Signature of the External Examiner

REPRESENTATION OF INTEGERS AS SUMS OF POWERS

DISSERTATION SUBMITTED
BY

KARTHIKA.K.S. (Reg.No. PMA051935)

Under the guidance of

Dr. V.Vilfred

The project submitted in partial fulfillment of the requirements for the
degree of

MASTER OF SCIENCE IN MATHEMATICS
(Batch 2019-2021)

at



CENTRAL UNIVERSITY OF KERALA
APRIL 2021
DEPARTMENT OF MATHEMATICS
SCHOOL OF MATHEMATICAL AND PHYSICAL SCIENCES
PERIYE P.O., KASARAGOD - 671316
KERALA, INDIA

DECLARATION

I, KARTHIKA. K. S., hereby declare that the dissertation entitled, '**Representation of Integers as Sums of Powers**' submitted by me to Central University of Kerala, Kasaragod in partial fulfillment for the award of the Degree of Masters of Science in Mathematics is a record of bonafide work carried out by me under the guidance of Dr. V. Vilfred, Associate Professor, Department of Mathematics, Central University of Kerala. I further declare that the dissertation has not been submitted, in part or full, for the award of any other degree or diploma in this University or any other University or Institute.

Date: April 2021

(KARTHIKA. K. S.)

Place: Periyar

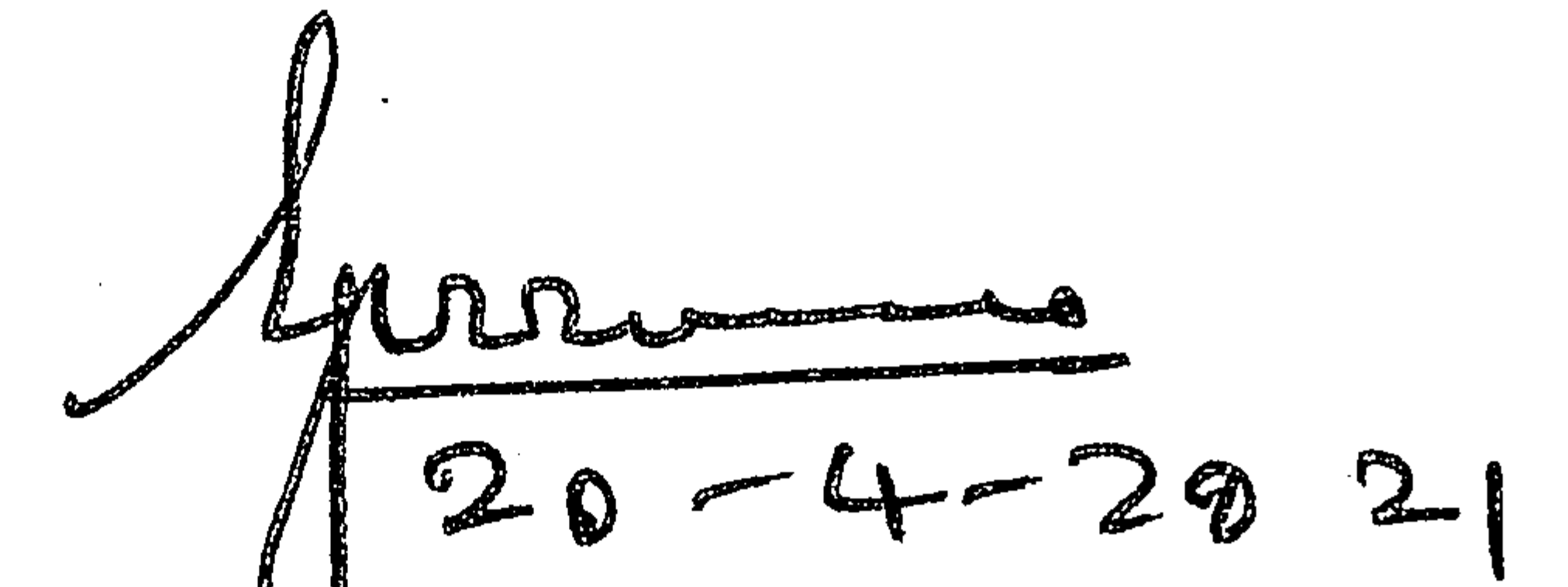
Reg.No. PMA051935

CERTIFICATE

This is to certify that the Dissertation entitled, '**Representation of Integers as Sums of Powers**' submitted by KARTHIKA.K.S.(Reg.NO. PMA 051935) is a bonafide work carried out in the Department of Mathematics, Central University of Kerala, Kasaragod under my guidance in partial fulfillment for the award of the Degree of Masters of Science in Mathematics.

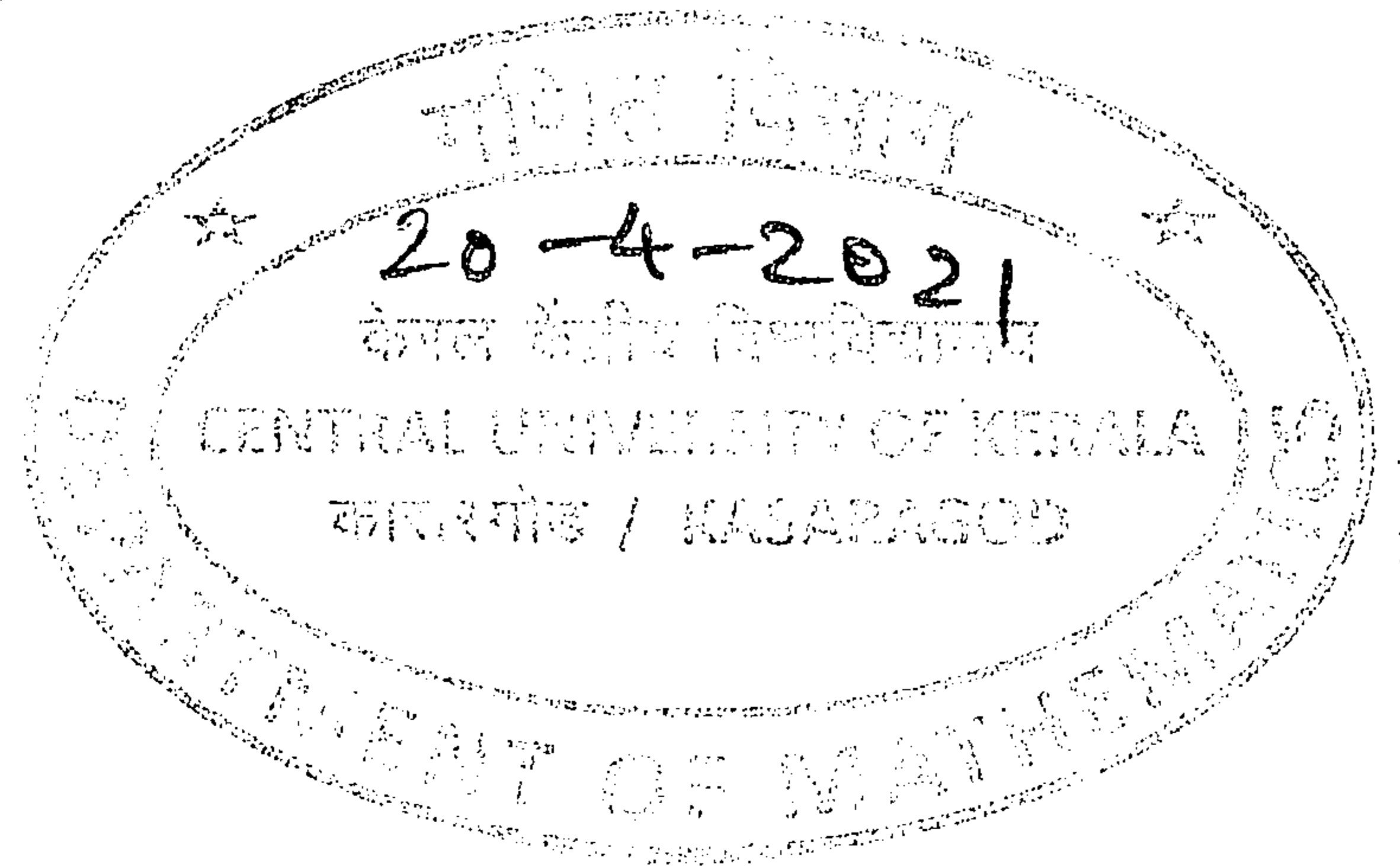


Dr. V. Vilfred (Supervisor)
Associate Professor,
Department of Mathematics,
Central University of Kerala,
Kasaragod - 671 316.



Dr.K.A.Germina
Head,

Department of Mathematics,
Central University of Kerala,
Kasaragod - 671 316.



A STUDY ON LATTICE THEORY AND ITS MEASURES

DISSERTATION SUBMITTED BY

Midhun T A

(Reg No: PMA051936)

Under the guidance of

Dr. Manikandan Rangaswamy

The project submitted in partial fulfillment of the requirement for the degree of

MASTER OF SCIENCE IN MATHEMATICS

(Batch : 2019- 2021)



CENTRAL UNIVERSITY OF KERALA

APRIL 2021

DEPARTMENT OF MATHEMATICS

SCHOOL OF PHYSICAL SCIENCES

CENTRAL UNIVERSITY OF KERALA

PERIYA P.O, KASARGOD- 671320

KERALA, INDIA

DECLARATION

I, **Midhun T A**, hereby declare that the project entitled "**A Study on Lattice Theory and its Measures**" is an original piece of record of studies and bonafide work carried out by me under the guidance and supervision of **Dr. Manikandan Rangaswamy**, Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala and has not been submitted by me elsewhere for the award of any degree, diploma, title or recognition before.

Midhun T A

(PMA051936)

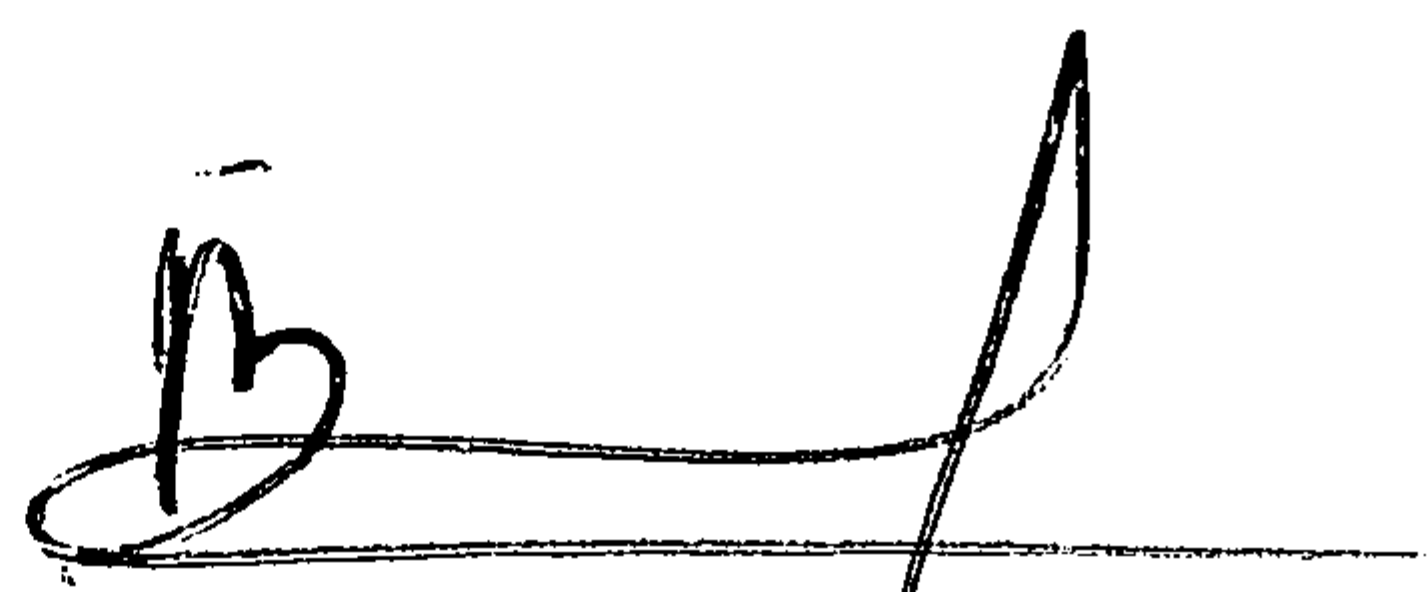
Department of Mathematics

Central university of Kerala

Kasargod

CERTIFICATE

I, **Dr. Manikandan Rangaswamy** Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala, hereby certify that the project entitled "**A Study on Lattice Theory And its Measures**" is a record of bonafide study carried out by **Midhun T A** under my guidance and supervision in partial fulfillment of the requirements for the Master degree in Mathematics.

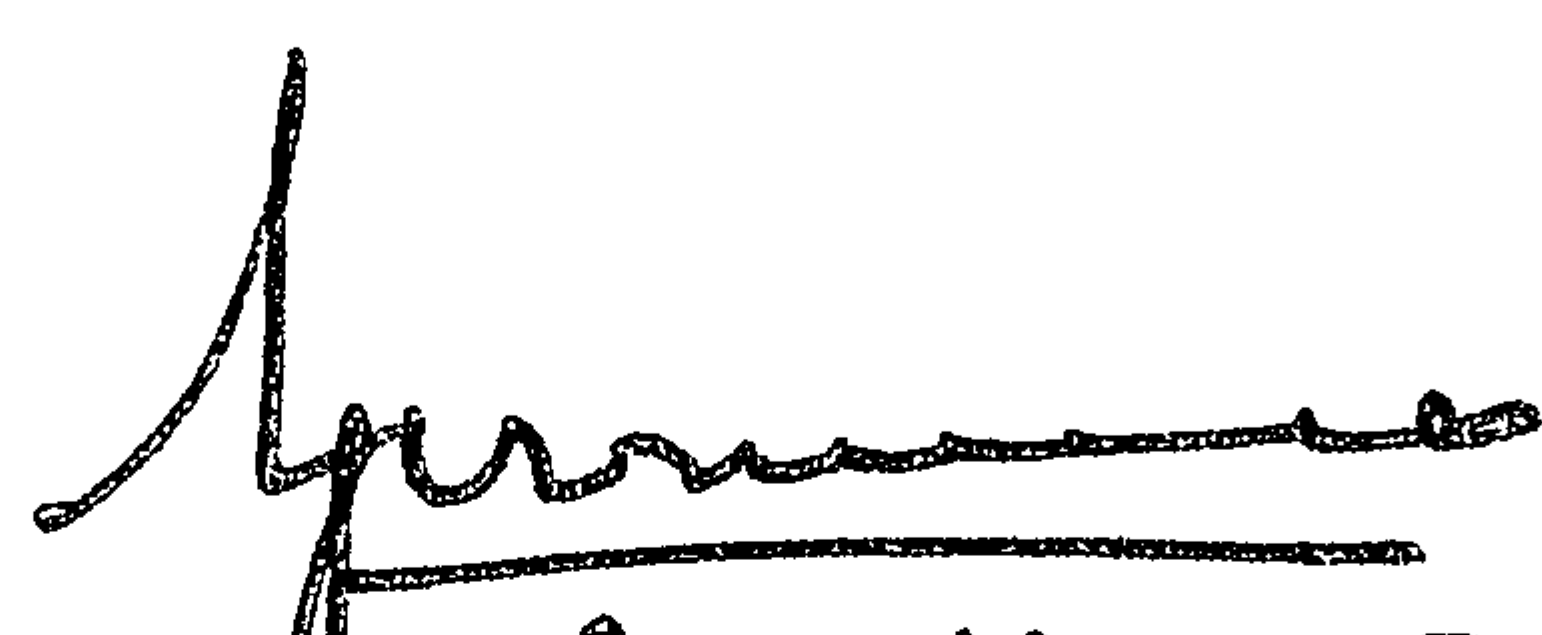
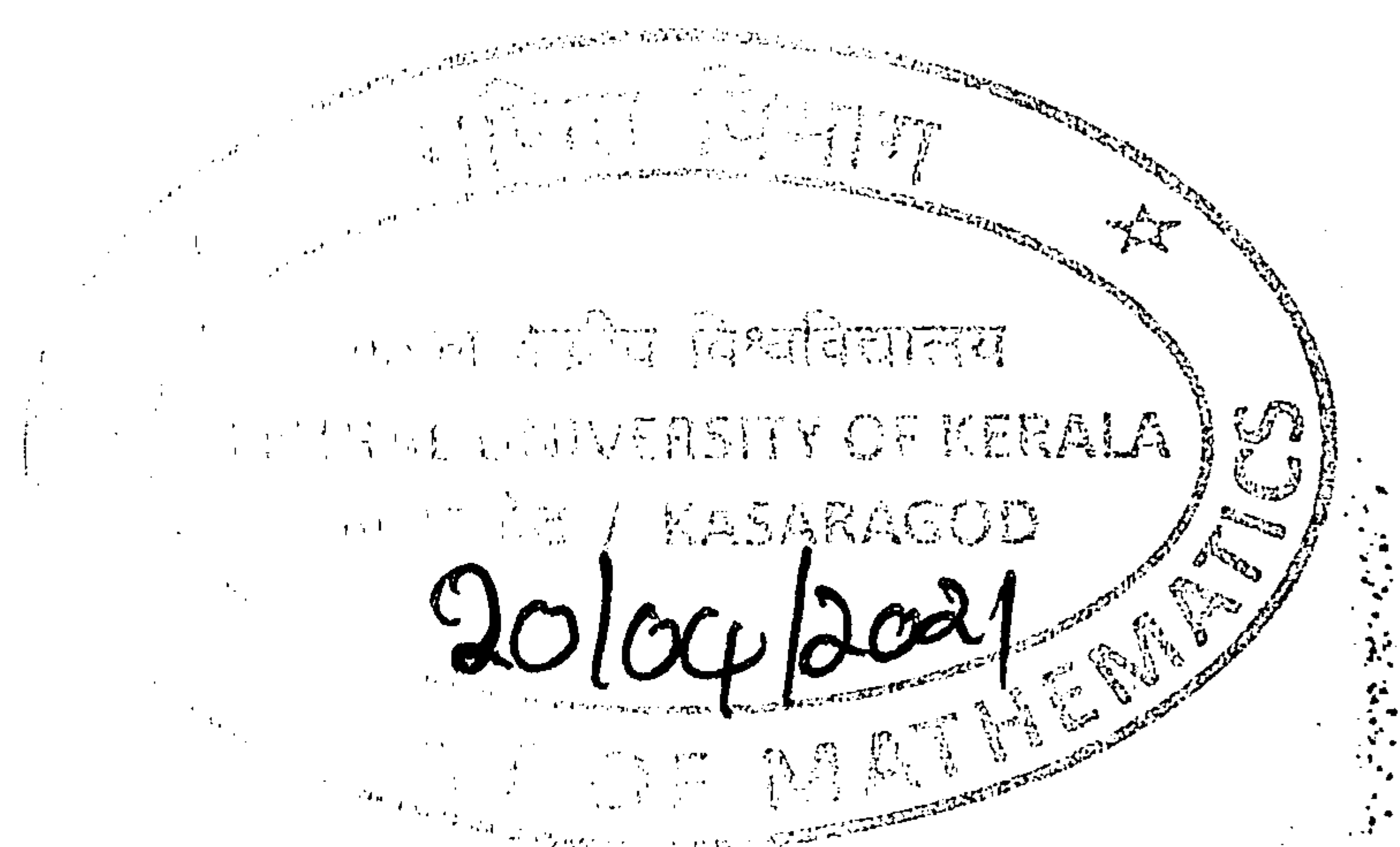


Dr. Manikandan Rangaswamy

Assistant Professor

Department of Mathematics

Central University of Kerala Kasaragod, Kerala.



20-4-2021
Dr. Germina K. A

Head, Department of Mathematics

Central University of Kerala Kasaragod, Kerala

**A STUDY ON VANDERMONDE MATRICES AND
CONSTRUCTION OF MDS MATRICES**

DISSERTATION SUBMITTED

BY

MUBASIL P (Reg.No. PMA051937)

Under the guidance of

DR. ALI AKBAR K

The project submitted in partial fulfillment of the requirement for
the degree of

MASTER OF SCIENCE IN MATHEMATICS
(Batch 2019-2021)



CENTRAL UNIVERSITY OF KERALA

APRIL 2021

DEPARTMENT OF MATHEMATICS
SCHOOL OF MATHEMATICAL AND PHYSICAL SCIENCES
PERIYE P.O, KASARAGOD-671316
KERALA, INDIA

DECLARATION

I, MUBASIL P, here by declare that the dissertation entitled **A study on Vandermonde matrices and construction of MDS matrices** submitted by me to Central University of Kerala, Kasaragod in partial fulfillment for the award of the Degree of Masters of Science in mathematics is a record of bonafide work carried out by me under the guidance of Dr. Ali Akbar K, Associative professor, Department of mathematics, Central university of Kerala. I further declare that the dissertation has not been submitted, in part or full, for the award of any other degree or diploma in this University or any other University or Institute.

Date:

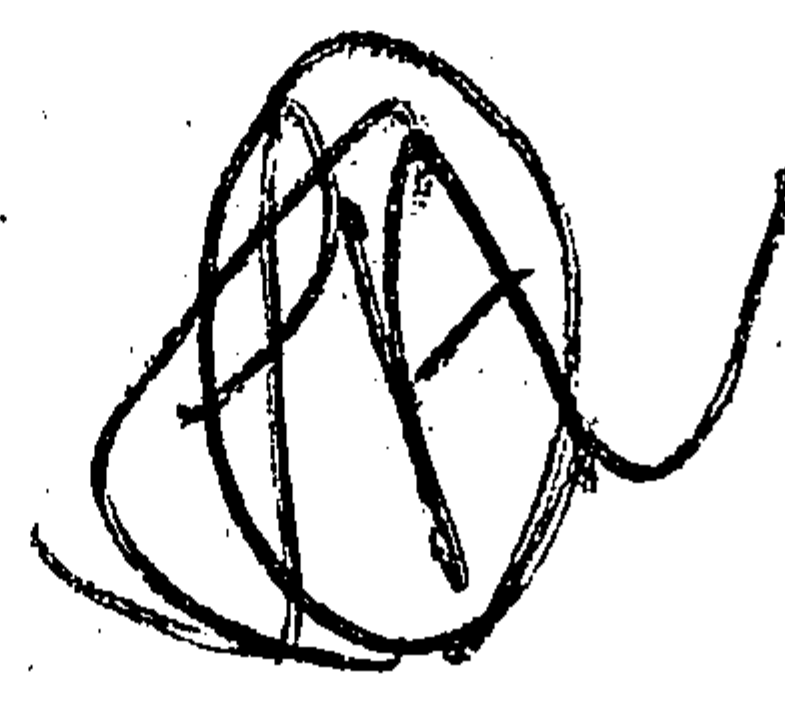
(MUBASIL P)

Place:

Reg.No. PMA051937

CERTIFICATE

This is to certify that the dissertation entitled, **A study on Vandermonde matrices and construction of MDS matrices** submitted by MUBASIL P (Reg.No.PMA051937) is a bonafide work carried out in the Department of mathematics, Central university of Kerala, Kasaragod under my guidance in partial fulfillment for the award of the degree of Master of Science in Mathematics.

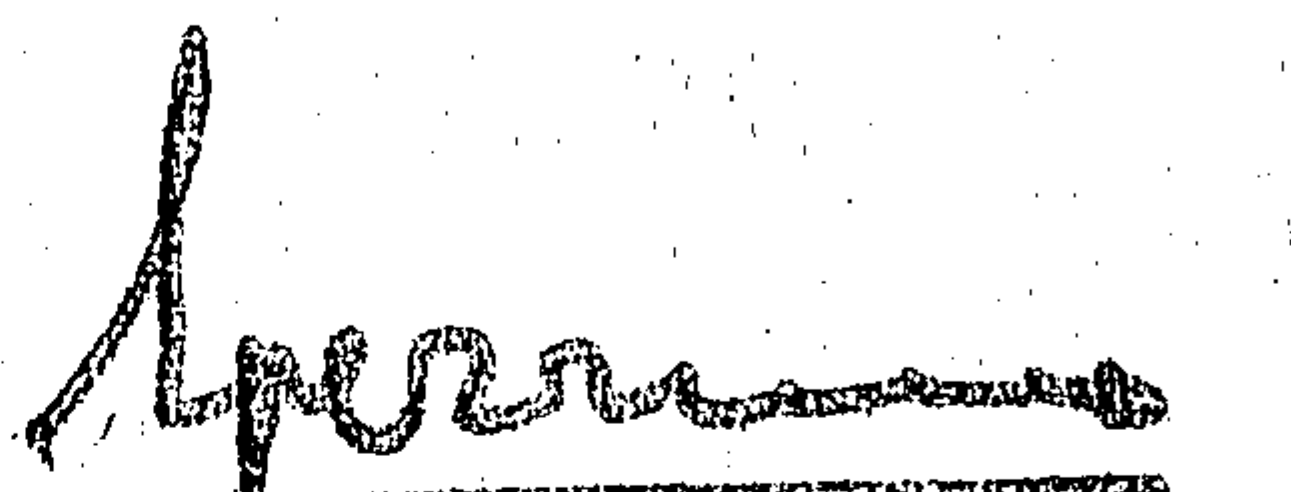
 26/04/2021

Dr. Ali Akbar K (Research Supervisor)

Assistant professor,

Department of mathematics Central
University of Kerala Kasaragod.




26/4/2021
Dr. K.A. Germina

Head , Department of mathematics

Central University of Kerala
Kasaragod.

PROPERTIES OF REGULAR SEMIGROUPS

DISSERTATION SUBMITTED
BY

RESHMA K

Reg.No. PMA051938

Under the guidance of

Dr. V. Vilfred

The project submitted in partial fulfillment of the requirements for
the degree of

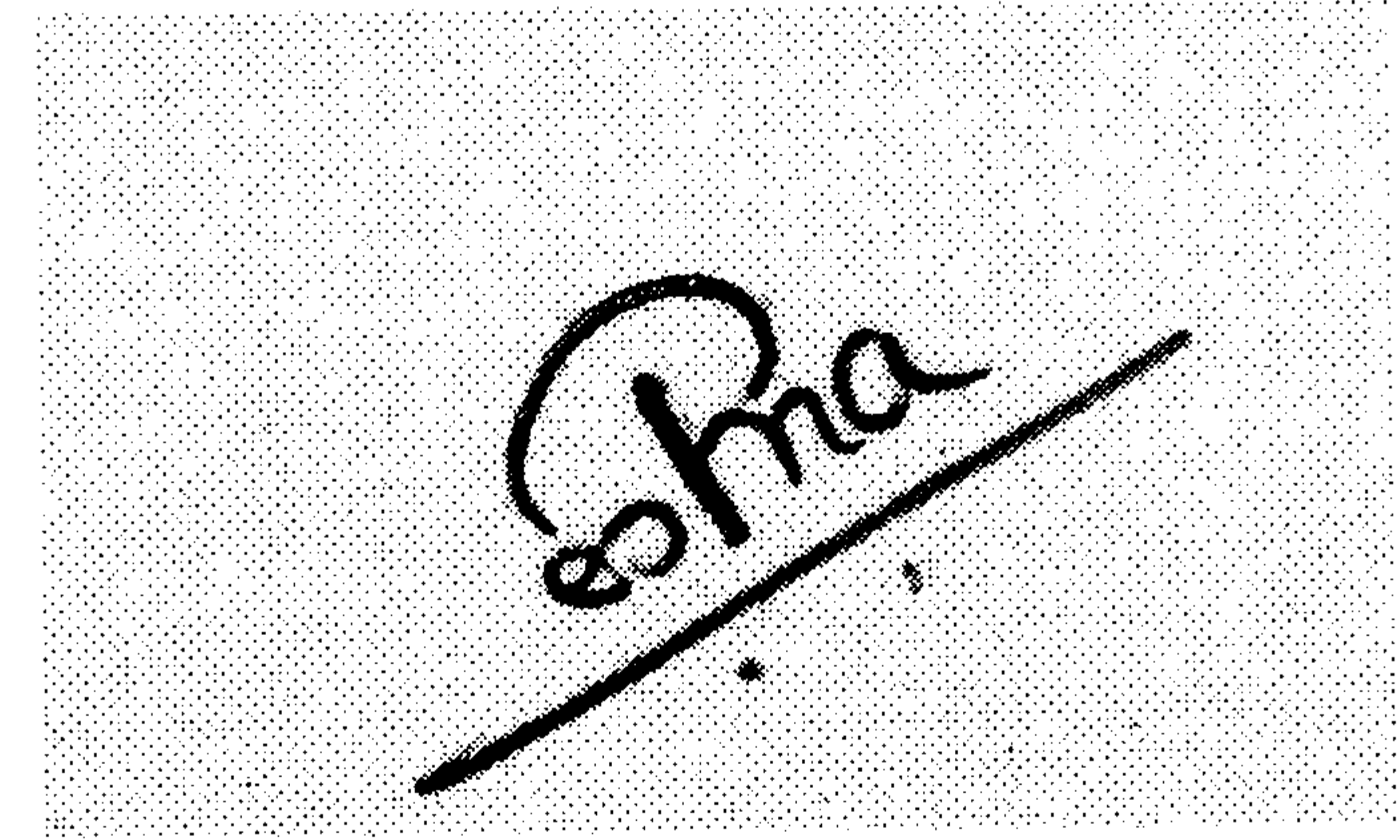
MASTER OF SCIENCE IN MATHEMATICS
(Batch 2019-2021)
at



CENTRAL UNIVERSITY OF KERALA
APRIL 2021
DEPARTMENT OF MATHEMATICS
SCHOOL OF MATHEMATICAL AND PHYSICAL SCIENCES
PERIYE P.O., KASARAGOD - 671316
KERALA, INDIA

DECLARATION

I, RESHMA K, hereby declare that the dissertation entitled, '**Properties Of Regular Semi Groups**' submitted by me to Central University of Kerala, Kasaragod in partial fulfillment for the award of the Degree of Masters of Science in Mathematics is a record of bonafide work carried out by me under the guidance of Dr. V. Vilfred, Associate Professor, Department of Mathematics, Central University of Kerala. I further declare that the dissertation has not been submitted, in part or full, for the award of any other degree or diploma in this University or any other University or Institute.

A rectangular box containing a handwritten signature in black ink. The signature appears to be 'Reshma' written in a cursive style, with a horizontal line drawn underneath the name.

Date: 26.04.2021

Place: Periyar

(RESHMA K)

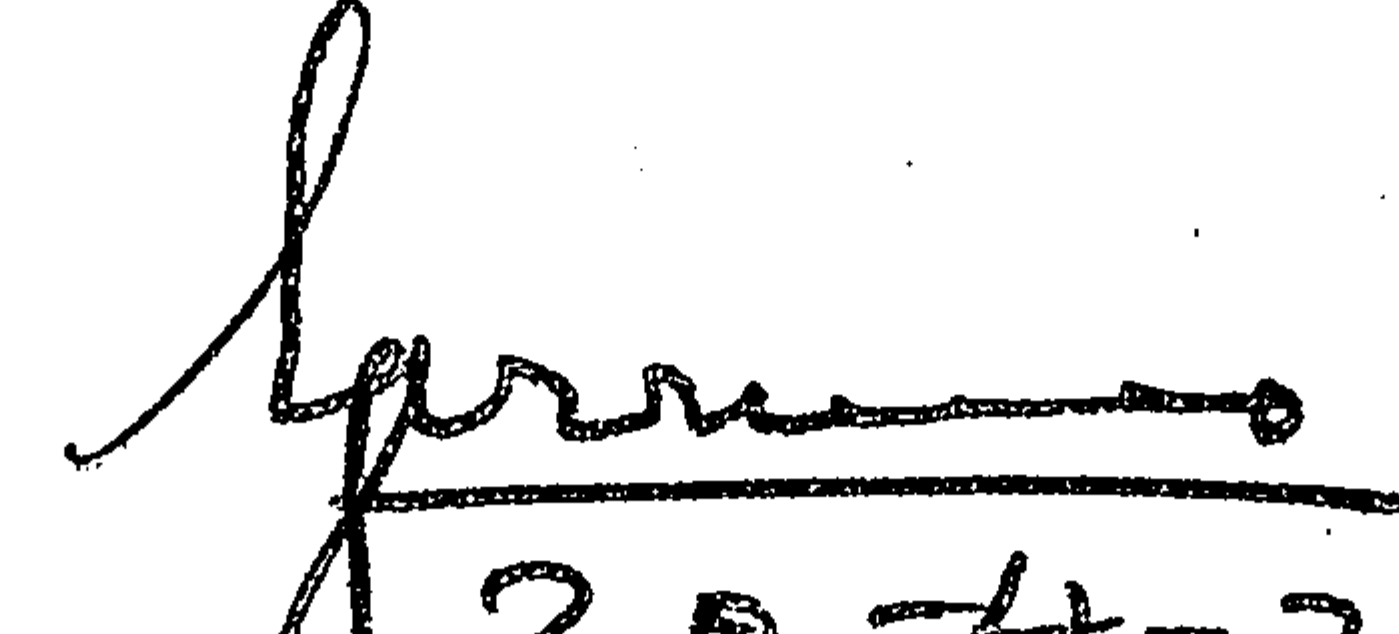
Reg.No. PMA051938

CERTIFICATE

This is to certify that the Dissertation entitled, '**Properties Of Regular Semi Groups**' submitted by RESHMA K, Reg.No. PMA051938 is a bonafide work carried out in the Department of Mathematics, Central University of Kerala, Kasaragod under my guidance in partial fulfillment for the award of the Degree of Masters of Science in Mathematics.

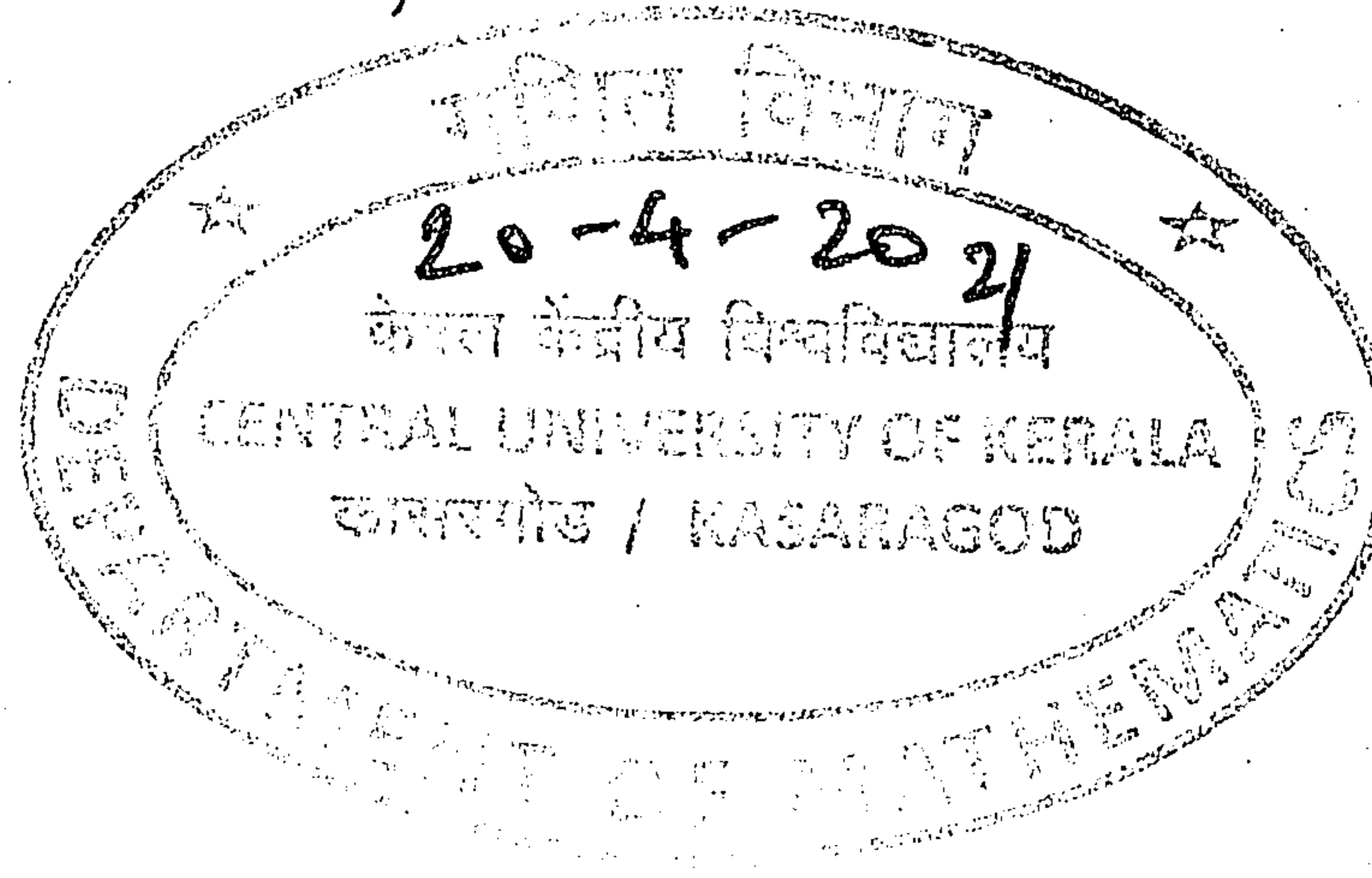


Dr. V. Vilfred (Supervisor)
Associate Professor,
Department of Mathematics,
Central University of Kerala,
Kasaragod - 671 316.



20-4-2021
Dr. K. A. Germina
Head,

Department of Mathematics,
Central University of Kerala,
Kasaragod - 671 316.



Signature of the External Examiner

INTRODUCTION TO TIME DELAY INDUCED HOPF BIFURCATION

Dissertation submitted
by

ROSHNI ISSAC
Reg.No.PMA051939

Under the guidance of

Dr. GNANAVEL SOUNDARARAJAN

The project submitted in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN MATHEMATICS

(Batch 2019-2021)

at



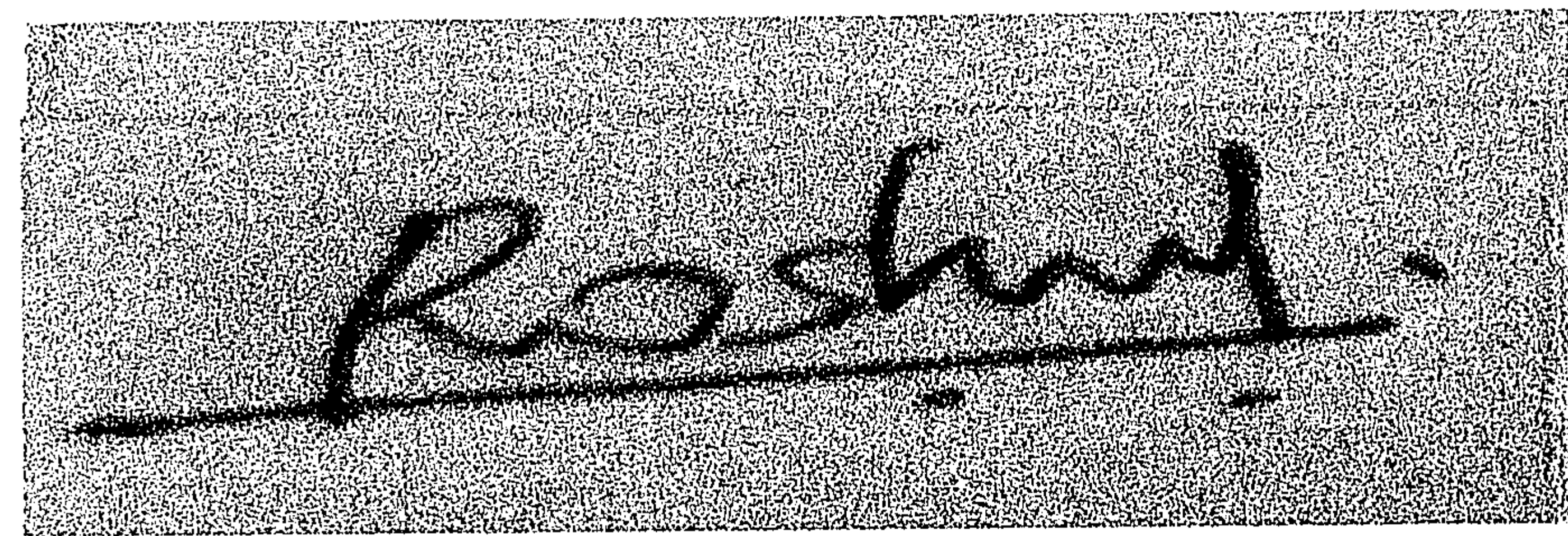
Central University of Kerala

April 2021

Department of Mathematics
School of Physical Sciences
Central University of Kerala
Periya P.O., Tejaswini Hills
Kasargod, Kerala , PIN-671316.

DECLARATION

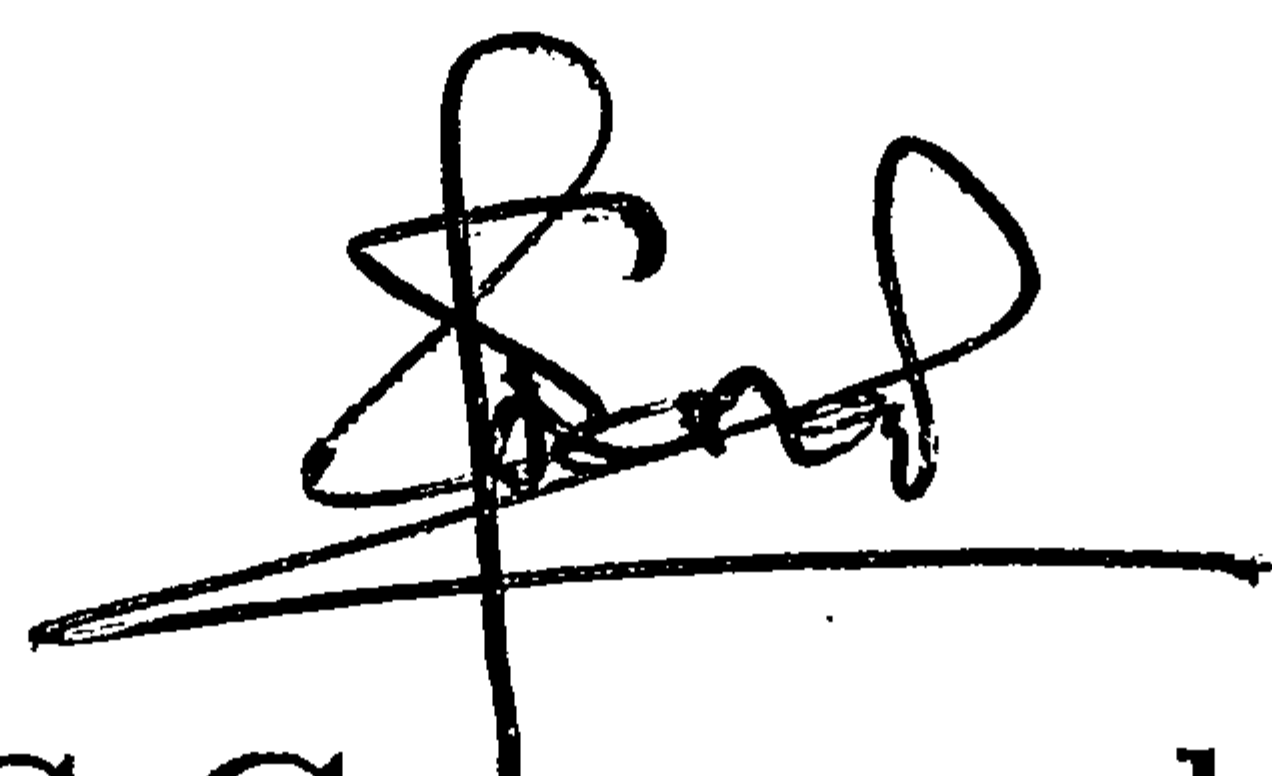
I, **ROSHNI ISSAC** hereby declare that the project entitled “**INTRODUCTION TO TIME DELAY INDUCED HOPF BIFURCATION**” is a bonafide work carried out by me under the guidance and supervision of **Dr. GNANAVEL SOUNDARARAJAN**, Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala and has not been submitted by me elsewhere for the award of any degree, diploma, title or recognition before.

A rectangular box containing a handwritten signature in black ink. The signature appears to be 'Roshni' with a horizontal line underneath it.

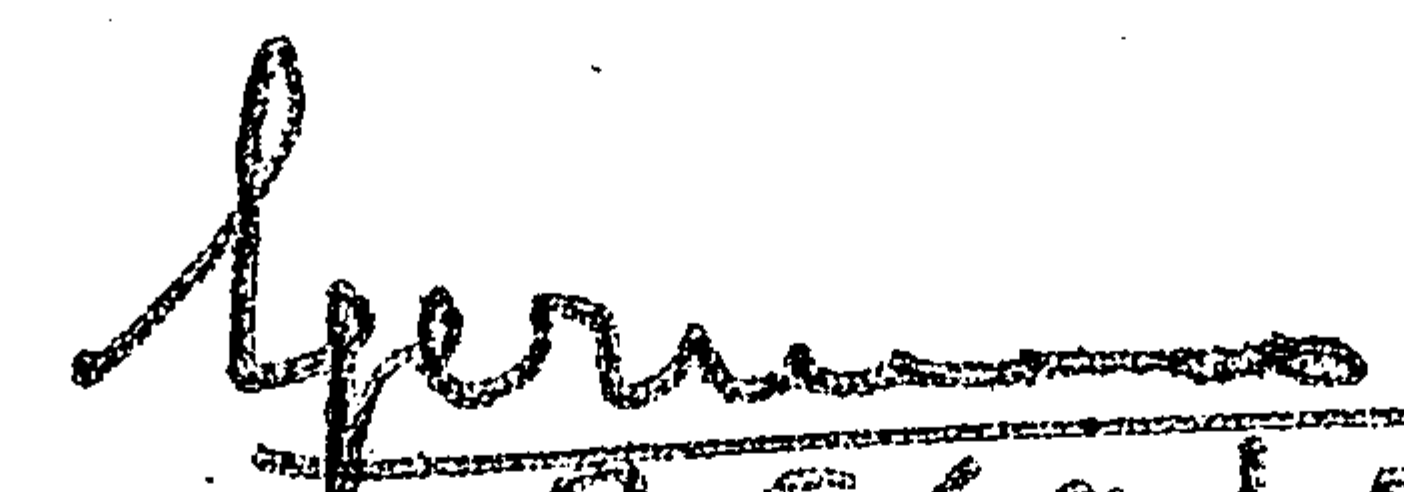
ROSHNI ISSAC

CERTIFICATE

I, **Dr. GNANAVEL SOUNDARARAJAN** hereby certify that project entitled **“INTRODUCTION TO TIME DELAY INDUCED HOPF BIFURCATION”** is a record of bonafide study carried out by **ROSHNI ISSAC (PMA051939)** under my guidance and supervision in partial fulfillment of the requirements for the Master degree in Mathematics.



Dr.S.Gnanavel
Assistant Professor
Department of Mathematics
Central University of Kerala
Kasaragod.



Dr. K.A. GERMINA
Head of the Department
Department of Mathematics
Central University of Kerala
Kasaragod

Signature of the External Examiner

A GLANCE INTO THE AMAZING GOLDEN RATIO

DISSERTATION SUBMITTED

by

SARANYA V.

(Reg.No.PMA051940)

Under the guidance of

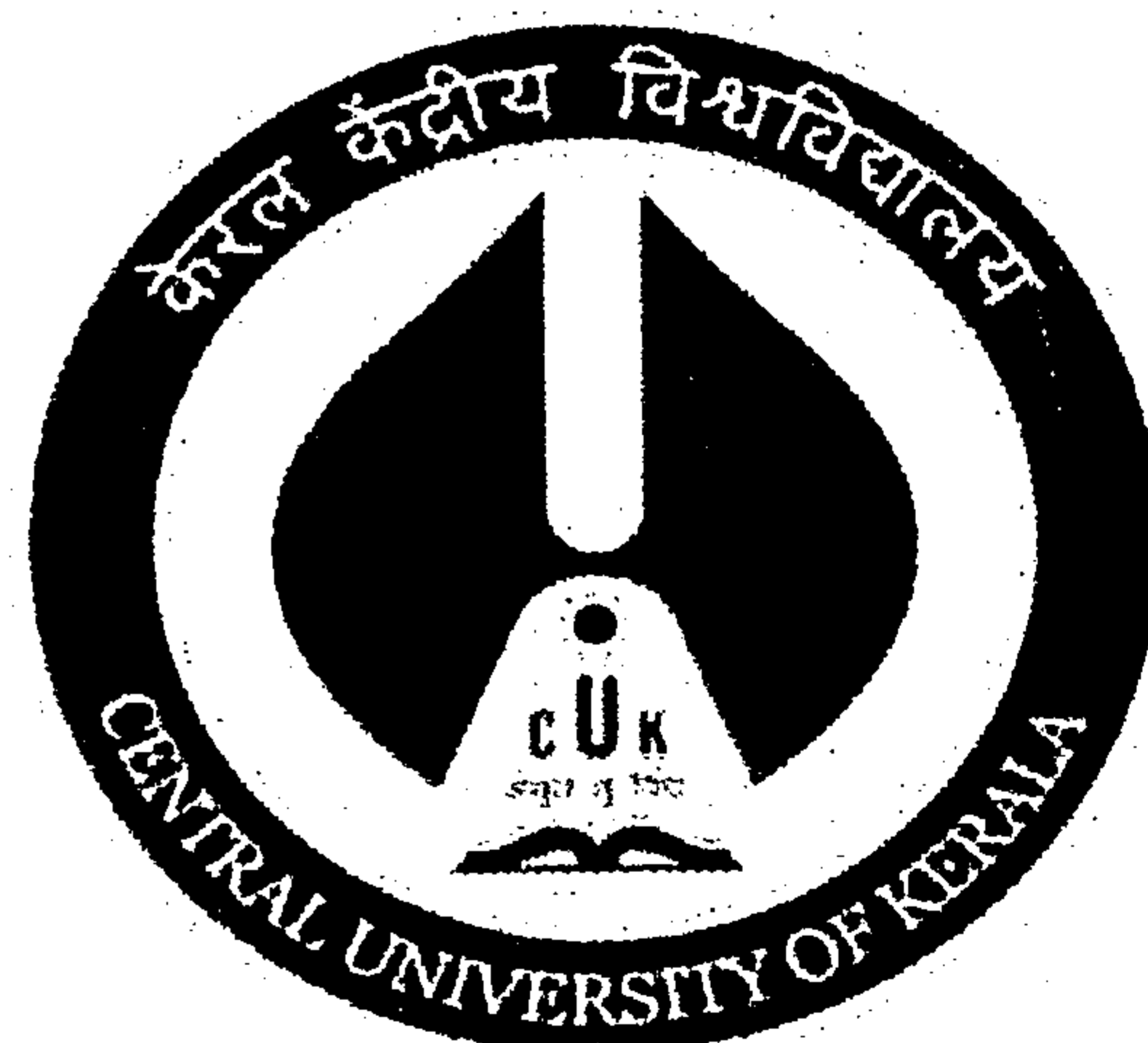
Dr.SHAINI P.

*The project submitted in partial fulfillment of the requirements for the
degree of*

MASTER OF SCIENCE IN MATHEMATICS

(Batch 2019-2021)

at



CENTRAL UNIVERSITY OF KERALA

APRIL 2021

DEPARTMENT OF MATHEMATICS

SCHOOL OF PHYSICAL SCIENCE

CENTRAL UNIVERSITY OF KERALA

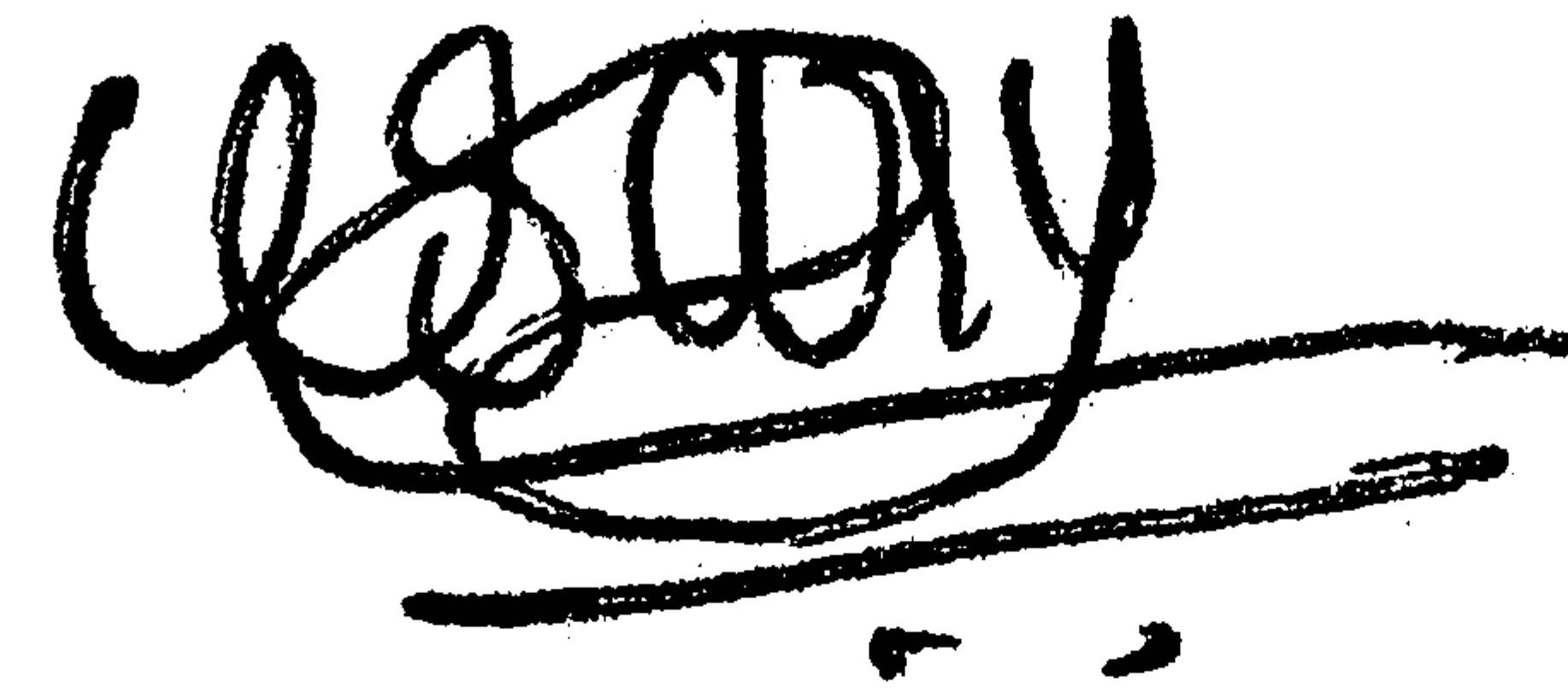
PERIYA P.O

KASARAGOD - 671316, KERALA, INDIA.

DECLARATION

I, **SARANYA V.** hereby declare that the dissertation entitled **A GLANCE INTO THE AMAZING GOLDEN RATIO** is a bonafide study carried out by me under the guidance and supervision of **Dr. SHAINI P.**, Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala and has not been submitted by me elsewhere for the award of any degree, diploma, title or recognition before.

Department of Mathematics
Central University of Kerala
Kasaragod.



Saranya V.
Reg.No. PMA051940

CERTIFICATE

I, **Dr. SHAINI P.**, Associate Professor, Department of Mathematics, Central University of Kerala, Kasaragod, hereby certify that the project entitled **A GLANCE INTO THE AMAZING GOLDEN RATIO** is a record of bonafide study carried out by **SARANYA V.** (PMA051940) under my guidance and supervision in partial fulfillment of the requirements for the Master degree in Mathematics.

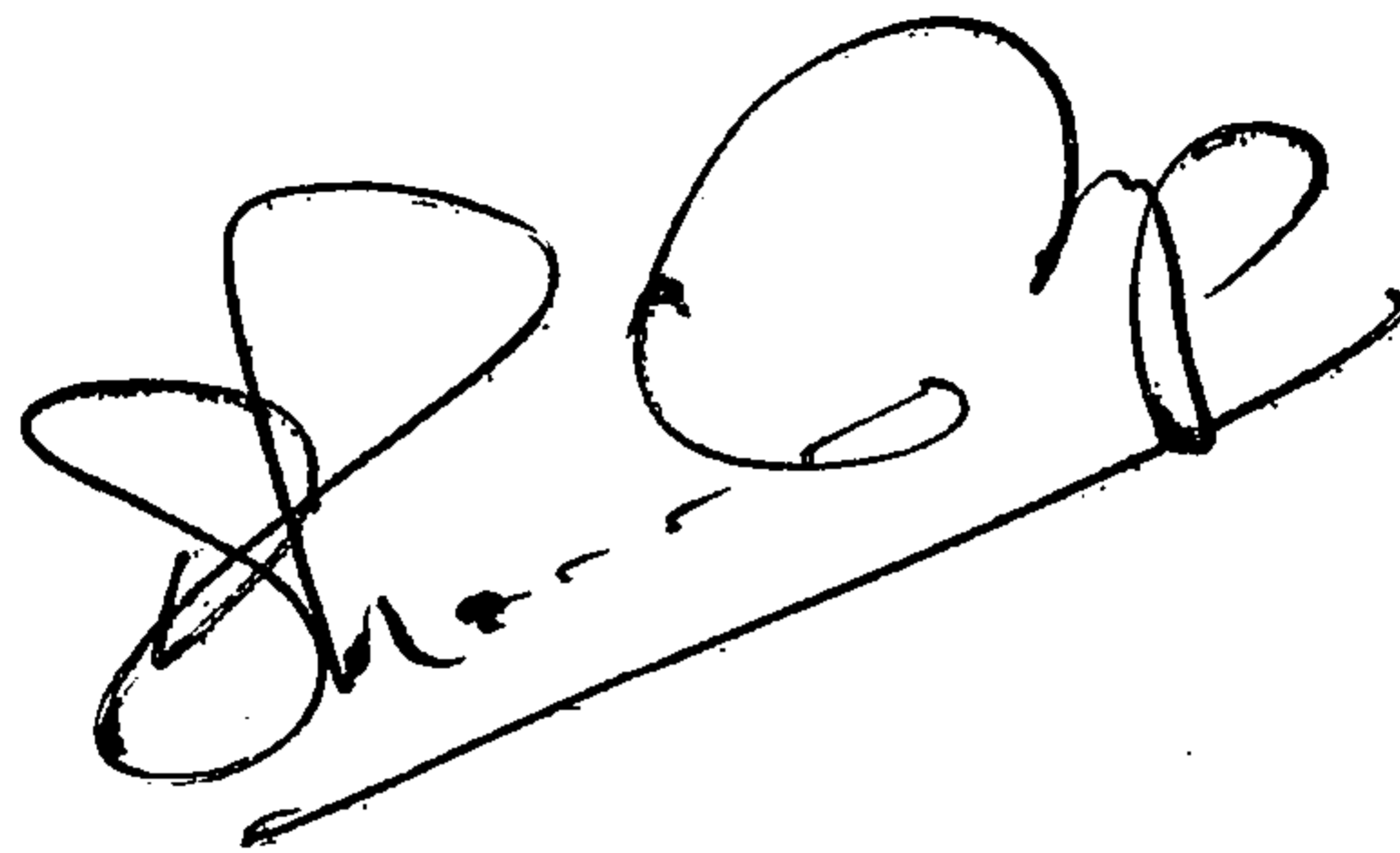
Dr. Shaini P.

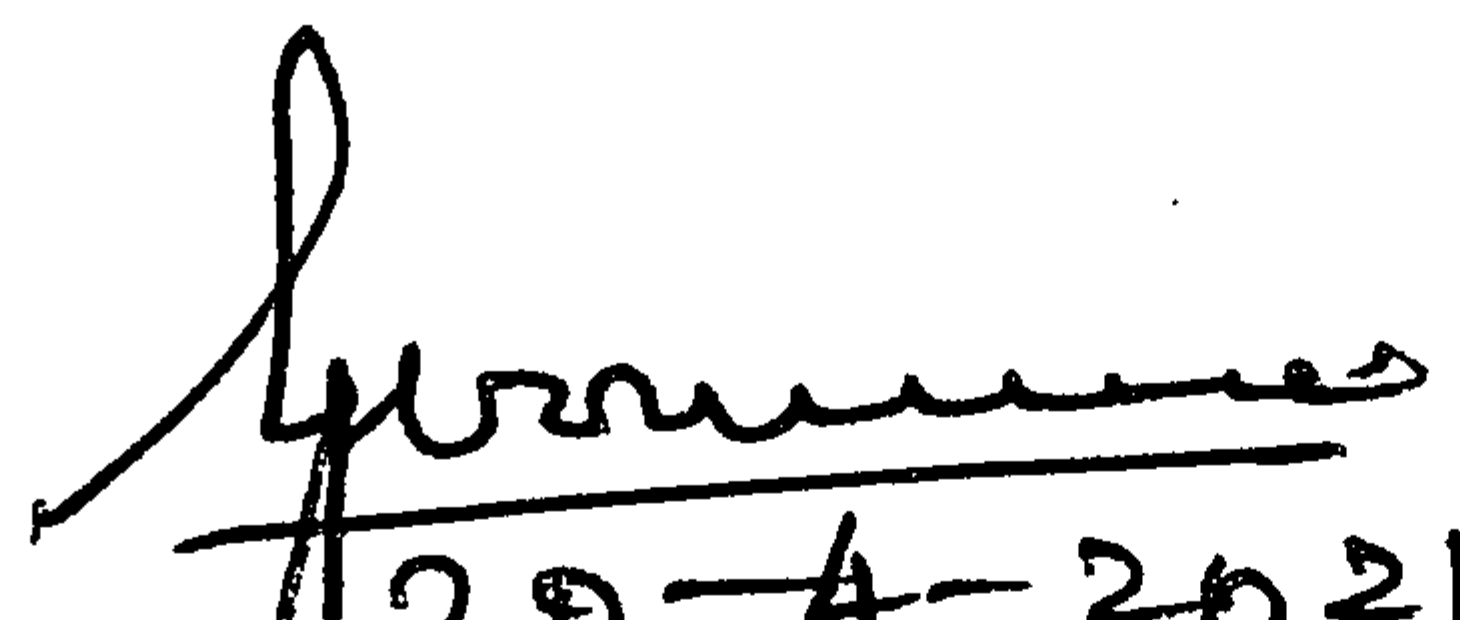
Assistant Professor

Department of Mathematics

Central University of Kerala

Kasaragod.



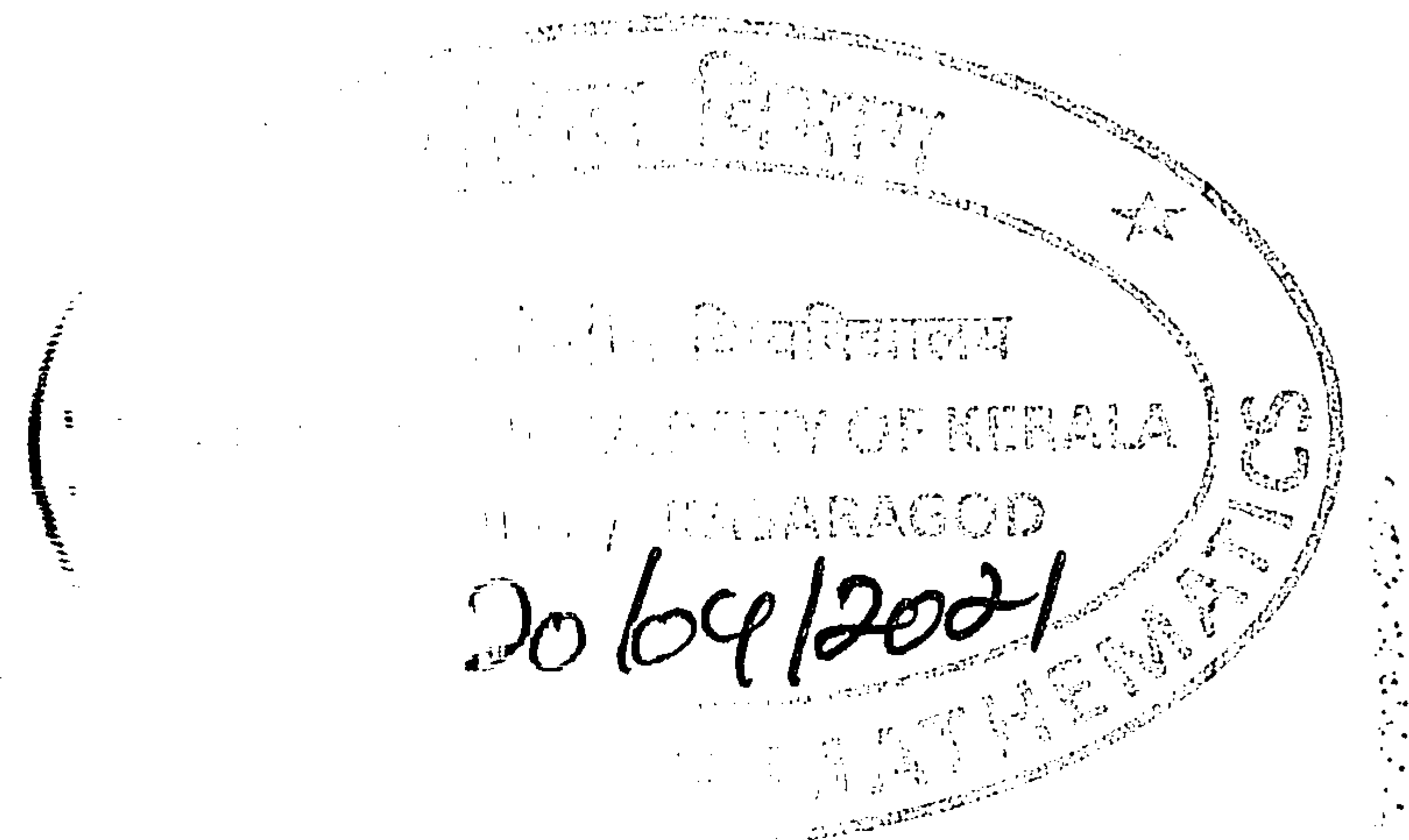

20-4-2021
Dr. K. A. Germina

H. O .D

Department of Mathematics

Central University of Kerala

Kasaragod.



Signature of the External Examiner

A STUDY ON MATRIX EXPONENTIATION

Dissertation submitted

by

SAUBHAGYA

(Reg.No.PMA051941)

Under the guidance of

Dr.SHAINI P

The project submitted in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN MATHEMATICS

(Batch 2019-2021)

At



CENTRAL UNIVERSITY OF KERALA

APRIL 2021

DEPARTMENT OF MATHEMATICS

SCHOOL OF PHYSICAL SCIENCE

CENTRAL UNIVERSITY OF KERALA

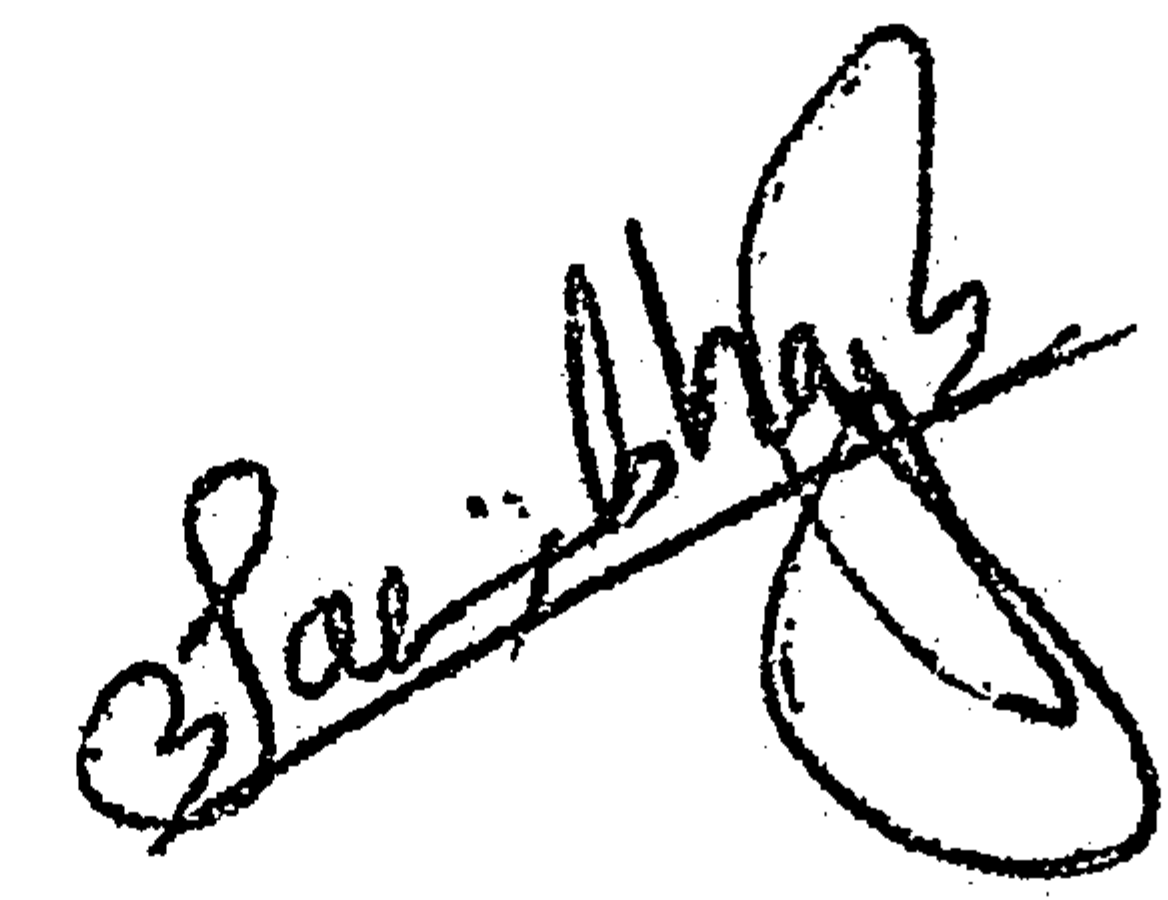
PERIYA,P.O

KASARAGOD - 671316, KERALA, INDIA.

DECLARATION

I, SAUBHAGYA hereby declare that the project entitled "A Study on **Matrix Exponentiation**" is a bonafide study carried out by me under the guidance and supervision of **Dr.Shaini P.**, Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala and has not been submitted by me elsewhere for the award of any degree, diploma, title or recognition before.

Department of Mathematics
Central University of Kerala
Kasaragod



SAUBHAGYA
Reg.No. PMA051941

CERTIFICATE

I, **Dr.SHAINI P**, Associate Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala, hereby certify that the project entitled “ **A Study On Matrix Exponentiation** ” is a record of bonafide study carried out by **SAUBHAGYA** (PMA051941) under my guidance and supervision in partial fulfillment of the requirements for the Master degree in Mathematics.

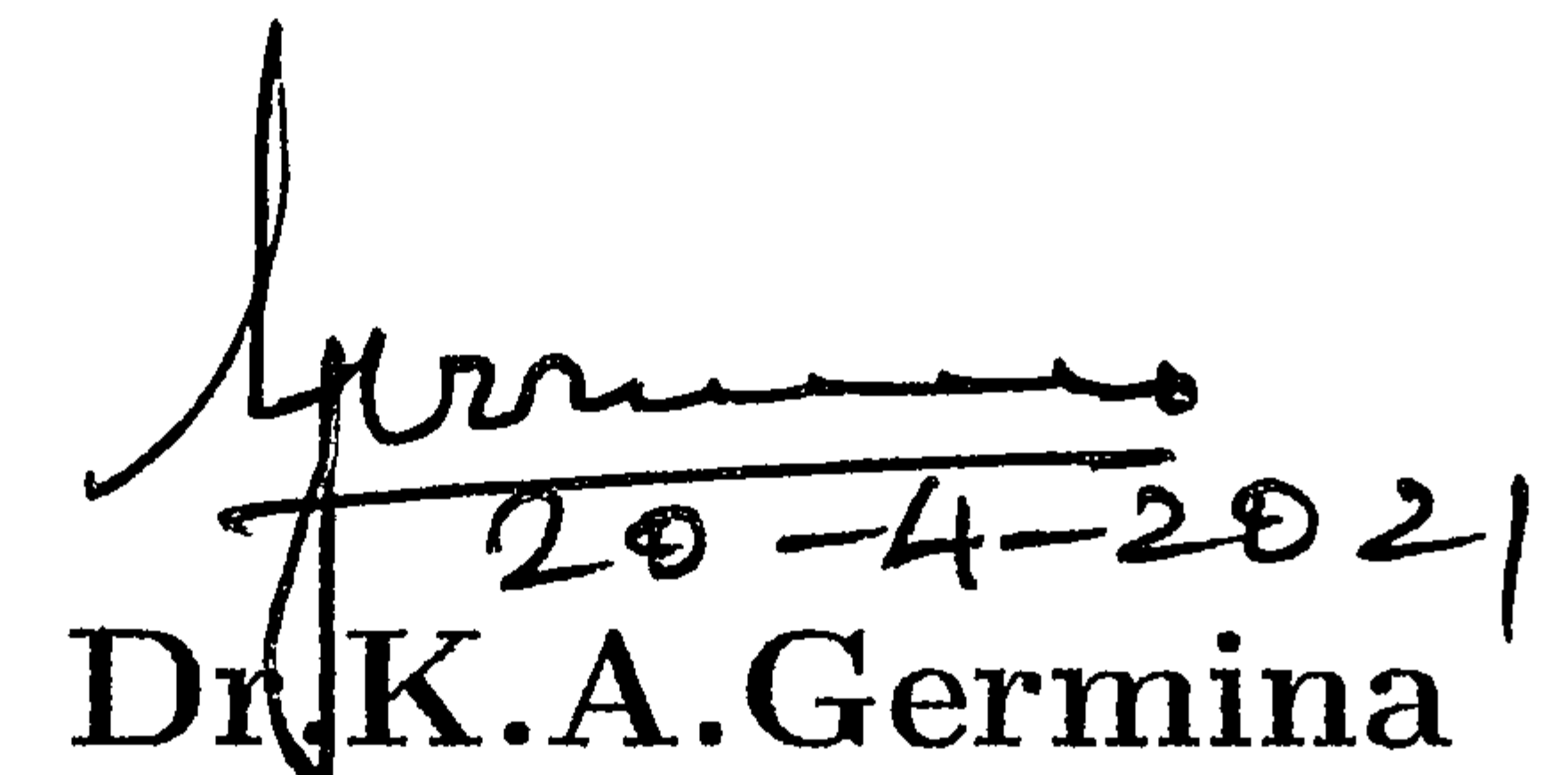
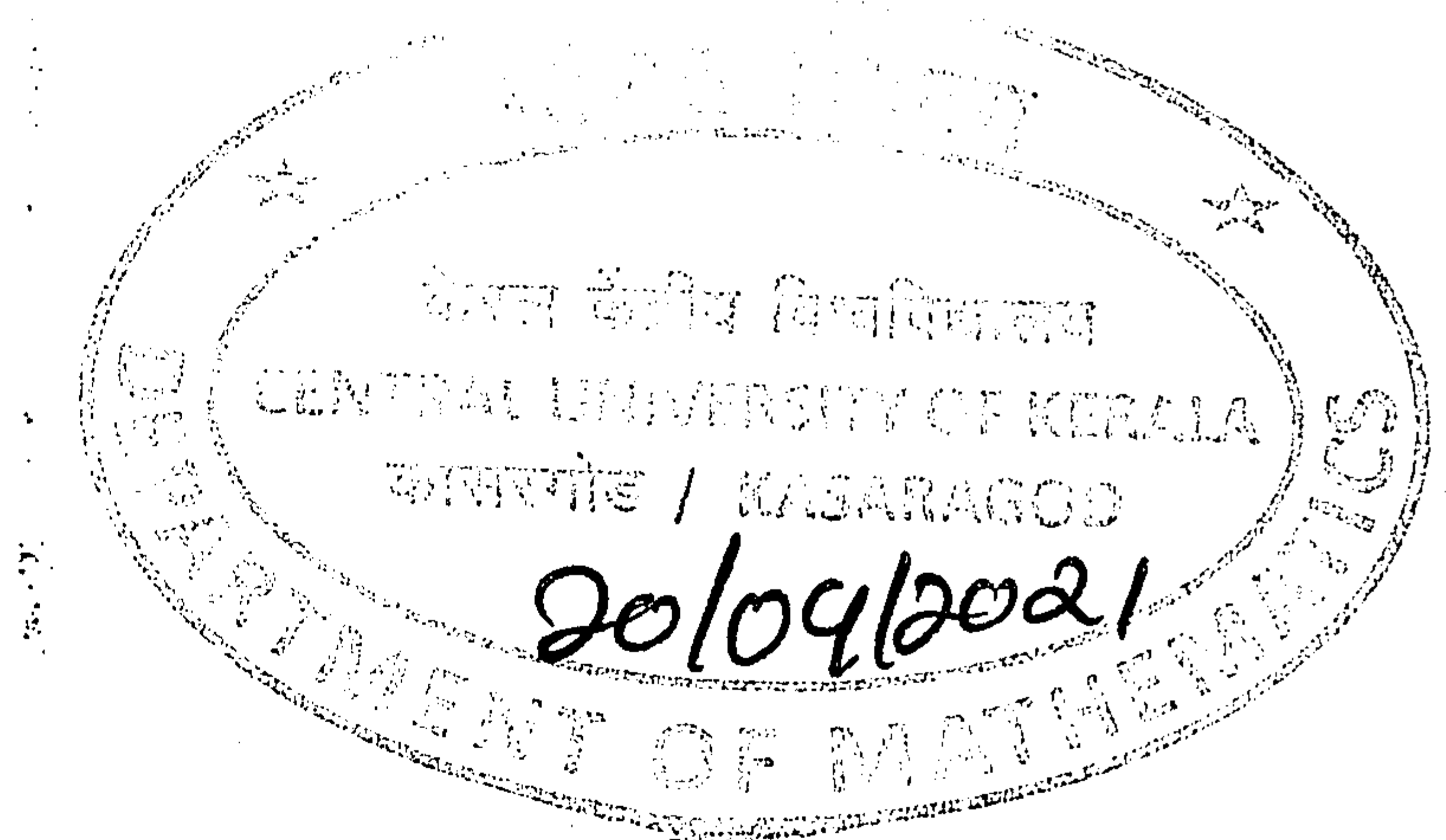
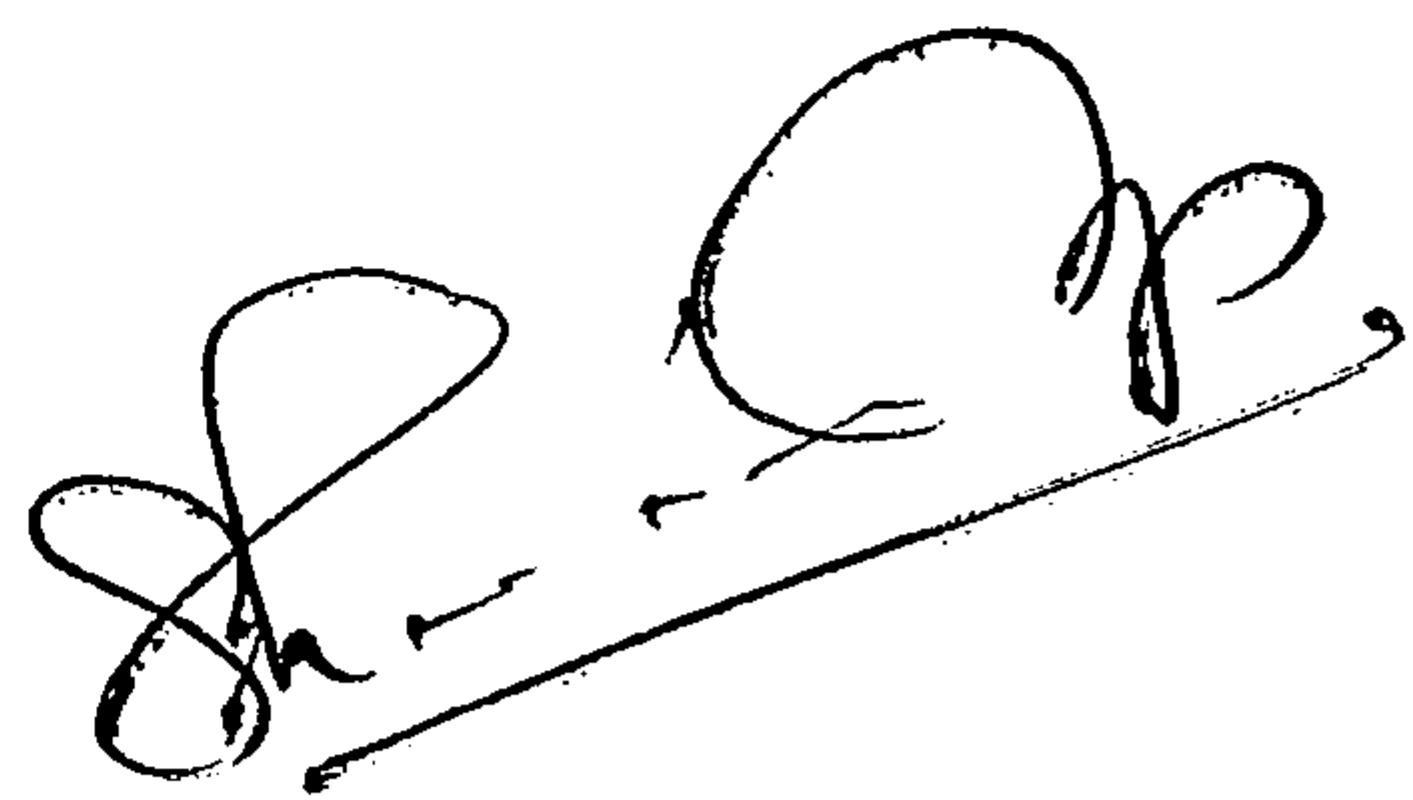
Dr.Shaini P.

Assistant Professor

Department of Mathematics

Central University of Kerala

Kasaragod.


20-4-2021

Dr.K.A.Germina

Head of the Department,
Department of Mathematics
Central University of Kerala
Kasaragod.

Signature of the External Examiner

**A STUDY ON EULER GRAPH AND IT'S
APPLICATIONS**

DISSERTATION SUBMITTED

BY

SHILPA.N.M

(Reg.No.PMA051942)

Under the guidance of

Dr.K.A.GERMINA

The project submitted in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN MATHEMATICS

At



CENTRAL UNIVERSITY OF KERALA

APRIL 2021

DEPARTMENT OF MATHEMATICS

SCHOOL OF PHYSICAL SCIENCE

CENTRAL UNIVERSITY OF KERALA

PERIYA,P.O

KASARAGOD - 671316,KERALA,INDIA.

DECLARATION

I, **SHILPA.N.M** hereby declare that the project work entitled “ **A Study on Euler graph and it’s applications** ” is an original record of studied and bonafide work carried out by me under the guidance of **Dr.K.A Germina** , Head, Department of Mathematics, Central University of Kerala, Kasaragod, India, and has not been submitted by me elsewhere for the award of any degree, diploma, title or recognition before.

Date: 20 – 4 – 2021

Place: Kasaragod

Department of Mathematics
Central University of Kerala

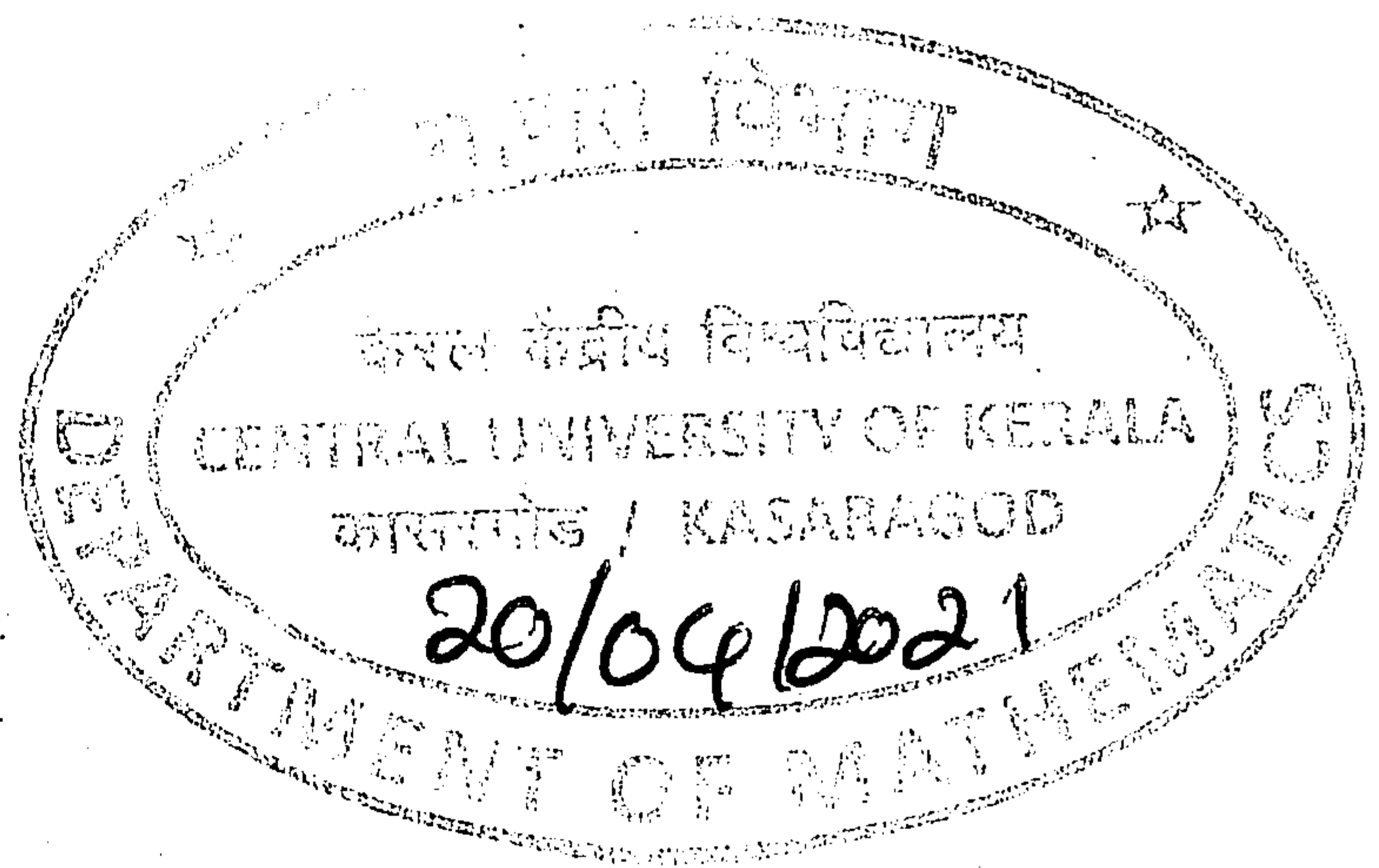


SHILPA.N.M

PMA051942

CERTIFICATE

I, **Dr.K.A GERMINA**, Associate Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala, hereby certify that the project entitled **“A STUDY ON EULER GRAPH AND IT’S APPLICATIONS”** is a record of bonafide study carried out by **SHILPA.N.M** under my guidance and supervision in partial fulfillment of the requirements for the Master Degree in Mathematics.



Germina
20-4-2021
Dr.K.A.Germina
Associated
~~Assistant~~ professor and Head,
Department of Mathematics,
Central University of Kerala,
Kasaragod

Signature of the External Examiner

ANT COLONY OPTIMISATION
DISSERTATION SUBMITTED

By

SHUBHAM KUMAR

(Reg. No. PMA051943)

Under the guidance of

Dr. GNANAVEL SOUNDARAJAN

*The project submitted in partial fulfilment of the
requirements for the degree of*

MASTER OF SCIENCE IN MATHEMATICS

(Batch 2019-2021)



CENTRAL UNIVERSITY OF KERALA

APRIL 2021

DEPARTMENT OF MATHEMATICS

SCHOOL OF PHYSICAL SCIENCES

CENTRAL UNIVERSITY OF KERALA

PERIYA, P.O. KASARAGOD – 671320

KERALA, INDIA

DECLARATION

I, **SHUBHAM KUMAR** by declare that the project entitled **ANT COLONY OPTIMISATION** an original piece of record of studies and bonafide work carried out by me under the guidance and supervision of **Dr. GNANAVEL SOUNDRARAJAN** Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala and has not been submitted by me elsewhere for the award of any degree, diploma, title or recognition before.

Department of Mathematics

Central University of Kerala

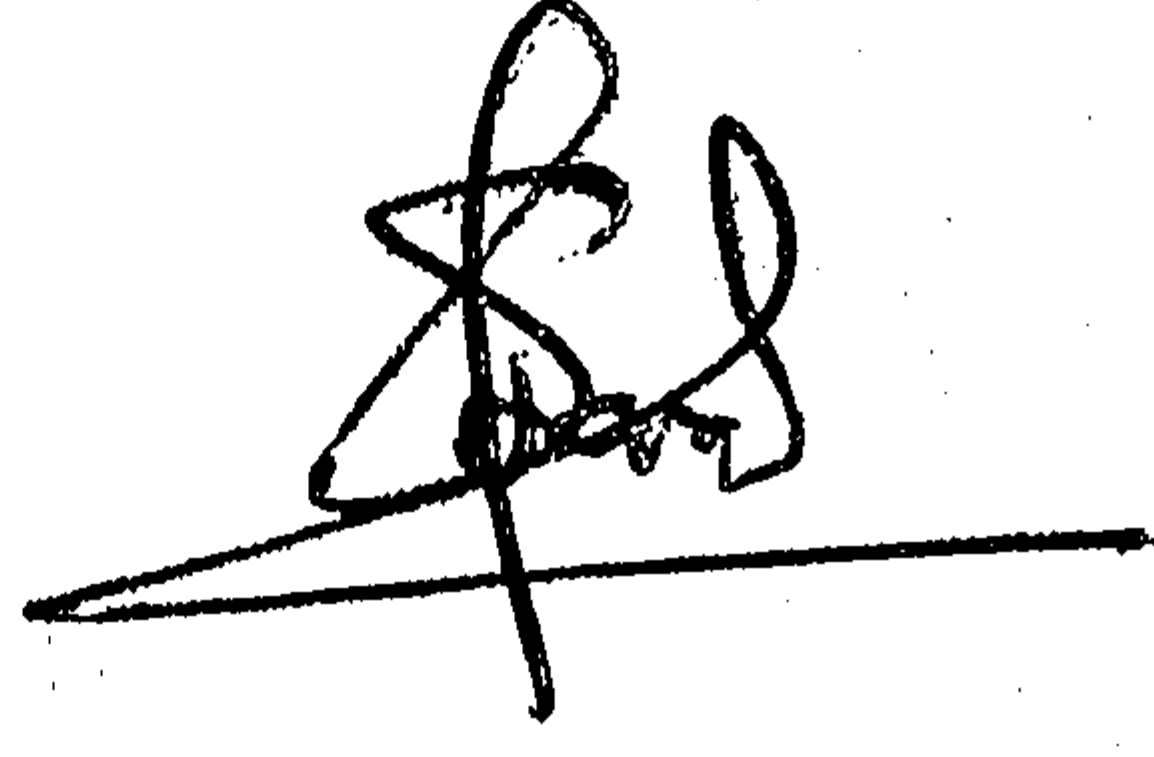
Kasaragod

SHUBHAM KUMAR

(PMA051943)

CERTIFICATE

I, Dr. GNANAVEL SOUNDARAJAN Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala, hereby certify that the project entitled " ANT COLONY " is a record of bonafide study carried out by SHUBHAM KUMAR my guidance and supervision in partial fulfilment of the requirement for the master degree in Mathematics.

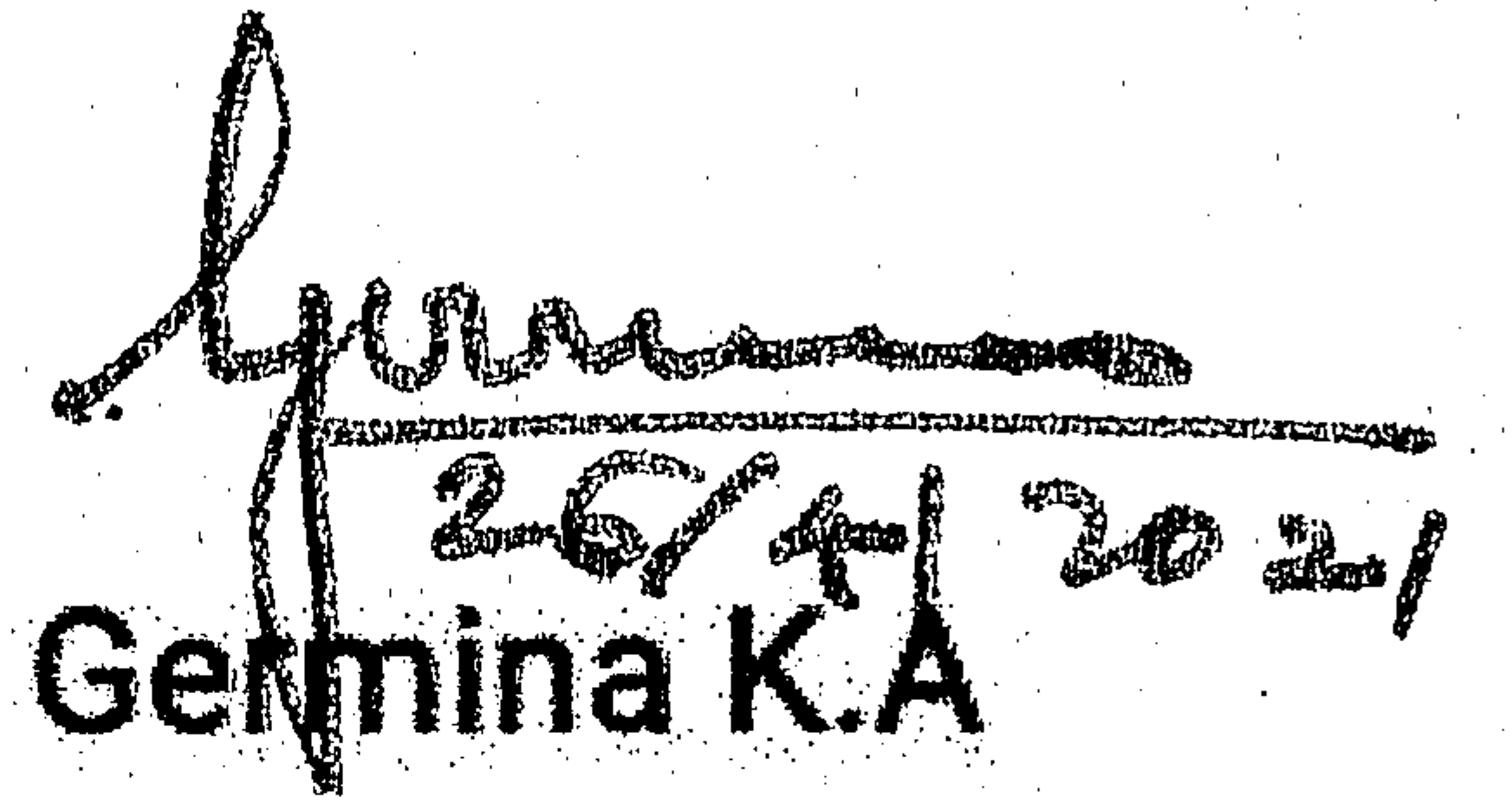


Dr. GNANAVEL SOUNDARAJAN

Assistant Professor

Department of Mathematics

Central University of Kerala, Kasaragod, Kerala.



Dr. Germina K.A

Head, Department of Mathematics

Central University of

Kerala

Kasaragod,

Kerala.

HOLDER AND LOCALLY HOLDER CONTINUOUS FUNCTIONS,
AND
OPEN SETS OF CLASS $C^k, C^{k,\lambda}$

DISSERTATION SUBMITTED
BY

SIDDANT PRABHAKAR GAIKWAD (REG.No PMA05144)

Under the guidance of

Dr. GNANAVEL SOUNDARARAJAN

The project submitted in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN MATHEMATICS

(Batch 2019-2021)

at



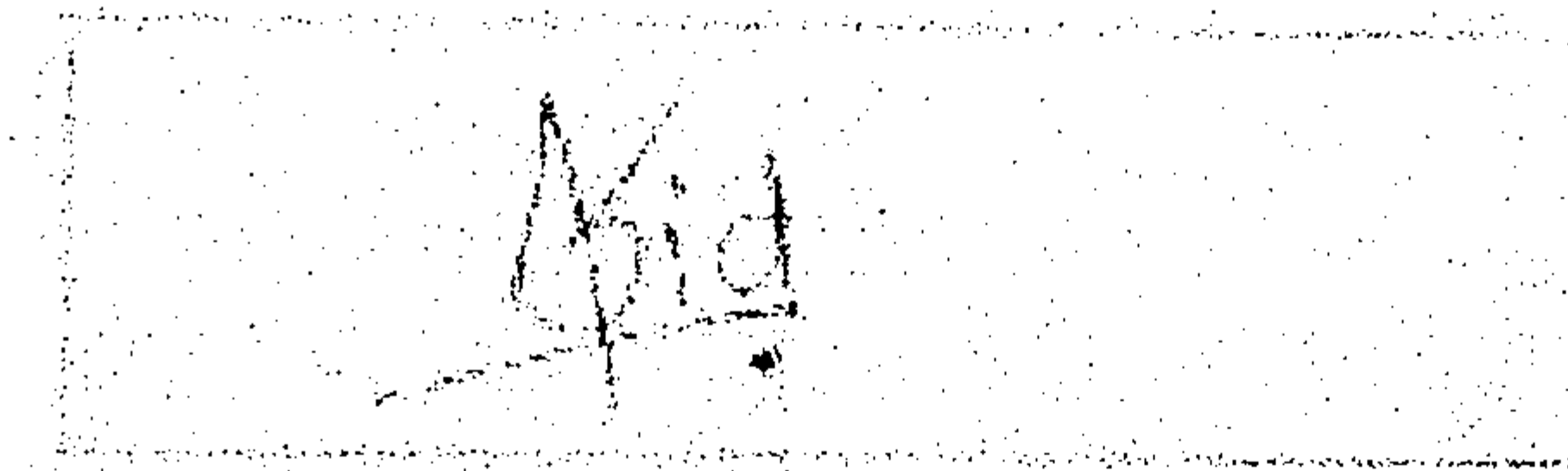
CENTRAL UNIVERSITY OF KERALA

april 2021

DEPARTMENT OF MATHEMATICS
SCHOOL OF MATHEMATICAL AND PHYSICAL SCIENCES
PERIYE P.O, KASARAGOD - 671316
KERALA, INDIA

DECLARATION

I, SIDDANT PRABHAKAR GAIKWAD hereby declare that the project work en-titled "HOLDER AND LOCALLY HOLDER CONTINUOUS FUNCTIONS, AND OPENSETS OF CLASS C^k, C^k LAMBDA" is an original record of studies and bonafide work carried out by me (using the original work entitled 'holder and locally holder continuous functions, and open sets of class, C^k lambda by renato fiorenza, birkhauser) under the guidance of **Dr. Gnanavel Soundarara jan**, Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala, India and has not been submitted by me elsewhere for the award of any degree, diploma, title or recognition before.

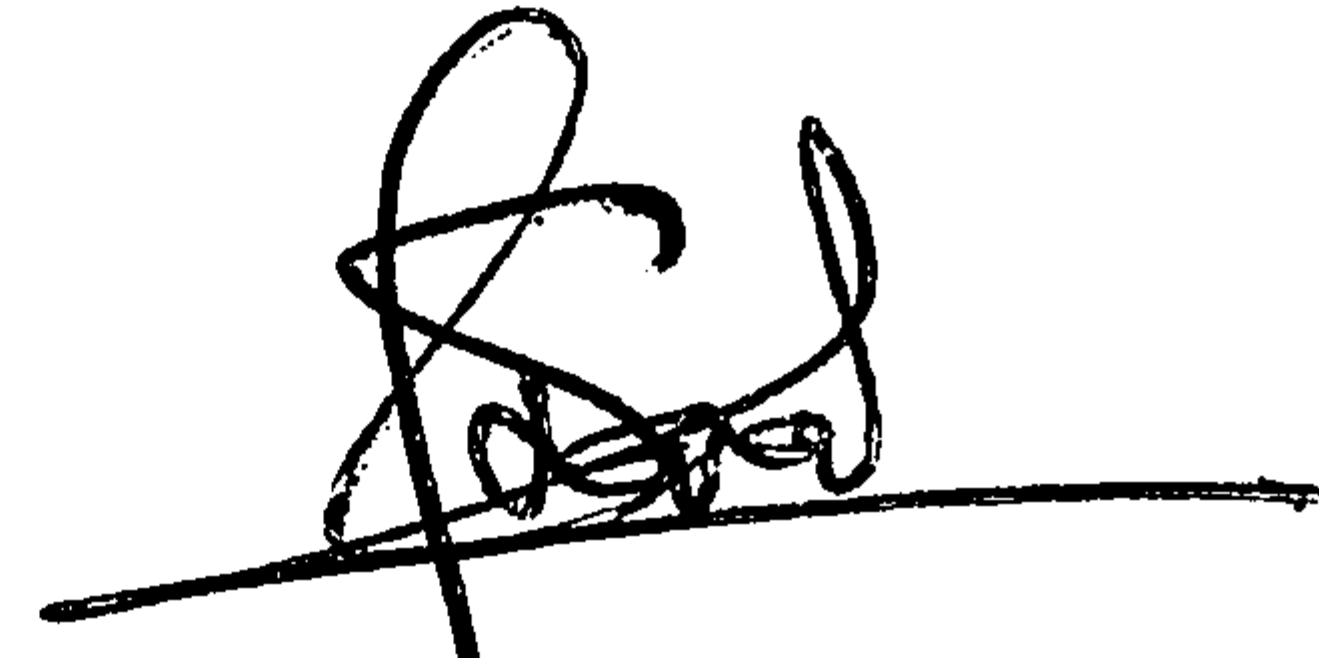


SIDDANT PRABHAKAR GAIKWAD

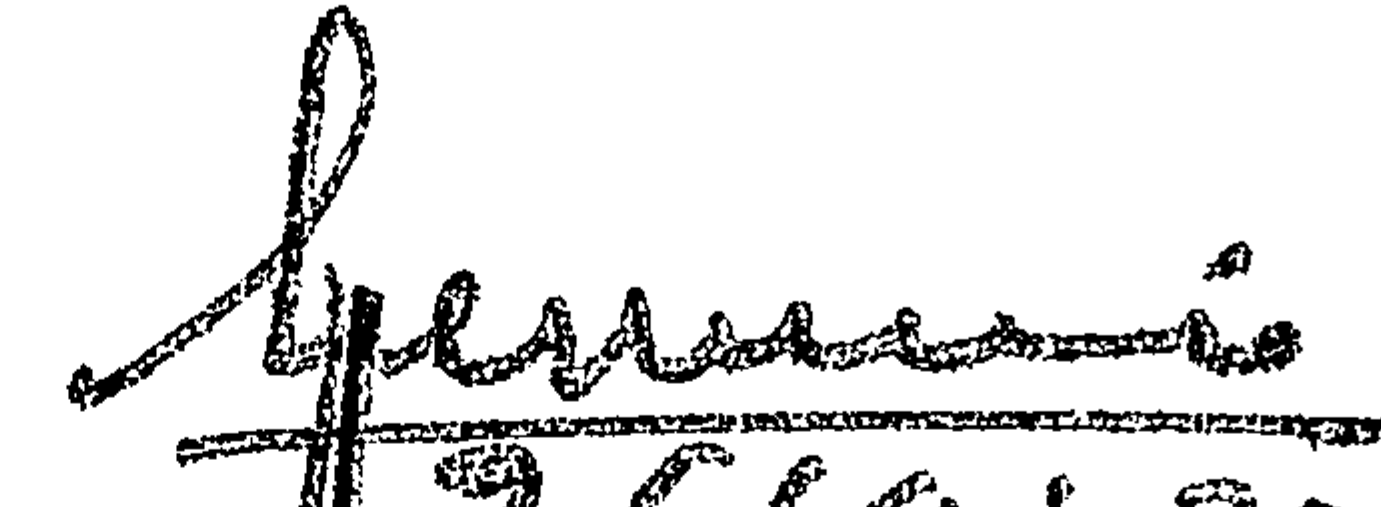
Department Of Mathematics,
Central University Of Kerala,
Kasaragod

CERTIFICATE

I, **Dr. Gnanavel Soundararajan**, Assistant Professor, Department of Mathematics, Central University Of Kerala, hereby certify that the project work entitled “Holder and locally holder continuous functions, and open sets of class C^k ” is a record of bona fide study carried out by **SIDDANT PRABHAKAR GAIKWAD** under my guidance and supervision in partial fulfillment for the Master degree in Mathematics of Central University of Kerala.



Dr. Gnanavel Soundararajan (Research Supervisor)
Assistant Professor,
Department of Mathematics,
Central University of Kerala,
Kasaragod.


26/4/2021

Dr. KVA. Germina
Associate Professor & Head,
Department of Mathematics
Central University of Kerala,
Kasaragod.

Signature of the External Examiner

GREEN'S RELATIONS ON SEMIGROUPS

DISSERTATION SUBMITTED
BY

SREELAKSHMI K

Reg.No. PMA051945

Under the guidance of

Dr. V. Vilfred

The project submitted in partial fulfillment of the requirements for
the degree of

MASTER OF SCIENCE IN MATHEMATICS
(Batch 2019-2021)


at



CENTRAL UNIVERSITY OF KERALA
APRIL 2021
DEPARTMENT OF MATHEMATICS
SCHOOL OF MATHEMATICAL AND PHYSICAL SCIENCES
PERIYE P.O., KASARAGOD - 671316
KERALA, INDIA

DECLARATION

I, SREELAKSHMI K, hereby declare that the dissertation entitled, 'Green's Relations On Semi Groups' submitted by me to Central University of Kerala, Kasaragod in partial fulfillment for the award of the Degree of Masters of Science in Mathematics is a record of bonafide work carried out by me under the guidance of Dr. V. Vilfred, Associate Professor, Department of Mathematics, Central University of Kerala. I further declare that the dissertation has not been submitted, in part or full, for the award of any other degree or diploma in this University or any other University or Institute.



Date: 26.04.2021

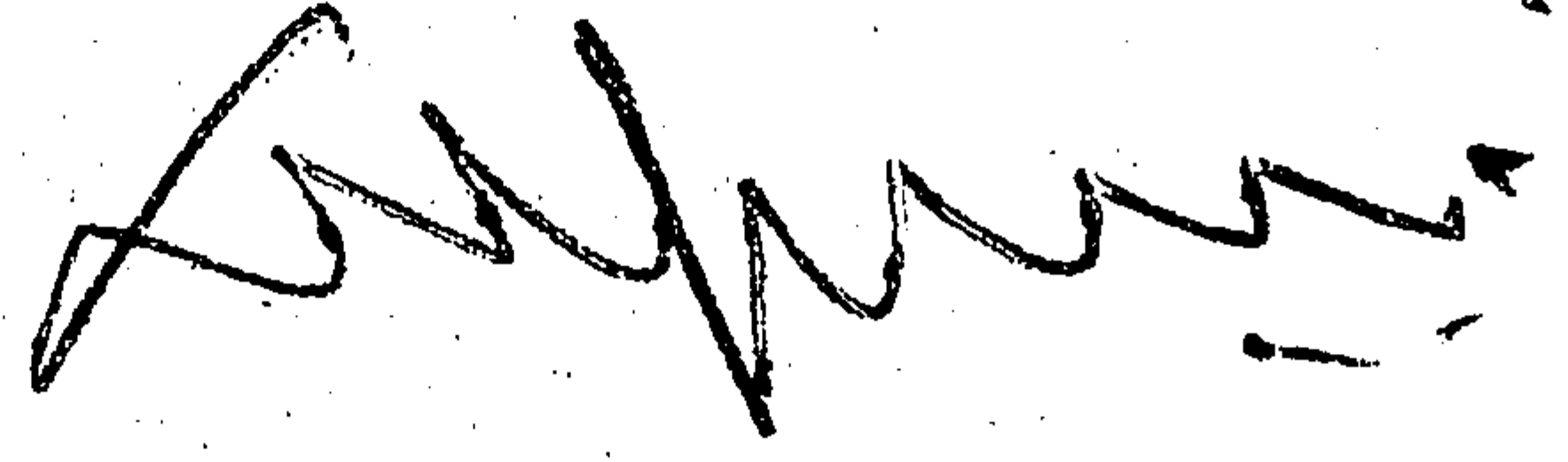
Place: Periyar

(SREELAKSHMI K)

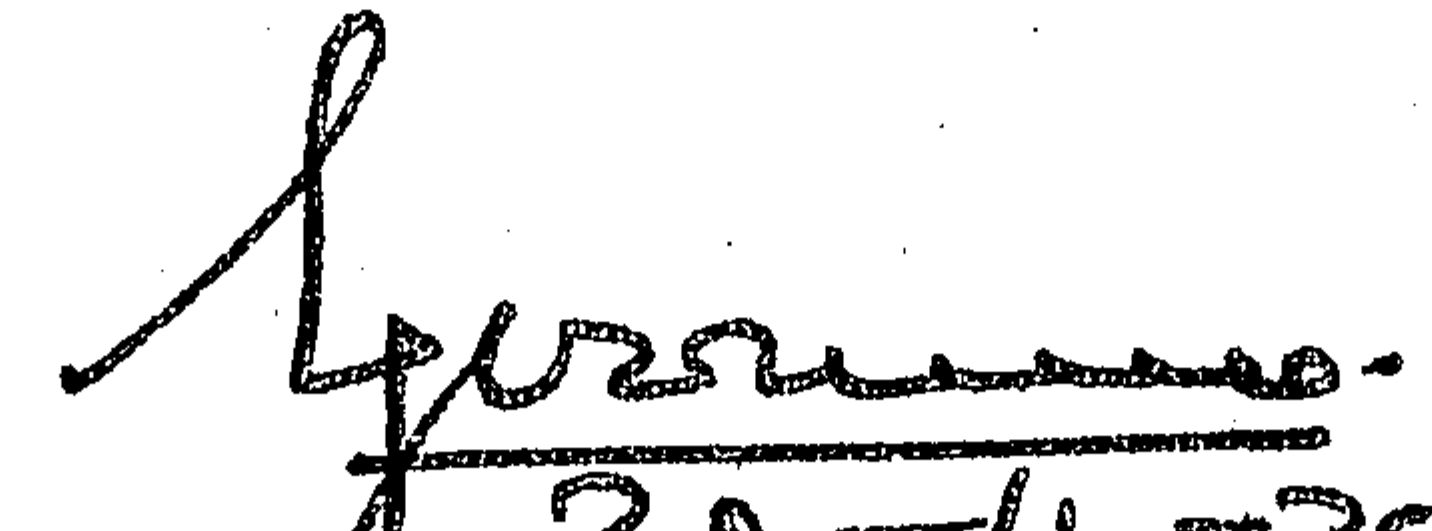
Reg.No. PMA051945

CERTIFICATE

This is to certify that the Dissertation entitled, '**Green's Relations On Semi Groups**' submitted by SREELAKSHMI K, Reg.No. PMA051945 is a bonafide work carried out in the Department of Mathematics, Central University of Kerala, Kasaragod under my guidance in partial fulfillment for the award of the Degree of Masters of Science in Mathematics.



Dr. V. Vilfred (Supervisor)
Associate Professor,
Department of Mathematics,
Central University of Kerala,
Kasaragod - 671 316.



Dr. K. A. Germina
Head,
Department of Mathematics,
Central University of Kerala,
Kasaragod - 671 316.



Signature of the External Examiner

Taxicab Numbers

DISSERTATION SUBMITTED BY

Supantha Kundu
(PMA051946)

Under the guidance of
Dr. Shaini P.

The project submitted in partial fulfillment of the requirements
for the degree of

MASTERS OF SCIENCE IN MATHEMATICS

(BATCH 2019-2021)

at



CENTRAL UNIVERSITY OF KERALA

April, 2021

Department of Mathematics

School of Mathematical and Physical Science

Periye, Kasaragod-671316, Kerala, India

DECLARATION

I, **SUPANTHA KUNDU** hereby declare that the project entitled “**TAXICAB NUMBERS**” is a bonafide study carried out by me under the guidance and supervision of **Dr. SHAINI P.**, Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala and has not been submitted by me elsewhere for the award of any degree, diploma, title or recognition before.

Supantha Kundu

PMA051946

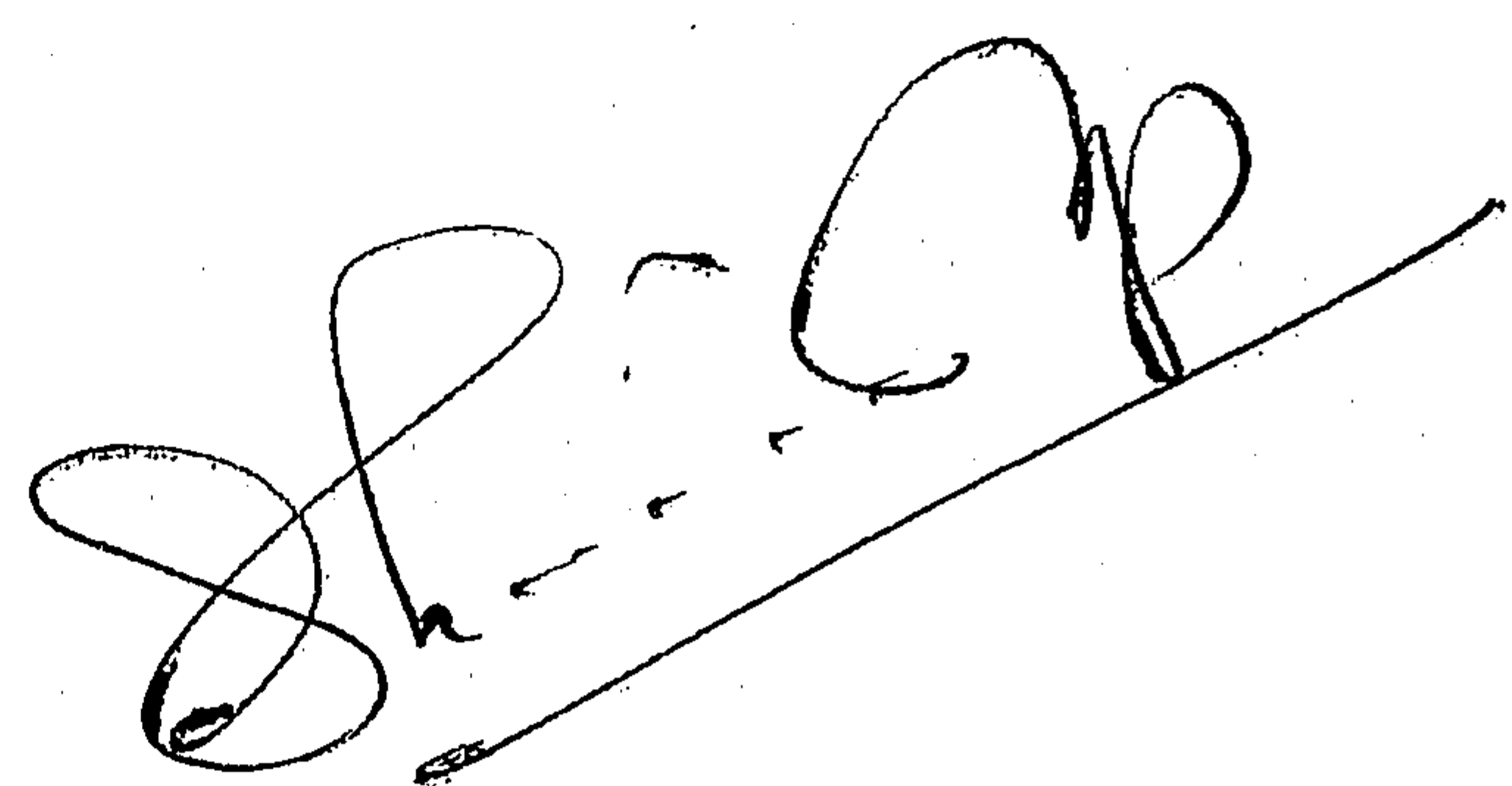
Department of Mathematics

Central University of Kerala

Kasaragod

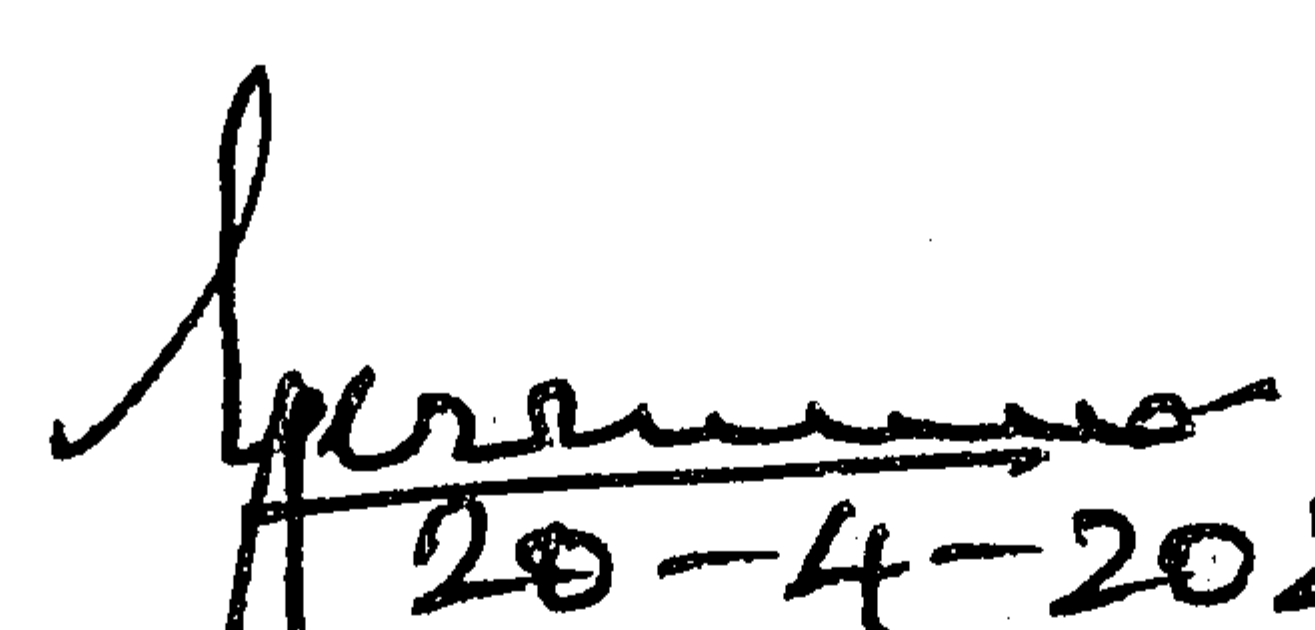
CERTIFICATE

I, Dr. SHAINI P. hereby certify that project entitled "TAXICAB NUMBERS" is a record of bonafide study carried out by SUPANTHA KUNDU (PMA051946) under my guidance and supervision in partial fulfillment of the requirements for the Master degree in Mathematics.



Dr. SHAINI P.
Assistant Professor
Department of Mathematics
Central University of Kerala
Kasaragod.




20-4-2021
Dr. K.A. GERMINA
Head of the Department
Department of Mathematics
Central University of Kerala
Kasaragod

Signature of the External Examiner

A STUDY ON HYPERGRAPHS

Dissertation submitted

by

VARNANA C R

(Reg.No.PMA051947)

Under the guidance of

Dr.SHAINI P

The project submitted in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN MATHEMATICS

(Batch 2019-2021)

At



CENTRAL UNIVERSITY OF KERALA

APRIL 2021

DEPARTMENT OF MATHEMATICS

SCHOOL OF PHYSICAL SCIENCE

CENTRAL UNIVERSITY OF KERALA

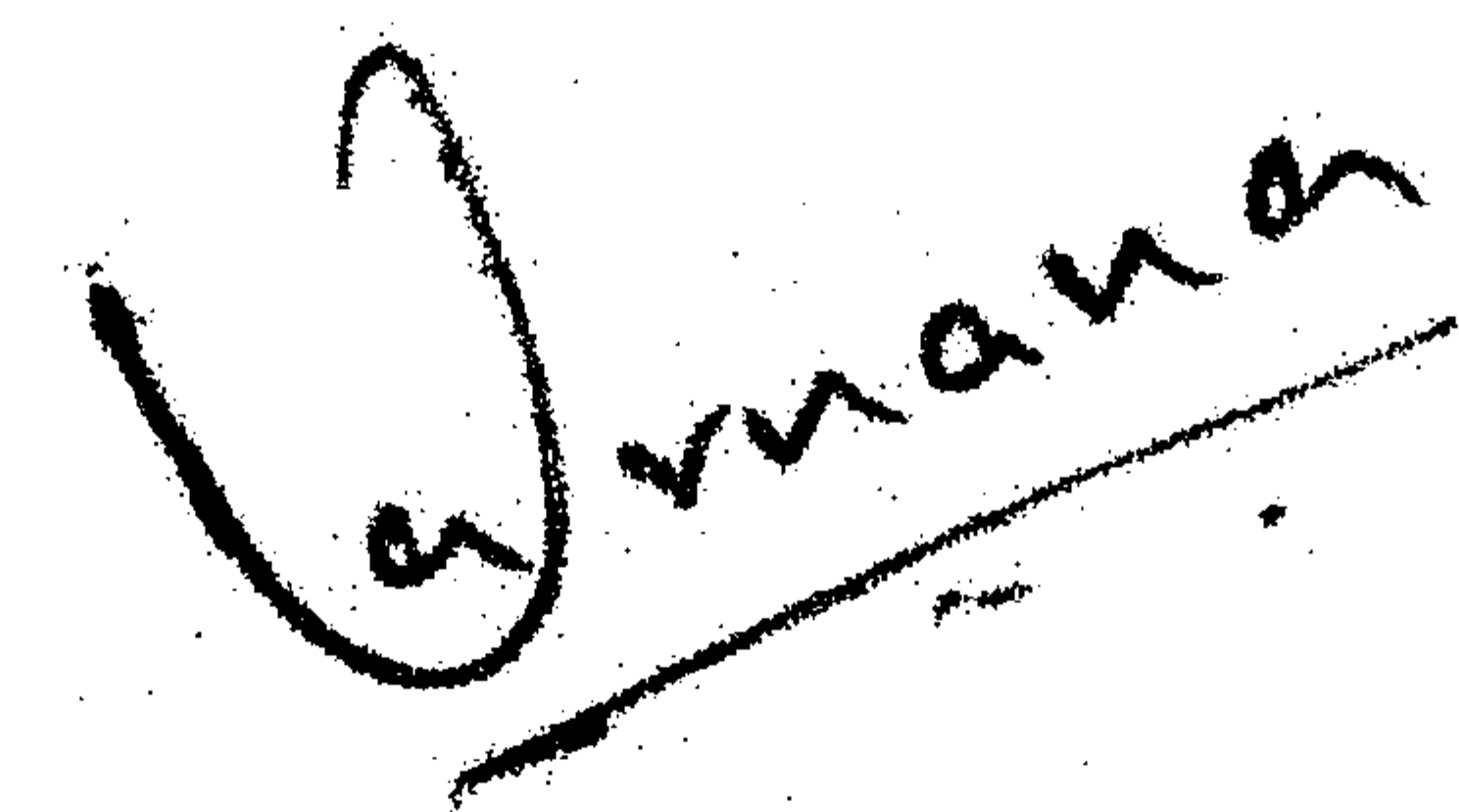
PERIYA,P.O

KASARAGOD - 671316, KERALA, INDIA.

DECLARATION

I, VARNANA C R hereby declare that the project entitled "A STUDY ON HYPERGRAPHS" is a bonafide study carried out by me under the guidance and supervision of **Dr.Shaini P.**, Assistant Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala and has not been submitted by me elsewhere for the award of any degree, diploma, title or recognition before.

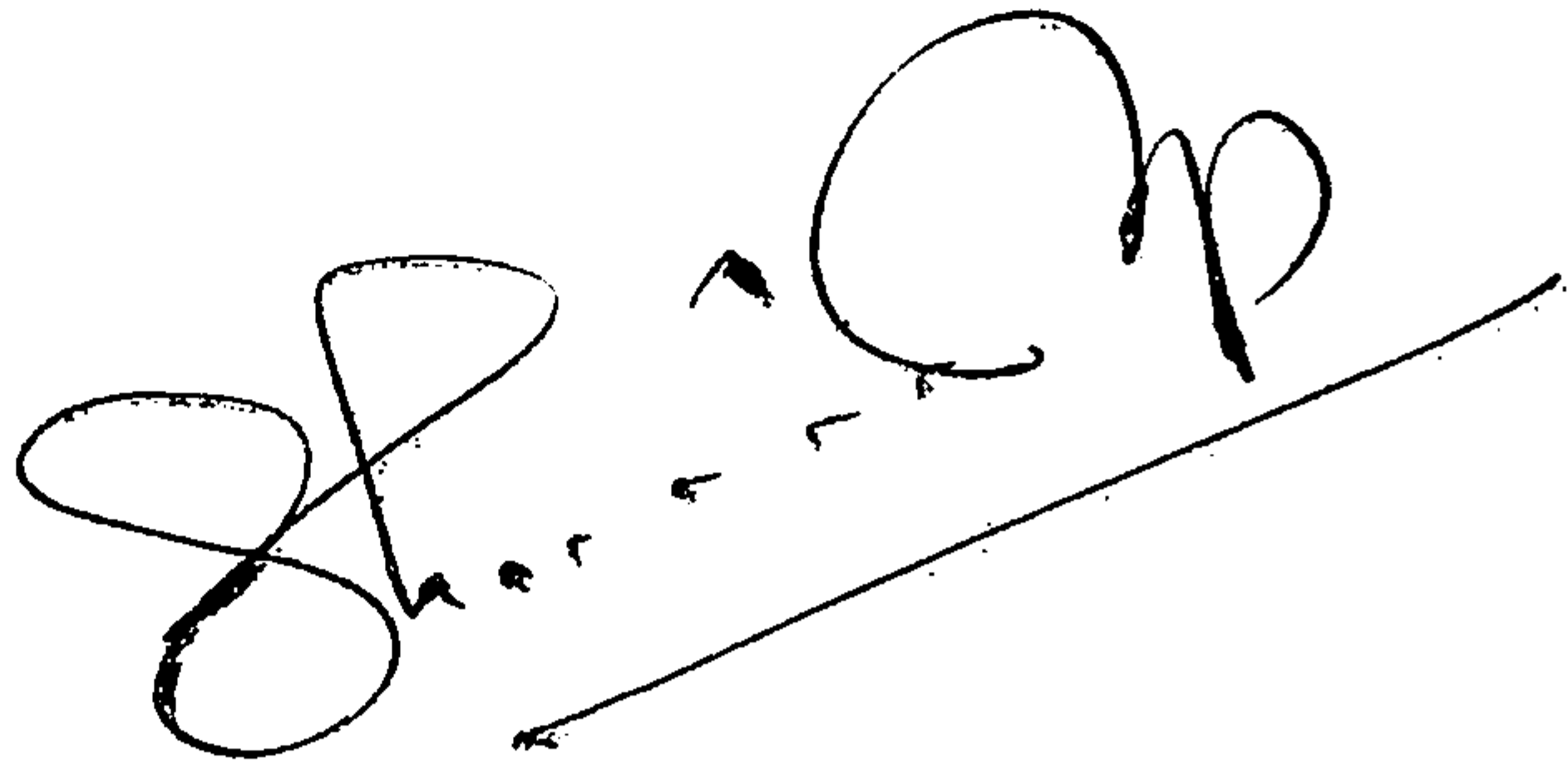
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VARNANA C R
Reg.No. PMA051947

CERTIFICATE

I, **Dr.SHAINI P**, Associate Professor, Department of Mathematics, Central University of Kerala, Kasaragod, Kerala, hereby certify that the project entitled “**A STUDY ON HYPER-GRAPHS**” is a record of bonafide study carried out by **VARNANA C R** (PMA051947) under my guidance and supervision in partial fulfillment of the requirements for the Master degree in Mathematics.



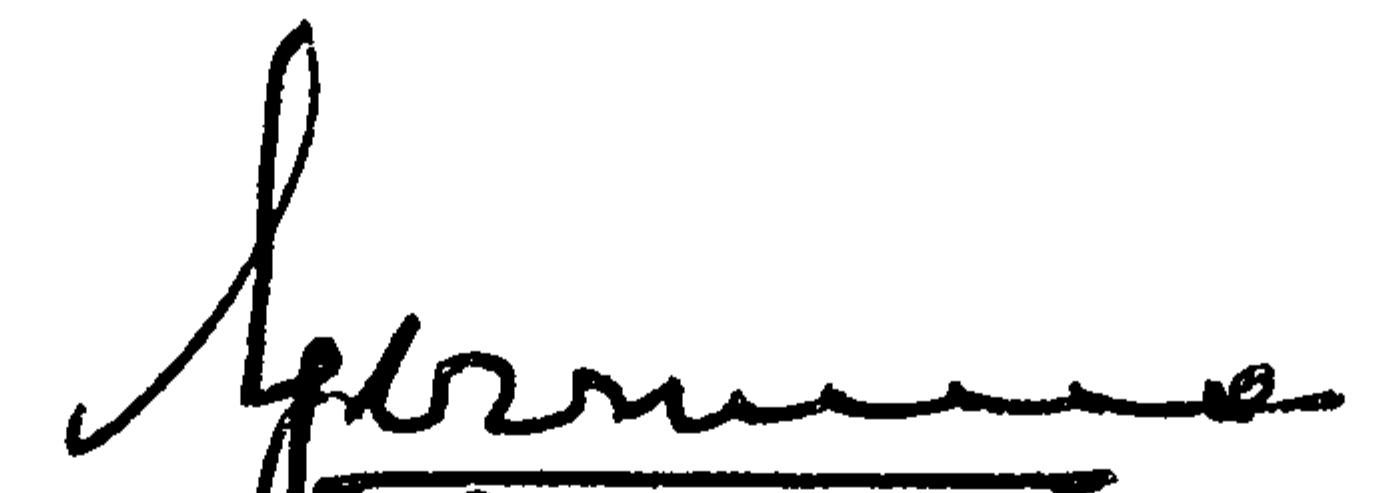
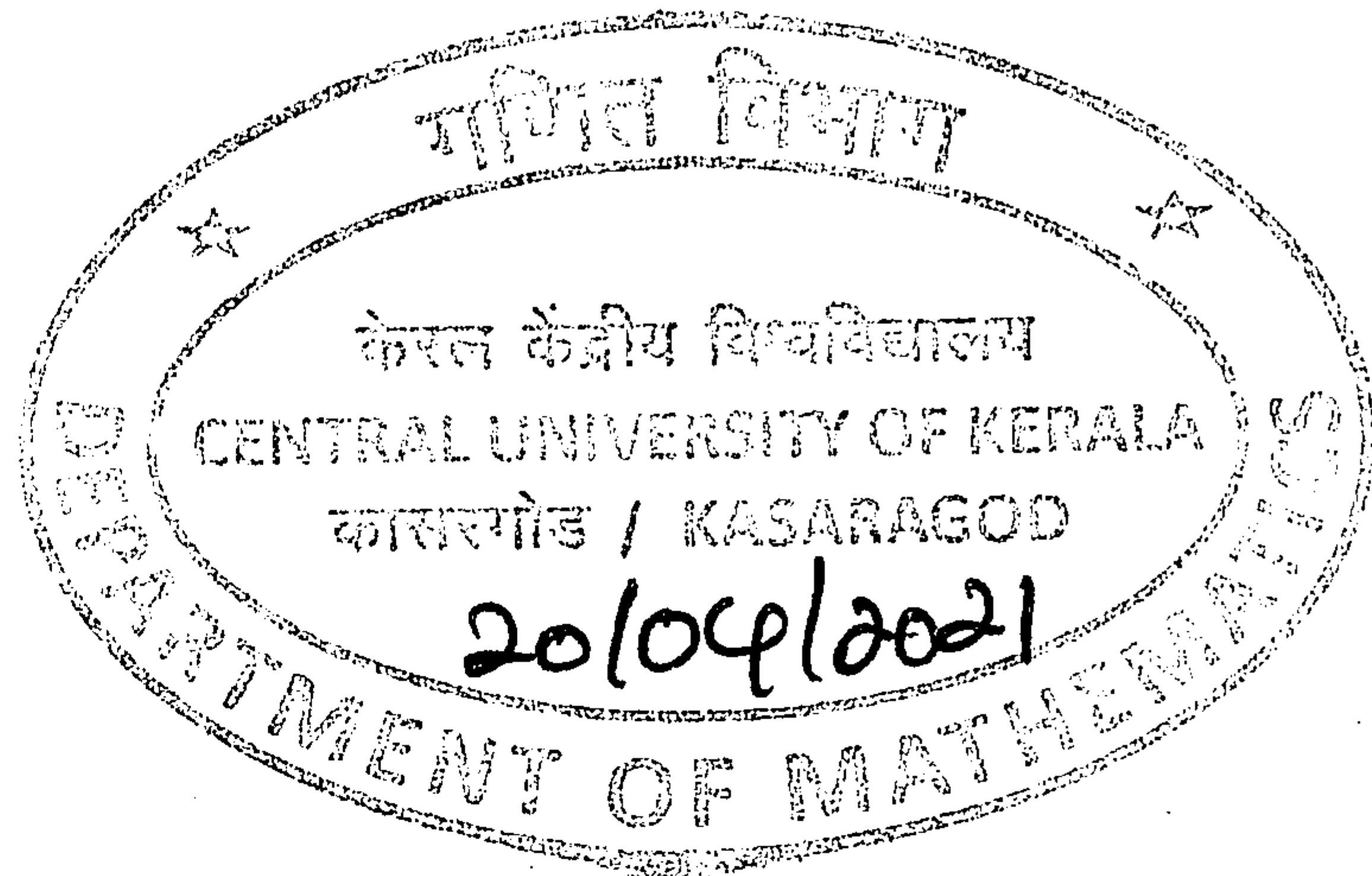
Dr.Shaini P.

Assistant Professor

Department of Mathematics

Central University of Kerala

Kasaragod.



20-4-2021
Dr. K.A. Germina

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Signature of the External Examiner