गुरु घासीदास विश्वविद्यालय
(केन्द्रीय विश्वविद्यालय अधिनियम 2009 क्र. 25 के अंतर्गत स्थापित केन्द्रीय विश्वविद्यालय)
कोनी, बिलासपुर – 495009 (छ.ग.)

Guru Ghasidas Vishwavidyalaya
(A Central University Established by the Central Universities Act 2009 No. 25 of 2009)
Koni, Bilaspur – 495009 (C.G.)

Department : Mathematics		
Academic Year : 2023-24		
Sr. No.	**Programme Code**	**Name of the Programme**
01.	309	M.Sc. (Project Phase-II)

विभागाध्यक्ष
Head
गणित विभाग
Department of Mathematics
गुरु घासीदास विश्वविद्यालय,
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बिलासपुर (छ.ग.) 495009, भारत
Bilaspur (C.G.), 495009, India

A PROJECT ON

ZORN'S LEMMA AND SOME APPLICATIONS

Submitted in a final fulfilment of the requirements for the degree of

M.Sc. in Mathematics

SUBMITTED BY

MANTHAN KUMAR SAHU
Roll No: 22075125

Under the supervision of

Dr. DHANANJAY GOPAL
Associate Professor, Department of Mathematics

DEPARTMENT OF MATHEMATICS
GURU GHASIDAS VISHWAVIDYALAYA BILASPUR
(C.G), INDIA

गुरु घासीदास विश्वविद्यालय
(केन्द्रीय विश्वविद्यालय अधिनियम 2009 क्र. 25 के अंतर्गत स्थापित केन्द्रीय विश्वविद्यालय)
कोनी, बिलासपुर – 495009 (छ.ग.)

Guru Ghasidas Vishwavidyalaya
(A Central University Established by the Central Universities Act 2009 No. 25 of 2009)
Koni, Bilaspur – 495009 (C.G.)

GURU GHASIDAS VISHWAVIDYALAYA, Bilaspur (C.G)

(A Central university established by the Central Universities Act 2009 No. 25 0f 2009)

CERTIFICATE

This is to that the candidate MANTHAN KUMAR SAHU of the Academic year 2023- 2024 is a bonafide student of the Department of Mathematics, GURU GHASIDAS VISHWAVIDYALAYA (A Central University), Koni, Bilaspur (C.G). The project work entitled "ZORN'S LEMMA AND SOME APPLICATIONS" is his original piece of work to the best of my knowledge, a project for the award of a Post-graduation Degree in GGV Koni, Bilaspur.

Date: 11.09.2024

Supervisor
Dr. DHANANJAY GOPAL
(Associate Professor)
Department of Mathematics

Prof. A.K. THAKUR
(Head of Dept.)
Department of Mathematics

विभागाध्यक्ष
Head
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Department of Mathematics
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Bilaspur (C.G.), 495009, India

गुरु घासीदास विश्वविद्यालय
(केन्द्रीय विश्वविद्यालय अधिनियम 2009 क्र. 25 के अंतर्गत स्थापित केन्द्रीय विश्वविद्यालय)
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Guru Ghasidas Vishwavidyalaya
(A Central University Established by the Central Universities Act 2009 No. 25 of 2009)
Koni, Bilaspur – 495009 (C.G.)

Contents

1

A PROJECT REPORT

ON

MATHEMATICAL LOGIC: FORMALIZING PROBLEMS USING LOGIC

Submitted in a partial fulfilment of the requirements for the

Degree of

MASTER OF SCIENCE IN MATHEMATICS

UNDER THE SUPERVISION OF	SUBMITTED BY
MR. HAPKA SURENDRA	**DEVESH KUMAR**
(ASSISTANT PROFESSOR)	**M.SC. IV SEMESTER**
	ROLL NO. 22075116
	ENROLL.NO. GGV/22/05713

DEPARTMENT OF MATHEMASTICS

GURU GHASIDAS VISHWAVIDYALAYA

BILASPUR (C.G.)

Certificate

This is to certify that the project entitled **Mathematical Logic: Formalizing Problems** submitted by **Devesh Kumar** in the partial fulfillment for the requirements for the award of Master of Science Degree in Mathematics at the Department of Mathematics, Guru Ghasidas Vishwavidyalaya Bilaspur (C.G.) is an authentic work carried out by him under my supervision and guidance.

Date- 23-09-2024

Supervisor

Mr. Hapka Surendra

(Assistant Professor)

Department of Mathematics

28/09/24

Dr. A. K. Thakur

(Head of Department)

Department of Mathematics

Abstract

In this project, our main aim to formalize problems in terms of mathematical logic. We use different method to formulate mathematical logic form of problems. In this project we had studied about mathematical logic types of mathematical operations (And,Or,Not). We have also studied about rules of inference and quantifiers such as universal quantifiers and existential quantifiers.

In this project we have formulated problems using simple statements. We have also used first order logic and formulated different kind of statements by first order logic.

We studied about model logic. In which we have found another types of statements such as "possible" and "necessarily". Also "not possible" also known as impossible. We also formuled some problems using model logic in which the word "possible" and "necessary" occurred.

MATHEMATICAL MODELING OF PREY-PREDATOR SYSTEM

WITH FEAR EFFECT AND GROUP DEFENSE

A desertation submitted
in partial fulfilment of the requirments
for the degree of

MASTER OF SCIENCE
in
PURE AND APPLIED MATHEMATICS
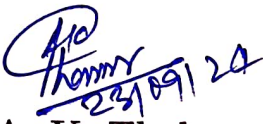
by

Pradeep Das

22075134

to

SCHOOL OF COMPUTATIONAL AND MATHEMATICAL SCIENCE

GURU GHASIDAS VISHWAVIDYALAYA,BILASPUR,C.G.

CERTIFICATE

This is to certify that the work contained in this project report entitled "**Mathematical Modeling of Predator-Prey System with Fear Effect and Group Defense**" submitted by **Pradeep Das**(Roll No: **22075134**, Enrollment No: **GGV/22/05729**) to the Department of Mathematics, Guru Ghasidas Vishwavidyalaya, Bilaspur towards the partial requirement of Master of Science in Mathematics has been carried out by him and that it has not been submitted elsewhere for the award of any degree.

Prof. A. K. Thakur
HoD
Department of Mathematics
Guru Ghasidas Vishwavidyalaya

Dr. Kankan Sarkar
Associate Professor
Department of Mathematics
Guru Ghasidas Vishwavidyalaya

Date: 11/09/2024

ABSTRACT

Name of student: Pradeep Das
Roll no: 22075134
Degree for which submitted: M.Sc.
Department: School of Computational and Mathematical Sciences
Project title: Mathematical Modeling of Predator-Prey System with Fear Effect and Group Defense
Project supervisor: Dr. Kankan Sarkar
Date of project submission: 11/09/2024

In this project we have reviewed Prey-Predator Lotka-Volterra model and study the dynamics of a prey-predator interaction model that incorporates: (1) reduction of prey growth rate, in the form of fear effect, in presence of predator; and (2) group defense of prey, against predation, by using the Monod-Haldane type functional response. Moreover, we interrelate these two factors, through the predator-taxis sensitivity, as the total time or energy for foraging and defense is constant for prey. If the prey invests more time or energy for group defense, then reproduction may decrease due to that investment. We provide detailed mathematical results, including, basic dynamical properties, existence of positive equilibria, asymptotic stability of all equilibria.

Key Words :

A

project on

""PSEUDO GENERALISED QUASI EINSTEIN MANIFOLD"

Submitted by

Prakash kumar thakur

Roll No - 22075136

M.Sc 4th Sem

Under the supervision of

Dr. B B Chaturvedi

Department of mathematics

Guru Ghasidas Central University , Bilaspur

DEPARTMENT OF MATHEMATICS

GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G) INDIA

(A Central University Established by the Central University Act 2009)

CERTIFICATE

This is to certify that the project entitled '**Pseudo Generalized Quasi-Einstein Manifolds**' submitted by Prakash Kumar Thakur in the partial fulfilment for the requirements for the award of Master of Science Degree in Mathematics at Department of Mathematics, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.), is an authentic work carried out by him under my supervision and guidance.

Prof. A.K. THAKUR

विभागाध्यक्ष
(HEAD OF DEPARTMENT)
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Bilaspur (C.G.), 495009, India

Dr. B.B. Chaturvedi
~~ASSISTANT~~
~~ASSOCIATE~~ PROFESSOR

(SUPERVISOR)

DATE....................

Basic Definitions

- Manifold

- Riemannian Manifold

- Non – flat Riemannian manifold

- Scalars

- Vector field

- Ricci curvature

- Conformly-flat manifold

- Pseudo manifold

- Generalized Quasi Einstein manifold

1. Introduction

2 . Preliminaries

- Theorem 2.1

- Theorem 2.2

3 . Existence Theorem $P(GQE)_n(n>2)$

- Proposition 3.1

- Theorem 3.1

4 . Conformally flat $P(GQE)_n(n>3)$

- Theorem 4.1

- Theorem 4.2

- Corollary 4.1

A
Project Report
on

'STUDY OF THE STONE-CECH COMPACTIFICATION'

Submitted in Partial fulfilment of the requirement of the

degree of Master of Science

By

NASIB KUMAR MAJHI

Enrolment Number- GGV/22/05723
Roll No.- 22075127

Supervisor

Dr.DHANANJAY GOPAL

Associate professor
G.G.V Bilaspur(C.G)

Department of Mathematics
GURU GHASIDAS VISHWAVIDYALAYA
2022-24

DEPARTMENT OF MATHEMATICS
GURU GHASIDAS UNIVERSITY , BILASPUR (C.G.) INDIA
A Central University Established by the Central University Act 2009

CERTIFICATE

This to certify that the project entitled 'STUDY OF THE STONE-CECH COMPACTIFICATION' submitted by NASIB KUMAR MAJHI in the partial fulfilment for the requirement for the award of Master of Science Degree in Mathematics at Department of Mathematics, GuruGhasidas University, Bilaspur(C.G) 495009 INDIA is an authentic work carried out by him under my supervision and guidance.

Date.11-09-2024

Signature of Supervisor
Dr.DHANANJAY GOPAL
(Associate Professor)

Signature of HOD
Prof. A.K.Thakur
Head
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Guru Ghasidas Vishwavidyalaya,
बिलासपुर (छ.ग.) 495009, भारत
Bilaspur (C.G. 105009, India

2

ABSTRACT

The Stone–Čech compactification βX of a discrete space X is a fundamental concept in topology, providing a means to extend X to its largest compact Hausdorff space, where X is densely embedded. This study explores both the fundamental properties of βX and its potential homeomorphism with $\beta(\beta X \setminus X)$, the compactification of the remainder space $\beta X \setminus X$. Leveraging the extremal disconnectedness inherent in βX, we demonstrate that βX and $\beta(\beta X \setminus X)$ are homeomorphic, revealing a recursive nature in the compactification process.

The investigation delves into key aspects of the Stone–Čech compactification, including the universal property of βX, the extension of continuous functions from X to βX, and the relationship between the topology of βX and X. Additional focus is given to the interaction with ultrafilters and the structure of the remainder space $\beta X \setminus X$, which plays a pivotal role in this homeomorphism.

A PROJECT

ON

DISCONTINUITY AT FIXED POINT

Project submitted to GGV

For the award of the degree of

Master of Science

In

MATHEMATICS

By

ANISH KUMAR KHUNTEY

ROLL NO.-22075106

Under the supervision of

DR. KOTI N.V.V. VARA PRASAD

Assistant Professor , Department of Mathematics

DEPARTMENT OF MATHEMATICS

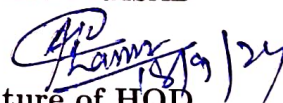## GURU GHASIDAS VISHWAVIDYALAYA

BILASPUR (C.G.), 495009, INDIA

DEPARTMENT OF MATHEMATICS
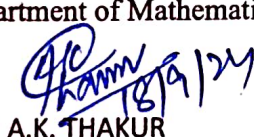## GURU GHASIDAS VISHWAVIDYALAYA
BILASPUR(C.G)-495009

CERTIFICATE

This is to certify that the work described in the project entitled " **Disconti-nuity at fixed point**"submitted by **Anish Kumar Khuntey** for the award of the degree of Master of Science in Mathematics by Department of Mathematics, **Guru Ghasidas Vishwavidyalaya, Koni, Bilaspur(C.G.)** was carried out by the candidate is his original piece of work to the best of my knowledge.

Signature of supervisor

Dr. KOTI N.V.V.VARA PRASAD

Signature of HOD

Prof. A.K. THAKUR

Head
गणित विभाग
Department of ...
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2

ABSTRACT

In this dissertation, we estasblish a fixed point theorem that offers a novel solution to Rhoades open problem regarding contractive mappings and Meir-keeler approach that may be discontinuous at the fixed point. These known solutions followed the first solution of Rhoades open problem by pant in 1999.

A PROJECT ON
OLYMPICS DATA ANALYSIS PROJECT OF PARTICIPATING COUNTRIES (1896-2016)

Submitted in final fulfillment of the requirements for the degree of

M.Sc. in Mathematics

SUBMITTED BY

ASHISH KASHYAP
Roll No: 22075111

Under the supervision of

Prof. P. P. MURTHY
Department of Mathematics

DEPARTMENT OF MATHEMATICS
GURU GHASIDAS VISHWAVIDYALAYA
BILASPUR (C.G), INDIA

1

DEPARTMENT OF MATHEMATICS

GURU GHASIDAS VISHWAVIDYALAYA, Bilaspur (C.G)

(A Central university established by the Central Universities Act 2009 No. 25 0f 2009)

CERTIFICATE

This is to that the candidate ASHISH KASHYAP of the Academic year 2023-2024 is a bonafide student of the Department of Mathematics, GURU GHASIDAS VISHWAVIDYALAYA (A Central University), Koni, Bilaspur (C.G). The project work entitled "OLYMPICS DATA ANALYSIS PROJECT OF PARTICIPATING COUNTRIES (1896-2016)" is his original piece of work to the best of my knowledge, a project for the award of a Post-graduation Degree in GGV Koni, Bilaspur.

Date: 10.09.2024

Supervisor

Prof. P. P. MURTHY

Department of Mathematics

Prof. A.K. THAKUR

(Head of Dept.)

Department of Mathematics

गणित विभाग

Department of Mathematics

गुरु घासीदास विश्वविद्यालय,

बिलासपुर (छ.ग.) 495009, भारत

Bilaspur (C.G.) 495009, India

2

ABSTRACT

This project examines the raw data of the 120-year Olympic Games, from 1896 to 2016, and provides great insights about the Olympic Games, such as their evolution over the course of 120 years in terms of the number of countries, participants, events, all-time top performers, physical attributes (such as height and weight), athlete's age, the trend of male/female participants, host country, economic factors (such as GDP), population size, etc.

A PROJECT ON

FIXED POINT THEOREM IN COMPLETE METRIC SPACE

Submitted in a final fulfilment of the requirements for the degree of
M.Sc in Mathematics

SUBMITTED BY

DeenaKrishna Dalabehera
Roll No: 22075115

Under the supervision of

Dr. Koti N.V.V. Vara Prasad
Assistant Professor, Department of Mathematics

DEPARTMENT OF MATHEMATICS
GURU GHASIDAS VISHWAVIDYALAYA BILASPUR
(C.G), INDIA

CERTIFICATE

This is hereby to certify that the candidate DeenaKrishna Dalabehera of the Academic year 2023-2024 is a bonafide student of the Department of Mathematics, GURU GHASIDAS VISHWAVIDYALAYA (A Central University), Koni, Bilaspur (C.G). The project work entitled "FIXED POINT THEOREMS IN COMPLETE METRIC SPACE" is his original piece of work to the best of my knowledge, a project for the award of a Post-graduation Degree in GGV Koni, Bilaspur.

Date: 10.09.2024

Supervisor

Dr. Koti N.V.V. Vara Prasad
(Assistant Professor)
Department of Mathematics

Prof. A.K. THAKUR
(Head of the department)
Head
गणित विभाग
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Guru Ghasidas Vishwavidyalaya,
बिलासपुर (C.G.) 495009, भारत
(C.G.) 495009, India

Contents

A
Project Report
on

' STUDY OF TOPOLOGICAL PROPERTIES OF NON-TRIANGULAR METRIC SPACES AND RELATED FIXED POINT RESULTS '

Submitted in Partial fulfilment of the requirement of the
degree of Master of Science
By

NIKITA GHARAMI
Roll No.- 22075130
Enrolment No.- GGV/19/5086

Supervisor
Dr. DHANANJAY GOPAL
Associate Professor
G.G.V. Bilaspur (C.G.)

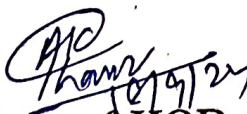**Department of Mathematics**
GURU GHASIDAS VISHWAVIDYALAYA
2022-24

DEPARTMENT OF MATHEMATICS
GURU GHASIDAS UNIVERSITY , BILASPUR (C.G.) INDIA
A Central University Established by the Central University Act 2009

CERTIFICATE

This to certify that the project entitled 'STUDY OF TOPOLOGICAL PROPERTIES OF NON-TRIANGULAR METRIC SPACES AND RELATED FIXED POINT RESULTS' submitted by **Nikita Gharami** in the partial fulfilment for the requirement for the award of Master of Science Degree in Mathematics at Department of Mathematics, GuruGhasidas University, Bilaspur(C.G) 495009 INDIA is an authentic work carried out by him under my supervision and guidance.

Date.11-09-2024

Signature of Supervisor
Dr.DHANANJAY GOPAL
(Associate Professor)

Signature of HOD
Prof. A.K.Thakur
विभागाध्यक्ष
गणित विभाग
Department of Mathematics
गुरु घासीदास विश्वविद्यालय,
G   hasidas Vishwavidyalaya,
      (छ.ग.) 495009, भारत
      C.G.), 495009, India

2

ABSTRACT

The introduction of non-triangular metric spaces by Khojasteh and Khandani in 2020 opens up new possibilities for topological and fixed point theory research. Unlike traditional metric spaces, these spaces eliminate the need for the triangle inequality, presenting fresh insights into fixed point results. Aniruddha Deshmukh and Dhananjay Gopal[2] explore the topology of non-triangular metric spaces by defining open sets in a natural way. Additionally, establish a fixed point theorem for Suzuki-type Z-contractions in this new context, introducing a novel property of mappings.

Savaliya, Jayesh and Gopal, Dhananjay and Moreno, Juan Martinez and Srivastava, Shailesh Kumar[7] address an open problem posed by Rhoades in 1988, which questions whether a contractive condition can ensure the existence of a fixed point without the requirement of continuity at that point. Building on the work of Bisht (2023), they provide a generalized result that offers a new solution to this problem. The findings are validated through several examples, further supporting the theoretical contributions of this work.

A Project Report
on

Higher-Order Iterative Methods for Finding Multiple Roots of Nonlinear Equations

Submitted in a final fulfillment of the requirements for the degree of
M.Sc. in MATHEMATICS

Under the Supervision of:
Dr. J.P. Jaiswal
(Associate Professor)

Submitted By:
SANJEEV KUMAR
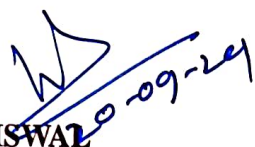M.Sc. IV Semester
Roll No.: 21075145
Enroll No.: GGV/21/05728

DEPARTMENT OF MATHEMATICS
GURU GHASIDAS VISHWAVIDYALAYA
Bilaspur (C.G.), India

CERTIFICATE

This is to certify that the project entitled **Higher-Order Iterative Methods for Finding Multiple Roots of Nonlinear Equations** submitted by **SANJEEV KUMAR** in the final fulfillment for the requirements for the award of **Master of Science Degree in Mathematics** at Department of Mathematics, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.) is an authentic work carried out by him under my supervision and guidance.

Date: _20/09/24_

Supervisor

Dr. J.P. JAISWAL
(Associate Professor)
Department of Mathematics

Prof. A.K. THAKUR
(Head of Department)
Department of Mathematics

1

ABSTRACT

Finding multiple zeros of nonlinear functions pose many difficulties for many of the iterative methods. A major difficulty in the application of iterative methods is the selection of initial guess such that neither guess is far from zero nor the derivative is small in the vicinity of the required root, otherwise the methods would fail miserably. Finding a criterion for choosing initial guess is quite cumbersome and therefore, more effective globally convergent algorithms for multiple roots are still needed. Therefore, the aim of this paper is to present an improved optimal class of higher-order methods having quartic convergence, permitting $f(x) = 0$ in the vicinity of the required root. The present approach of deriving this optimal class is based on weight function approach. All the methods considered here are found to be more effective and comparable to the similar robust methods available in literature

In this project, we propose and analyze higher-order iterative methods for finding multiple roots of nonlinear equations. Traditional methods, such as Newton's method, often converge linearly or quadratically to a simple root, but their performance can degrade when applied to multiple roots. To address this limitation, we introduce new iterative schemes that exhibit higher-order convergence for multiple roots.

The proposed methods are based on modifications of existing root-finding algorithms, incorporating multiplicity information to improve convergence rates. We derive the theoretical order of convergence for each method and provide a geometrical interpretation of the iterative steps. Additionally, we discuss the stability and efficiency of these methods in comparison to classical approaches.

Numerical experiments demonstrate the effectiveness of the new methods in terms of accuracy, convergence speed, and robustness when applied to a variety of nonlinear equations with known multiple roots. The results indicate that these higher-order methods offer significant improvements in scenarios where traditional methods are less effective.

A PROJECT ON

SEISMIC DATA ANALYSIS FOR EARTHQUAKE MAGNITUDE FORCASTING USING MACHINE LEARNING

SUBMITTED BY

SUBRAT SHEKHAR SAHOO
Roll No: 22075153

Under the supervision of

.Dr. BRIJENDRA PASWAN

Associate Professor, Department of Mathematics

DEPARTMENT OF MATHEMATICS

GURU GHASIDAS VISHWAVIDYALAYA

BILASPUR (C.G), INDIA

DEPARTMENT OF MATHEMATICS
GURU GHASIDAS VISHWAVIDYALAYA, Bilaspur (C.G)

(A Central university established by the Central Universities Act 2009 No. 25 0f 2009)

CERTIFICATE

This is to that the candidate SUBRAT SHEKHAR SAHOO of the Academic year 2023- 2024 is a bonafide student of the Department of Mathematics, GURU GHASIDAS VISHWAVIDYALAYA (A Central University), Koni, Bilaspur (C.G). The project work entitled "SEISMIC DATA ANALYSIS FOR EARTHQUAKE MAGNITUDE FORCASTING USING MACHINE LEARNING" is his original piece of work to the best of my knowledge, a project for the award of a Post-graduation Degree in GGV Koni, Bilaspur.

Date: 12.09.2024

Supervisor
Dr. BRIJENDRA PASWAN
(Assistant Professor)
Department of Mathematics

Prof. A.K. Thakur
Head of the Department of
Mathematics

विभागाध्यक्ष
Head
गणित विभाग
Department of Mathematics
गुरु घासीदास विश्वविद्यालय,
Guru Ghasidas Vishwavidyalaya
बिलासपुर (छ.ग.) 495009, भारत
Bilaspur (C.G.), 495009, India

Contents

A
Project Report
on
'SIGNAL PROCESSING AND ITS APPLICATION IN NOISE
CANCELLATION'

Submitted in Partial fulfilment of the requirement of the
degree of Master of Science

By

VIVEK RATRE

Enrolment Number- GGV/22/05750
Roll No.- 22075157

Supervisor

DR. SANTOSH VERMA

Assistant professor

G.G.V Bilaspur (C.G)

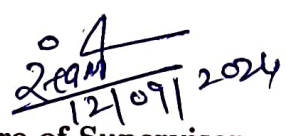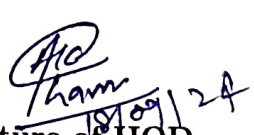

Department of Mathematics
GURU GHASIDAS VISHWAVIDYALAYA

2022-24

DEPARTMENT OF MATHEMATICS
GURU GHASIDAS UNIVERSITY , BILASPUR (C.G.) INDIA
A Central University Established by the Central University Act 2009

CERTIFICATE

This is to certify that the work described in the project entitled "SIG-NAL PROCESSING AND ITS APPLICATION IN NOISE CAN-CELLATION" submitted by **VIVEK RATRE** for the award of the degree of Master of Science in Mathematics by Department of Mathematics, **Guru Ghasidas Vishwavidyalaya, Koni, Bilaspur(C.G.)** was carried out by the candidate is his original piece of work to the best of my knowledge.

Signature of Supervisor
Dr. SANTOSH VERMA

Signature of HOD
Prof. A.K.Thakur

विभागाध्यक्ष
Head
गणित विभाग
Department of Mathematics
गुरु घासीदास विश्वविद्यालय,
बिलासपुर (छ.ग.) 495 009, भारत
Bilaspur (C.G.), 495 009, India

2

ABSTRACT

Signal processing is essential for effective noise cancellation, employing techniques to enhance signal clarity by reducing unwanted noise. Key methods include adaptive filtering, which adjusts in real-time to counteract noise, and spectral subtraction, which removes noise spectra from the signal. These techniques are widely used in telecommunications, audio engineering, and hearing aids, improving communication and audio quality. This abstract highlights the core signal processing techniques and their impact on noise reduction technologies.

A

Project on

fractional calculus of generalized M-series for exponential function

Submitted in Partial fulfilment of the requirement of the

degree of Master of Science

By

SUBHASH SONWANI

Roll No.- 22075152

Supervisor

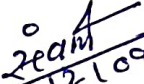## Dr.SANTOSH VERMA

Assistant professor
G.G.V Bilaspur(C.G)

Department of Mathematics
GURU GHASIDAS VISHWAVIDYALAYA
2022-24

DEPARTMENT OF MATHEMATICS
GURU GHASIDAS UNIVERSITY , BILASPUR (C.G.) INDIA
A Central University Established by the Central University Act 2009

CERTIFICATE

This is to certify that the work described in the project entitled
"fractional calculus of M-series for exponential function" submitted by
Subhash Sonwani for the award of the degree of Master of Science in Mathematics awarded by Department of Mathematics, **Guru Ghasidas Vishwavidyalaya, Koni, Bilaspur(C.G.)** was carried out by the candidate is her original piece of work to the best of my knowledge.

सन्तोष/12/09/2024

Signature of supervisor
Dr. Santosh Verma

Signature of HOD
Prof. A.K. Thakur

विभागाध्यक्ष
Head
गणित विभाग
Department of Mathematics
गुरु घासीदास विश्वविद्यालय,
Guru Ghasidas Vishwavidyalaya,
बिलासपुर (छ.ग.) 495009, भारत
495009, India

<u>ABSTRACT</u>

The present paper is to convert the M-series into M-series for exponential function, using fractional calculus.
This series is a particular case of H-function given by Inayat Hussain. The M-series is a powerful technique for solving the problems in a variety of fields such as in quantitative biology, scattering theory, signal processing and image processing etc.

A PROJECT

ON

DIFFERENTIATION AND INTEGRATION OF HYPERGEOMETRIC FUNCTION

Project submitted to GGV

For the award of the degree of

Master of Science

In

MATHEMATICS

By

RASHMI KHANDE

ROLL NO.-22075140

Under the supervision of
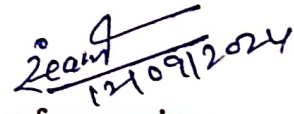
DR. SANTOSH VERMA

Assistant Professor , Department of Mathematics

DEPARTMENT OF MATHEMATICS

GURU GHASIDAS VISHWAVIDYALAYA

BILASPUR (C.G.), 495009, INDIA

CERTIFICATE

.

This is to certify that the work described in the project entitled "Differentiation and integration of Hypergeometric function"submitted by Rasmi Khande for the award of the degree of Master of Science in Mathematics by Department of Mathematics, **Guru Ghasidas Vishwavidyalaya, Koni, Bilaspur(C.G.)** was carried out by the candidate is his original piece of work to the best of my knowledge.

Signature of supervisor
Dr. SANTOSH VERMA

Signature of HOD
Prof. A.K. THAKUR
विभागाध्यक्ष
Head
गणित विभाग
Department of Mathematics
गुरु घासीदास विश्वविद्यालय,
Guru Ghasidas Vishwavidyalaya,
बिलासपुर (छ.ग.) 495009, भारत
Bilaspur (C.G.), 495009, India

1

ABSTRACT

This paper examines the differentiation of hypergeometric functions, focusing on the Gauss hypergeometric function $_2F_1(a, b; c; z)$ and its generalizations $_pF_q$. We explore differentiation with respect to variables and parameters using recurrence and transformation relations. The results provide essential tools for understanding the behavior of hypergeometric functions and their applications in various fields.

4

A PROJECT

ON

STATE WISE ANALYSIS OF COVID-19 IN INDIA

Project submitted to GGV

For the award of the degree of

Master of Science

In

MATHEMATICS

By

SANJEET KUMAR DAS

ROLL NO.-21075144

Under the supervision of

PROF. P. P. MURTHY

Professor , Department of Mathematics

DEPARTMENT OF MATHEMATICS

GURU GHASIDAS VISHWAVIDYALAYA

BILASPUR (C.G.), 495009, INDIA

DEPARTMENT OF MATHEMATICS

GURU GHASIDAS VISHWAVIDYALAYA, Bilaspur (C.G)

(A Central university established by the Central Universities Act 2009 No. 25 0f 2009)

CERTIFICATE

This is to that the candidate SANJEET KUMAR DAS of the Academic year 2023-2024 is a bonafide student of the Department of Mathematics, GURU GHASIDAS VISHWAVIDYALAYA (A Central University), Koni, Bilaspur (C.G). The project work entitled "STATE-WISE ANALYSIS OF COVID-19 IN INDIA" is his original piece of work to the best of my knowledge, a project for the award of a Post-graduation Degree in GGV Koni, Bilaspur.

Date: 12.09.2024

Supervisor

Prof. P. P. MURTHY

Department of Mathematics

Prof. A.K. THAKUR

(Head of Dept.)

Department of Mathematics

विभागाध्यक्ष
गणित विभाग
Department of Mathematics
गुरु घासीदास विश्वविद्यालय,
Guru Ghasidas Vishwavidyalaya,
बिलासपुर (छ.ग.) 495009, भारत
Bilaspur (C.G.) 495009, India

2

ABSTRACT

This project aims to analyze the impact of COVID-19 in India using the covid-19 india.csv dataset. This dataset includes information such as daily confirmed cases, deaths, recoveries, and vaccination rates, across Indian states and union territories.

A
Project on

'NUMERICAL INTEGRATION BY USING INTERPOLATION FORMULAS'

Submitted in project work for

the degree of

Master of Science

In

MATHEMATICS

submitted by

SORAJ CHANDRA PATEL
RollNo:22075151

Under the supervision of

Dr. J.P JAISWAL
ASSOCIATE PROFESSOR
Department of Mathematics

DEPARTMENT OF MATHEMATICS

GURU GHASIDAS VISHWAVIDYALAYA
BILASPUR(C.G),INDIA

CERTIFICATE

This is to certify that the project entitled " 'NUMERICAL INTEGRATION BY USING INTERPOLATION FORMULAS" submitted by **SORAJ CHANDRA PATEL** in the fulfilment for the requirements for the award of Master of Science Degree in Mathematics at department of Mathematics, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.) is an authentic work carried out by him under my supervision and guidance.

Date : ....

Supervisor

Dr. J.P JAISWAL
(Associate Professor)
Department of Mathematics

Dr. A.K THAKUR
(Head of deptt.)
Department of mathematics

NUMERICAL INTEGRATION BY USING

INTERPOLATION FORMULAS

Abstract

Numerical integration plays very important role in mathematics. In this research, overviews on the most common Numerical integration methods, namely, trapezoidal Simpson's1/ʳrule, Simpson's 1/ 8rule and Weddle's rule. Different procedures compared and tried to evaluate the value of some definite integrals. A combined approach of different integral rules has been proposed for a definite integral to get more accurate value for all cases. This paper describes classical quadrature method for the numerical solution by using polynomial with some interpolation formulas in numerical integration.

Keywords: Numerical integration; Classical quadrature formula; Trapezoidal rule; Simpson's 1/3 rule; Boole's rule; Weddle's rule.

A PROJECT

ON

A NEW RESULT ON EXTENDED INTERPOLATIVE HARDY-ROGERS TYPE F-CONTRACTION

Project submitted to GGV

For the award of the degree of

Master of Science

In

MATHEMATICS

By

DIVYANSH KHUNTE

ROLL NO.-22075120

Under the supervision of

DR. KOTI N.V.V. VARA PRASAD

Assistant Professor , Department of Mathematics

DEPARTMENT OF MATHEMATICS

GURU GHASIDAS VISHWAVIDYALAYA

BILASPUR (C.G.), 495009, INDIA

DEPARTMENT OF MATHEMATICS
GURU GHASIDAS VISHWAVIDYALAYA
BILASPUR(C.G.)-495009

CERTIFICATE

This is to certify that this project submitted by **Divyansh Khunte** entitled **"A New Result on Extended Interpolative Hardy-Rogers type F-contraction in complete metric space"** in fulfillment for the award of the degree of *Master of Science in Mathematics* at Department of Mathematics, Guru Ghasidas Vishwavidyalaya, Koni, Bilaspur(C.G.)495009,India. is a record of original project work carried out by him during the academic year 2022-2024 under my supervision.

The project has not formed the basis for the award of any degree , fellowship or other titles. I hereby confirm the originality of the work and that there is no plagiarism in any part of the dissertation.

Date :

Signature of Supervisor

Dr.Koti N.V.V.Vara Prasad
Assistant Professor
Department of Mathematics

Head of Department
Prof. A.K.Thakur
Professor
Department of Mathematics

2

ABSTRACT

The main objective of the project is to study an extended interpolative Hardy-Rogers type F-contraction in complete metric spaces. We establish several fixed point result for such mappings. Further we give an example and application to verify our main results.

A Project Report

On

RICCI FLOW AND FORMATION OF SINGULARITIES ON MANIFOLDS

Submitted in a partial fulfilment of the requirements
For the Degree of Master's of Science

In the School of Studies in Mathematical and Computational Sciences

UNDER THE SUPERVISION OF:

Dr. B.B. CHATURVEDI

ASSISTANT PROFESSOR

SUBMITTED BY:

RENUKA DEWANGAN

M.SC.IV SEMESTER

Roll no. - 22075142

Enroll.no. - GGV/22/05736

DEPARTMENT OF MATHEMATICS

GURU GHASIDAS VISHWAVIDHYALAYA,

BILASPUR(C.G.),495009

CERTIFICATE

This is to certify that the project entitled **RICCI FLOW AND FORMATION OF SINGULARITIES ON MANIFOLDS** submitted by **Renuka Dewangan** in partial fulfilment of the requirements for the award of Master's of Science degree in mathematics at Department of Mathematics, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.) is an authentic work carried out by him under my supervision and guidance.

Date: ....

Signature of Supervisor

Dr. B.B. Chaturvedi

Assistant Professor

Signature of HOD

Prof. A.K. Thakur

Associate Professor

Signature of Dean

Prof. P.P. Murthy

Associate Professor

Department of Mathematics

Abstract

This research project investigates the interplay between Ricci flow, singularities, and the geometric properties of the manifold $S^2 \times S^1$ in the context of black hole conditions. Ricci flow, introduced by Richard S. Hamilton and further developed by Grigori Perelman, serves as a powerful tool in Riemannian geometry, allowing for the analysis of the evolution of metrics on manifolds. Singularities in Ricci flow, particularly those arising in finite time, are crucial for understanding the geometric and topological transformations that occur under this flow.

We focus on the manifold $S^2 \times S^1$, which exhibits unique curvature characteristics that make it an interesting candidate for studying black hole-like behavior. By examining the Ricci flow on this manifold, we explore the conditions under which singularities form and their implications for the geometric structure. Our analysis highlights the relationship between curvature conditions and the manifestation of black hole properties, providing insights into the nature of singularities in this specific context.

Through a detailed exploration of both Type I and Type II singularities, we aim to elucidate the local and global behaviors of the Ricci flow on $S^2 \times S^1$. This study not only contributes to the theoretical understanding of Ricci flow and its singularities but also opens avenues for future research into the geometric implications of these phenomena in the areas of general relativity and cosmology. Ultimately, our findings underscore the significance of Ricci flow as a bridge between geometry and physics, particularly in the study of black holes and the evolution of the universe

Keywords: Geometric Structures, Geometric Evolution, Ricci flow, Ricci Solitons, Singularity, Black holes.

1

A

Project Report on

'AN EXTENSION OF (ψ, φ)-WEAKLY CONTRACTIVE MAPPINGS'

Submitted in the partial fulfillment of the requirement of the

degree of Master of Science in Mathematics

By

NEHA SHARMA

Roll No. - 22075129

Enrollment No. – GGV/22/05725

Supervisor

Mr. C. P. Dhuri

Department of Mathematics

Guru Ghasidas Vishwavidyalaya
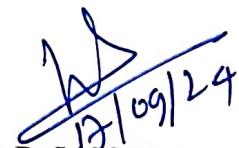
Koni, Bilaspur (C.G.), India, 495009

DEPARTMENT OF MATHEMATICS

GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G) INDIA

(A Central University Established by the Central University Act 2009)

CERTIFICATE

This is to certify that the project entitled *'AN EXTENSION OF (ψ,φ)-WEAKLY CONTRACTIVE MAPPINGS'* submitted by **Neha Sharma** in the partial fulfillment for the requirements for the award of Master of Science Degree in Mathematics at Department of Mathematics, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.) 495009, is a Project work carried out by her under my supervision and guidance.

H.O. D.

Prof. A.K.THAKUR

Date:

Supervisor

Mr. C. P. Dhuri

(Assistance Professor)

Contents

A Project Report on

ITERATIVE METHODS THROUGH NONLINEAR SYSTEM

(DERIVATIVE FREE)

Submited in the partial fulfilment of requirment for the award of

the Degree of

M. sc. in Mathematics

SUBMITED BY

DIBYANSU SEKHAR DASH

Enrollment No: GGV/19/5237

Roll No: 22075117

UNDER THE SUPERVISION OF

Dr. J. P. JAISWAL

ASSOCIATE PROFESSOR

DEPARTMENT OF MATHEMATICS

(DST-FIST SPONSORED)

GURU GHASIDAS VISHWAVIDYALAYA BILASPUR

CHHATTISGARH-495009

DEPARTMENT OF MATHEMATICS
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G) INDIA
(A Central University Established by the Central University Act 2009)

CERTIFICATE

This is to certify that the project entitled '**ITERATIVE METHOD THROUGH NONLINEAR SYSTEM (DERIVATIVE FREE)**' submitted by Dibyansu Sekhar Dash in the partial fulfilment for the requirements for the award of Master of Science Degree in Mathematics at Department of Mathematics, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.), is an authentic work carried out by him under my supervision and guidance.
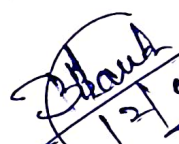
Prof. A.K. THAKUR

(HEAD OF DEPARTMENT)

विभागाध्यक्ष
Head
गणित विभाग
Department of Mathematics
गुरु घासीदास विश्वविद्यालय,
बिलासपुर (छ.ग.) 495009, भारत
(C.G.), India

Dr. J. P. JAISWAL

ASSOCIATE PROFESSOR

(SUPERVISOR)

DATE.................

Abstract

Derivative free iterative method for nonlinear systems is a class of numerical algorithms used to find the roots of a given system of nonlinear equations. The approach of derivative free iterative methods involves iteratively approximating the roots by the derivative free methods. The process is repeated until a sufficiently accurate root is obtained. We studied a family of fourth order and seventh order derivative free iterative methods. This family of derivative free method is more efficient for large systems.

A Project on

RICCI PSEUDO-SYMMETRIC SUPER QUASI-EINSTEIN

HERMITIAN MANIFOLDS

MASTER OF SCIENCS

IN

MATHEMATICS

BY

VINAYAK PATEL

Enrollment No: GGV/22/05749

Roll No: 22075156

UNDER THE SUPERVISION OF

Dr. B. B. CHATURVEDI

ASSISTANT PROFESSOR

DEPARTMENT OF MATHEMATICS

GURU GHASIDAS VISHWAVIDYALAYA BILASPUR

CHATTISHGARH-495009

DEPARTMENT OF MATHEMATICS GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G) INDIA (A Central University Established by the Central University Act 2009)

CERTIFICATE

This is to certify that the project entitled '**Ricci pseudo symmetric super quasi Eisntein hermitian manifold**' submitted by **vinayak patel** in the partial fulfilment for the requirements for the award of Master of Science Degree in Mathematics at Department of Mathematics, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.), is an authentic work carried out by him under my supervision and guidance.

Prof. A.K. THAKUR

(HEAD OF DEPARTMENT)

विभागाध्यक्ष
Head
गणित विभाग
Department of Mathematics
गुरु घासीदास विश्वविद्यालय,
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बिलासपुर (छ.ग.) 495009, भारत
Bilaspur (C.G.) 495009, India

Dr. B.B. Chaturvedi

ASSISTANT PROFESSOR

(SUPERVISOR)

Contents

A Project Report on

A STUDY OF PROBLEM OF COINCIDENCE POINT OF TWO MAPPINGS ON A HILBERT SPACE

Submitted in the partial fulfilment of the requirement for the award of
the degree of
Master of Science in Mathematics
by

RUPESH CHANDRA

Roll no: 22075144
Enrollment no: GGV/22/05738

Under the supervision of
Mr. C.P. DHURI
(ASSISTANT PROFESSOR)

DEPARTMENT OF MATHEMATICS

[DST-FIST sponsored]

GURU GHASIDAS VISHWAVIDALAYA, BILASPUR
CHHATTISGARH – 495009

CERTIFICATE

This is to certify that the project entitled *'A STUDY OF PROBLEM OF COINCIDENCE POINT OF TWO MAPPINGS ON A HILBERT SPACE'* submitted by **Rupesh Chandra** in the partial fulfilment for the requirements for the award of Master of Science Degree in Mathematics at Department of Mathematics, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.), is an authentic work carried out by him under my supervision and guidance.

Prof. A. K. THAKUR
HEAD OF DEPARTMENT
DATE:

विभागाध्यक्ष
Head
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विलासपुर (छ.ग.) 495009, भारत
Bilaspur (C.G.), 495009, India

Mr. C. P. DHURI
ASSISTANT PROFESSOR
DATE:

Table of Contents

Guru Ghasidas Vishwavidyalaya Bilaspur

(A CENTRAL UNIVERSITY KONI , BILASPUR 495009, INDIA)

DEPARTMENT OF PURE AND APPLIED MATHEMATICS

M.Sc. 4th Sem.

PROJECT PHASE-II

2023 – 2024

CALCULATING AN OPTIMIZATION OF GEODESIC DOMES

STRUCTURE THROUGH PARAMETRIC MODLING

UNDER THE SUPERVISION OF

DR. B.B.CHATURVEDI

(ASSISTANT PROFESSOR)

SUBMITTED BY

LAXMIKANT MAHESH

ROLL NO.- 22075124

ENROL. NO. – GGV/22/05720

CERTIFICATE

This is to certify that the work described in the project entitled "Calculating an optimization of geodesic domes structure through parametric modeling" submitted by **Laxmikant mahesh** for the award of the degree of Master of Science in Mathematics awarded by Department of Mathematics,**Guru Ghasidas Vishwavidyalaya, Koni, Bilaspur(C.G.)** was carried out by the candidate is her original piece of work to the best of my knowledge.

Signature of supervisor
Dr. B.B. Chaturvedi

Signature of HOD
Prof. A.K. Thakur

Contents

A PROJECT REPORT

ON

ITERATIVE METHODS THROUGH INVERSE INTERPOLATION

FOR THE DEGREE OF

M.Sc. in MATHEMATICS

SUBMITTED

BY

NEHA CHAUHAN
Roll.No.-2207528
Enroll. No.-GGV/22/05724

UNDER THE SUPERVISION OF

Dr. JAI PRAKASH JAISWAL

ASSOCIATE PROFESSOR

Department of Mathematics
(DST-FIST Sponsored)

Guru Ghasidas Vishwavidyalaya

Bilaspur(Koni) C.G. - 495009

CERTIFICATE

This is to certify that the project entitled **ITERATIVE METHODS THROUGH INVERSE INTERPOLATION** submitted by **NEHA CHAUHAN** in partial fulfillment of the requirements for the award of the Master of Science Degree in Mathematics, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.) is an authentic work carried out by her under my supervision and guidance.

Place: Guru Ghasidas Vishwavidyalaya
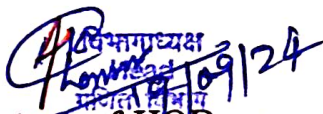**Date:** September 10, 2024

Signature of Supervisor
Dr. J. P. Jaiswal
Associate Professor
Department of Mathematics
Guru Ghasidas Vishwavidyalaya

Signature of HOD
Prof. A. K. Thakur
Professor
Department of Mathematics
Guru Ghasidas Vishwavidyalaya

ABSTRACT

Iterative methods through inverse interpolation are a class of numerical algorithms used to find the roots of a given function. The approach involves iteratively approximating the location of a root by interpolating between two known points and computing the inverse of the resulting interpolated function at a given value. The process is repeated until a sufficiently accurate root is obtained. Inverse interpolation methods have several advantages over other numerical methods, including their ability to converge rapidly and their ability to handle functions with multiple roots. In this project, we provide an overview of iterative methods through inverse interpolation.

A Project Report

On

FUZZY CLUSTERING:TECHNIQUES AND APPLICATION

Submitted in a partial fulfilment of the requirements

for the award of degree in

MASTER OF SCIENCE MATHEMATICS

DEPARTMENT OF MATHEMATICS

(DST-FIST Sponsored)

GURU GHASIDAS VISHWAVIDYALAYA KONI

BILASPUR (C.G) , 495009

UNDER THE SUPERVISION OF

PROF. A.S. RANADIVE

SUBMITTED BY

AMAN MALAKAR

MSc IV SEM

ROLL NO-22075104

CERTIFICATE

This is to certify that the work described in the project entitled "**Fuzzy Clustering Techniques&Applications**" submitted by **Aman Malakar** for the award of the degree of Master of Science in Mathematics by Department of Mathematics, **Guru Ghasidas Vishwavidyalaya, Koni, Bilaspur(C.G.)** was carried out by the candidate is him original piece of work to the best of my knowledge.

Signature of supervisor
Prof. A. S. Ranadive

Signature of HOD
Prof. A. K. Thakur

विभागाध्यक्ष
Head
गणित विभाग
Department of Mathematics
गुरू घासीदास विश्वविद्यालय,
Guru Ghasidas Vishwavidyalaya,
बिलासपुर (छ.ग.) 495009, भारत
Bilaspur (C.G.), 495009, India

ABSTRACT

Fuzzy clustering is a form of unsupervised learning, which allows for data points to belong to more than one cluster, unlike traditional clustering methods. This technique provides flexibility and a more realistic model for complex data sets, especially in areas where precise classifications are difficult or where overlap between categories is natural.

The aim of this dissertation is to explore various fuzzy clustering algorithms, such as Fuzzy C-Means (FCM), Possibilistic Clustering, and others, focusing on their theoretical foundation and practical applicability. Additionally, this study will highlight the implementation of these techniques in fields such as medical diagnosis, image processing, pattern recognition, and market segmentation. By evaluating the performance of fuzzy clustering methods in real-world datasets, the dissertation will assess their strengths, limitations, and areas for future research.

Fuzzy Groups

Project Report Submitted
by
Ananda Meher
(M.Sc.)

Under the Supervision of

Dr. Uma Devi Patel
Department of Mathematics
Guru Ghasidas Vishwavidyalaya
Bilaspur (C. G.)

CERTIFICATE

This is to certify that the project entitled **"FUZZY GROUPS"** submitted by **ANANDA MEHER** in the partial fulfilment for the requirements for the award of Master of Science Degree in Mathematics at department of Mathematics, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.) is an authentic work carried out by her under my supervision and guidance.

Date: ....

Supervisor. 10/9/24

DR. UMA DEVI PATEL

(Assistant Professor)

Department of Mathematics

DR. A. K. THAKUR

(Professor)

(Head of Deptt.)

Department of Mathematics

Head
Department of Mathematics
Guru Ghasidas Vishwavidyalaya,
Bilaspur (C.G.) 495009, India

1 ABSTRACT

the theory of fuzzy groups, an extension of classical group theory where elements can belong to a group with varying degrees of membership. By integrating fuzzy set theory, fuzzy groups address scenarios involving uncertainty, imprecision, and gradations of membership, which are common in real-world systems. Central concepts like fuzzy subgroups, fuzzy normal subgroups, and fuzzy homomorphisms are examined in detail, highlighting their role in extending the traditional algebraic properties of groups into the fuzzy domain.

A significant focus of the thesis is on the translation of fuzzy groups. This process involves the mapping of fuzzy group elements and their associated membership functions between different domains or contexts while preserving their group-theoretic properties. Translation of fuzzy groups enables the application of fuzzy group theory across diverse fields, adapting it to specific problem domains such as control systems, decision-making frameworks, and pattern recognition.

Applications of fuzzy groups and their translations are presented in various areas, including artificial intelligence, robotics, image processing, and expert systems. These applications demonstrate the utility of fuzzy groups in handling uncertainty, managing incomplete data, and improving decision-making processes in complex environments. The thesis also provides case studies where fuzzy groups and their translations are used to model and analyze real-world problems, emphasizing their importance in fields like neural networks, system modeling, and intelligent control systems.

This research contributes to the growing body of knowledge on fuzzy group theory by formalizing the translation process and demonstrating its practical utility across several domains. It aims to extend the theoretical foundation and present a flexible framework for the application of fuzzy groups in environments where traditional binary group structures are insufficient.

A Project Report

on

FUZZY RELATION

Submitted in a partial fulfillment of the requirement for the degree of

M.SC. in MATHEMATICS

UNDER THE SUPERVISION OF:

Dr. UMA DEVI PATEL
(ASSISTANT PROFESSOR)

SUBMITTED BY:

ARINA KUJUR
M.SC. IV SEMESTER
ROLL NO. - 22075110
ENROLLMENT NO.-
GGV/22/05708

DEPARTMENT OF MATHEMATICS

(DST-FIST SPONSORED)

GURU GHASIDAS VISHWAVIDYALAYA

BILASPUR (C.G), INDIA

CERTIFICATE

This is to certify that the project entitled **"FUZZY RELATION"** submitted by **ARINA KUJUR** in the partial fulfilment for the requirements for the award of Master of Science Degree in Mathematics at department of Mathematics, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.) is an authentic work carried out by her under my supervision and guidance.

Date: ....

Supervisor.

DR. UMA DEVI PATEL

(Assistant Professor)

Department of Mathematics

DR. A. K. THAKUR

(Professor)

(Head of Deptt.)

Department of Mathematics

Content:-

A Project(Phase-II) Report

on

PRIMITIVE OF SECOND KIND LINEAR VOLTERRA INTEGRAL EQUATION USING SHEHU TRANSFORM

Submitted in Partial fulfilment of the requirement of the degree

M.SC. in MATHEMATICS

DEPARTMENT OF MATHEMATICS
GURU GHASIDAS UNIVERSITY , BILASPUR (C.G.) INDIA
A Central University Established by the Central University Act 2009

SANGEETA SINGH

Roll No.- 22075146

Supervisor

Mr. HAPKA SURENDRA

Assistant professor
G.G.V Bilaspur(C.G)

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CERTIFICATE

This is to certify that the project entitled **PRIMITIVE OF SECOND KIND LINEAR VOLTERRA INTEGRAL EQUATION USING SHEHU TRANSFORM** submitted by **SANGEETA SINGH** in the partial fulfilment for the requirements for the award of Master of Science Degree in Mathematics at department of Mathematics, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G) is an authentic work carried out by him under my supervision and guidance.

Date :...........

Supervisor

Mr.HAPKA SURENDRA

(Assistant Professor)

Department of Mathematics

17/09/24

DR.A.K.THAKUR

(Head of Deptt.)
Department of Mathematics

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ABSTRACT

Integral equations are fundamental in various scientific and engineering disciplines, providing essential frameworks for modeling complex phenomena involving unknown functions and their integrals. This study offers a comprehensive examination of integral equations, with a focus on their theoretical underpinnings, solution methodologies, and practical applications. We explore both linear and nonlinear integral equations, including Fredholm and Volterra types, and discuss classical and modern techniques for solving them, such as analytical methods, numerical algorithms, and iterative approaches. The study highlights key issues such as existence, uniqueness, and stability of solutions, and examines their implications for real-world problems in fields like physics, engineering, and applied mathematics.

Primitive of second kind linear Volterra integral equation using Shehu transform. In this work, authors have considered that the kernel of second kind linear Volterra integral equation is a convolution type kernel. Some numerical problems have been considered and solved with the help of Shehu transform for explaining the complete methodology. Results of numerical problems show that Shehu transform is very effective integral transform for determining the primitive of second kind linear Volterra integral equation.

A Project(Phase-II) Report

on

ITERATIVE METHODS FOR SOLVING NONLINEAR EQUATION:A GEOMETRICAL APPROACH

Submitted in Partial fulfilment of the requirement of the degree

M.SC. in MATHEMATICS

DEPARTMENT OF MATHEMATICS
GURU GHASIDAS UNIVERSITY , BILASPUR (C.G.) INDIA
A Central University Established by the Central University Act 2009

ANURAG SINGH

Roll No.- 22075108

Supervisor

Dr.J.P.JAISWAL

Associate professor
G.G.V Bilaspur(C.G)

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CERTIFICATE

This is to certify that the project entitled **ITERATIVE METHODS FOR SOLVING NONLINEAR EQUATION: A GEOMETRICAL APPROACH** submitted by **ANURAG SINGH** in partial fulfillment of the requirements for the award of the Master of Science Degree in Mathematics, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.) is an authentic work carried out by her under my supervision and guidance.

Place: Guru Ghasidas Vishwavidyalaya
Date: September 10, 2024

Signature of Supervisor
Dr. J. P. Jaiswal
Associate Professor
Department of Mathematics
Guru Ghasidas Vishwavidyalaya

Signature of HOD
Prof. A. K. Thakur
Professor
Department of Mathematics
Guru Ghasidas Vishwavidyalaya

ABSTRACT

In this project, our main to present an iterative method to solving non-linear equation through geometrical approaches. We present some new third order iterative methods for findin a simple root α of a non-scalar equation $f(x) = 0$ in R.

A geometric approch basch based on the circle of curvature is used to construct the new method.

And we present a geometrical interpretation of several iterative methods to solve a nonlinear scalar equation.

We consider a geometric construction for improving the order of convergence of iterative formulas of order two.

We present another simple way deriving several iterative methods for solving nonlinear equations numerically. The presented approach of deriving these methods is based on exponentially fitted osculating straight line.

A PROJECT REPORT ON

FUZZY LOGIC CONTROL SYSTEM AND IT'S APPLICATION

submitted in partial fulfilment of the requirements of the degree of

Master of Science in Mathematics

UNDER THE SUPERVISION OF

PROF. A.S. RANADIVE

(PROFESSOR)

SUBMITTED BY

SHREYA VISHWAKARMA

(ROLL NO. 22075147)

DEPARTMENT OF MATHEMATICS

GURU GHASIDAS VISHWAVIDYALAYA

BILASPUR (C.G.), INDIA

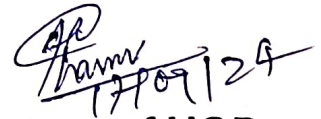(A CENTRAL UNIVERSITY)

SEPTEMBER 2024

CERTIFICATE

This is to certify that the project report entitled **"Fuzzy Logic control system and it's application"** submitted by **Shreya Vishwakarma** for the award of the degree of Master of Science in Mathematics by Department of Mathematics, **Guru Ghasidas Vishwavidyalaya, Koni, Bilaspur(C.G.)** was carried out by the candidate is her original piece of work to the best of my knowledge.

Signature of supervisor

Prof. A.S.Ranadive

Signature of HOD

Prof. A.K.Thakur

विभागाध्यक्ष
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Guru Ghasidas Vishwavidyalaya,
बिलासपुर (छ.ग.) 495009, भारत
Bilaspur (C.G.), 495009, India

ABSTRACT

The concept of fuzzy logic is based near the human thinking and natural activities. Fuzzy logic enables designers to control complex systems more effectively than traditional approaches. As it provides a simple way to arrive at definite conclusion upon ambiguous, imprecise or noisy information. We have proposed the design of fuzzy logic controller having three inputs to give correct wash time of washing machine. The objective is to save lot of time, electricity and water for washing the cloth. The procedure that can be used to get a suitable washing time for different cloths. The process is based entirely on the principle of taking non-precise inputs from the sensors subjecting them to fuzzy arithmetic and obtaining a crisp value of washing time.

A PROJECT (PHASE – II) ON

ANALYSIS OF EMPLOYEE ATTRITION DATASET

Submitted by
SHRUTI GUPTA
Roll No. 22075149

M.Sc. 4th Semester

Under the guidance of

Professor P. P. Murthy

Session 2023-24

Department of Mathematics
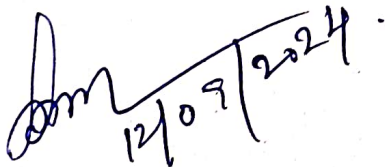
Guru Ghasidas Vishwavidyalaya , Bilaspur , Chhattisgarh 495009

CERTIFICATE

This is to certify that the project entitled **ANALYSIS OF EMPLOYEE ATTRITION DATASET** submitted by **SHRUTI GUPTA** in the partial fulfillment for the requirements for the award of Master of Science Degree in Mathematics at department of Mathematics , Guru Ghasidas Vishwavidyalaya , Bilaspur (C.G.) is an authentic work carried out by her under my supervision and guidance .

Date : 17/09/2024

Supervisor
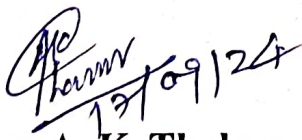
Professor P. P. Murthy

(Professor)

Department of Mathematics

Professor A. K. Thakur

(Head of Department)

Department of Mathematics

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A PROJECT (PHASE-II) REPORT ON

"HUNTING COOPERATION AND ALLEE EFFECTS IN PREDATORS"

Submitted in a partial fulfilment of the requirements for the degree of

M.Sc. in MATHEMATICS

SESSION- 2023-24

DEPARTMENT OF MATHEMATICS

GURU GHASIDAS VISHWAVIDYALAYA, KONI, BILASPUR (C.G.)

GUIDED BY:

DR. MANISH KUMAR GUPTA

PRESENTED BY:

SHRUTI GUPTA

ROLL NO. 22075148

ENROLL.NO.- GGV/22/05741

M.Sc. MATHEMATICS IV SEMESTER

CERTIFICATE

This is to certify that the project entitled " **HUNTING COOPERATION AND ALLEE EFFECTS IN PREDATORS"** submitted by **SHRUTI GUPTA** in the partial fulfillment for the requirements for the award of Master of Science Degree in Mathematics at department of Mathematics , Guru Ghasidas Vishwavidyalaya , Bilaspur (C.G.) is an authentic work carried out by him under my supervision and guidance .
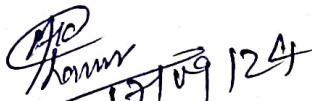
Date : .1.7.[09/.2024

Supervisor

DR. MANISH KUMAR GUPTA

(Assistant Professor)

Department of Mathematics

Professor A. K. Thakur

(Head of Department)

Department of Mathematics

CONTENT

A Project (Phase-II) Report
On

IMPACT OF FEAR ROLE IN SEARCHING EFFICIENCY IN A TWO SPECIES LOTKA- VOLTERRA MODEL WITH A WEAK ALLEE EFFECT

Submitted in a partial fulfilment of the requirements for the degree of

M.SC. in MATHEMATICS

UNDER THE SUPERVISION OF: -

DR. MANISH KUMAR GUPTA
(Assistant Professor)

SUBMITTED BY: -

RASHMI PATEL

M.SC. IV SEM

ROLL NO: -22075141

Department of Mathematics
Guru Ghasidas Vishwavidyalaya
Bilaspur, Chhattisgarh, 495009

CERTIFICATE

This is to certify that the project entitled **IMPACT OF FEAR ROLE IN SEARCHING EFFICIENCY IN A TWO SPECIES LOTKA-VOLTERRA MODEL WITH A WEAK ALLEE EFFECT** submitted by **RASHMI PATEL**in the partial fulfillment for the requirements for the award of Master of Science Degree in Mathematics at department of Mathematics , Guru Ghasidas Vishwavidyalaya , Bilaspur (C.G.) is an authentic work carried out by him under my supervision and guidance .

Date : 17.9.2024

Supervisor

Dr. M. K. Gupta

(Assistant Professor)

Department of Mathematics

Professor A. K. Thakur

(Head of Department)

Department of Mathematics

<u>CONTENT</u>