

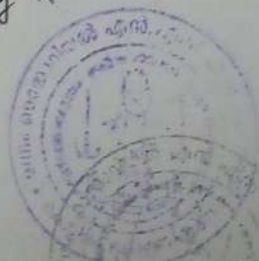
Group	Reg: No	Name of Students	Title of Project & Supervising Faculty
I	23020116001 23020116002 23020116029 23020116037 23020116044	Abhilekshmi B.G. Navaneetha A.S. Arjun O.S. Krishnapriya B Veni Vinod	"SOLAR MOBILE CHARGER"  - Dr. Ratheesh Kumar V
II	23020116002 23020116011 23020116022 23020116030 23020116038	Adersh R.G. Prajith P Adithya V. Dev Aromal J.C. Krishnendu I	"OBJECT DETECTION USING ULTRASONIC SENSOR"  - Dr Smitha S.L.  <i>Smitha</i>
III	23020116003 23020116012 23020116020 23020116031 23020116039	Adithya A.S. Haix Pranav V Adarsh M Athira A.S. Lekshmi Chandran	"DETERMINATION OF TRACKS SPACING ON CDS USING He-Ne LASER"  - Ms. Resmi V.S.  <i>Resmi</i>
IV	23020116004 23020116013 23020116023 23020116032 23020116040	Ashish Chandran Shibin C. Ajaylal M. Devika R.S. Pooja R.	"THERMISTOR CHARACTERISTICS"  - Ms. Anusha M.G.

Signature of HoD

DEPARTMENT OF PHYSICS  
M. M. N. S. S. COLLEGE  
KOTTIYAM

Signature of Principal  
M. M. N. S. S. COLLEGE  
KOTTIYAM

Group	Reg No	Name of students	Title of project and supervising faculty.
V	23020116005 23020116016 23020116024 23020116033 23020116041	Ganesh A.N. Vighnesh Ramachandran Akshaya Krishnan Devika S. Rashida A.	"SURFACE TENSION - JAEGER'S METHOD" -Dr. Suthertha S. Nair
VI	23020116006 23020116015 23020116025 23020116036 23020116042	Gopikrishnan A Thushara L Amina R Kisandharan Y Rifana Hassan S.	"OP AMP FILTERS" -Mr. Nair G. Krishnaprasad
VII	23020116007 23020116014 23020116026 23020116035 23020116043	Gouri Raj Thanima A Aranthakrishnan P.S. Tisha Chandran S. Sai Krishna L.S	"TOUCH SENSOR" -Dr. Prabitha B. Nair
VIII	23020116008 23020116027 23020116034	Lekshmi S. Kurup Anil Sankar Gayathri R.	"LASER SECURITY ALARM" - Dr. Suthertha S. Nair
IX	23020116009 23020116018 23020116028	Nandana L. Abhijith G.B. Arathy R	"DETERMINATION OF PLANCK'S CONSTANT" - Dr. Prabitha B. Nair





# DETERMINATION OF PLANK'S CONSTANT

Project Report

submitted in partial fulfillment towards the requirement for the  
Award of Bachelor of Science Degree in Physics.

Submitted by

- **NANDANA L** 23020116009
- **ABHIJITH G B** 23020116018
- **ARATHY R** 23020116028



POST GRADUATE DEPARTMENT OF PHYSICS,  
MMNSS COLLEGE, KOTTIYAM, KOLLAM.  
(AFFILIATED TO UNIVERSITY OF KERALA)  
(2020 - 2023)



*Signature*  
DEPARTMENT OF PHYSICS  
M M. N. S. S. COLLEGE  
KOTTIYAM

# CERTIFICATE



This is to certify that the project report entitled "DETERMINATION OF PLANCK'S CONSTANT" is a bonafide record of the work carried by

NANDANA L

23020116009

ABHIJITH G B

23020116018

ARATHY R

23020116028

, Final year B. Sc. Student, MMNSS College, Kottiyam, in partial fulfillment for the award of Bachelor of Science Degree in Physics of Kerala University.

Project Guide

Dr Prabitha B Nair



DEPARTMENT OF PHYSICS  
Head of  
M. M. N. S. S. COLLEGE  
KOTTIYAM.

Sutheertha S. Nair

Examiners

1.

2.

# THERMISTOR CHARACTERISTICS

## Project Report

submitted in partial fulfillment towards the requirement for the  
Award of Bachelor of Science Degree in Physics.

Submitted by

- SHIBIN.C 23020116013
- DEVIKA.R.S 23020116032
- AJAYLAL.M 23020116023
- ASHISH CHANDRAN 23020116004
- POOJA.R 23020116013



POST GRADUATE DEPARTMENT OF PHYSICS,  
MMNSS COLLEGE, KOTTIYAM, KOLLAM.  
(AFFILIATED TO UNIVERSITY OF KERALA)  
(2020 - 2023)



*Sutheshan*  
DEPARTMENT OF PHYSICS  
M. M. N. S. S. COLLEGE  
KOTTIYAM



# CERTIFICATE



This is to certify that the project report entitled "THERMISTOR CHARACTERISTICS" is a bonafide record of the work carried by

- SHIBIN.C (Candidate Code : 23020116013)
- DEVIKA.R.S (Candidate Code : 23020116032)
- AJAYLAL.M (Candidate Code : 23020116023)
- ASISH CHANDRAN (Candidate Code : 23020116004)
- POOJA.R (Candidate Code : 23020116040)

, Final year B. Sc. Student, MMNSS College, Kottiyam, in partial fulfillment for the award of Bachelor of Science Degree in Physics of Kerala University.

Project Guide  
Smt. ANUSHA M.G



Head of Department  
Dr. Sutheertha S. Nair

## Examiners

1.

2.

# DETERMINATION OF TRACKS SPACING ON CDs USING He -Ne LASER

Project work submitted in the partial fulfillment of the requirements for the  
degree of B.Sc. Physics.

Submitted by

ADARSH M	REG NO; 23020116020
ADITHYA.A.S.NAIR	REG NO; 23020116003
ATHIRA.A.S	REG NO; 23020116031
LEKSHMI CHANDRAN	REG NO; 23020116039
PRANAV V	REG NO; 23020116012

Under the supervision of

RESMI V.S

DEPARTMENT OF PHYSICS



MMNSS COLLEGE

KOTTIYAM

2020-2023

*Sathya*  
DEPARTMENT OF PHYSICS  
M. M. N. S. S. COLLEGE  
KOTTIYAM.

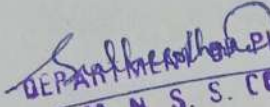


## CERTIFICATE

This is to certify that the project entitled “**DETERMINATION OF TRACKS SPACING ON CDs USING He-Ne LASER**” was done by

- ADARSH M  
REG NO; 23020116020
- ADITHYA.A.S. NAIR  
REG NO; 23020116003
- ATHIRA.A.S  
REG NO ; 23020116031
- LEKSHMI CHANDRAN  
REG NO; 23020116039
- PRANAV V  
REG NO; 23020116012

at MMNSS COLLEGE, Kottiyam in partial fulfillment of the graduation of science in physics during the year 2020-23.

  
DEPARTMENT OF PHYSICS  
M. N. S. S. COLLEGE  
Dr. SUDHEERTHA S L

HEAD OF THE DEPARTMENT



  
Smt. RESMI V.S

Supervising Teacher

ASST.PROFESSOR

Valued by examiners ;

1.

2.



# SOLAR MOBILE CHARGER

## Project Report

submitted in partial fulfillment towards the requirement for the  
Award of Bachelor of Science Degree in Physics.

Submitted by

- ABHILEKSHMI B G 23020116001
- NAVANEETHA A S 23020116010
- ARJUN O S 23020116029
- KRISHNAPRIYA B 23020116037
- VENI VINOD 23020116044



POST GRADUATE DEPARTMENT OF PHYSICS,  
MMNSS COLLEGE, KOTTIYAM, KOLLAM.  
(AFFILIATED TO UNIVERSITY OF KERALA)  
(2020 - 2023)



*Subscribed*  
DEPARTMENT OF PHYSICS,  
M. M. N. S. S. COLLEGE  
KOTTIYAM.

# CERTIFICATE



This is to certify that the project report entitled "SOLAR MOBILE CHARGER" is a bonafide record of the work carried by

- ABHILEKSHMI B G 23020116001
- NAVANEETHA A S 23020116010
- ARJUN O S 23020116029
- KRISHNAPRIYA B 23020116037
- VENI VINOD 23020116044

, Final year B. Sc. Student, MMNSS College, Kottiyam, in partial fulfillment for the award of Bachelor of Science Degree in Physics of Kerala University.

Project Guide  
Dr Ratheesh Kumar V



DEPARTMENT OF PHYSICS  
Head of N. S. S. COLLEGE  
KOTTIYAM

Department  
Sutheertha S. Nair

Examiners

1.

2.

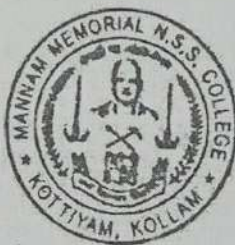
# **SURFACE TENSION - JAEGER'S METHOD**

## **Project Report**

submitted in partial fulfillment towards the requirement for the  
Award of Bachelor of Science Degree in Physics.

### **Submitted by**

- **GANESH A N** 23020116005
- **VIGHNESH RAMACHANDRAN** 23020116016
- **AKSHAYA KRISHNAN** 23020116024
- **DEVIKA S** 23020116033
- **RASHIDA A** 23020116041



**POST GRADUATE DEPARTMENT OF PHYSICS,  
MMNSS COLLEGE, KOTTIYAM, KOLLAM.  
(AFFILIATED TO UNIVERSITY OF KERALA)  
(2020 - 2023)**



*Sutheshan*  
**DEPARTMENT OF PHYSICS  
M. M. N. S. S. COLLEGE  
KOTTIYAM.**



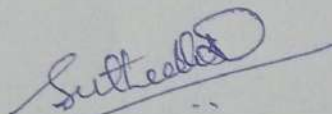
## CERTIFICATE



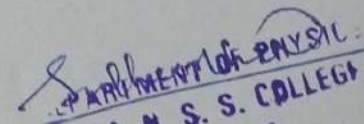
This is to certify that the project report entitled "SURFACE TENSION- JAEGER'S METHOD" is a bonafide record of the work carried by

- |                         |             |
|-------------------------|-------------|
| • GANESH A N            | 23020116005 |
| • VIGHNESH RAMACHANDRAN | 23020116016 |
| • AKSHAYA KRISHNAN      | 23020116024 |
| • DEVIKA S              | 23020116033 |
| • RASHIDA A             | 23020116041 |

, Final year B. Sc. Student, MMNSS College, Kottiyam, in partial fulfillment for the award of Bachelor of Science Degree in Physics of Kerala University.

  
Project Guide  
Dr Sutheertha S Nair



  
Head of Department  
Department  
Sutheertha S. Nair

Examiners

1.

2.

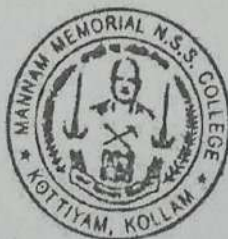
# DETERMINATION OF TRACKS SPACING ON CD'S USING He-Ne LASER

Project Report

submitted in partial fulfillment towards the requirement for the  
Award of Bachelor of Science Degree in Physics.

Submitted by

- ADITHYA A S NAIR 23020116003
- PRANAV V 23020116012
- ADARSH M 23020116020
- ATHIRA A S 23020116031
- LEKSHMI CHANDRAN 23020116039



POST GRADUATE DEPARTMENT OF PHYSICS,  
MMNSS COLLEGE, KOTTIYAM, KOLLAM.  
(AFFILIATED TO UNIVERSITY OF KERALA)  
(2020 - 2023)



*Suthenthakal*  
DEPARTMENT OF PHYSICS,  
M. M. N. S. S. COLLEGE  
KOTTIYAM.

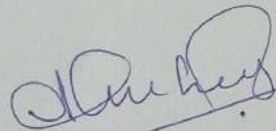
# CERTIFICATE



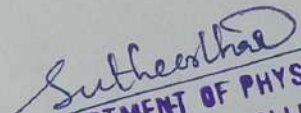
This is to certify that the project report entitled "Determination of Track Spacing on CDs using He Ne laser" is a bonafide record of the work carried by

- ADITHYA A S NAIR 23020116003
- PRANAV V 23020116012
- ADARSH M 23020116020
- ATHIRA A S 23020116031
- LEKSHMI CHANDRAN 23020116039

, Final year B. Sc. Student, MMNSS College, Kottiyam, in partial fulfillment for the award of Bachelor of Science Degree in Physics of Kerala University.

  
Project Guide  
Ms ANUSHA M G



  
DEPARTMENT OF PHYSICS  
HOD for N. S. S. COLLEGE  
KOTTIYAM.  
Department  
Sutheertha S. Nair

Examiners

1.

2.



# OP AMP FILTERS

## Project Report

submitted in partial fulfillment towards the requirement for the  
Award of Bachelor of Science Degree in Physics.

Submitted by

- GOPIKRISHNAN A 23020116006
- THUSHARA L 23020116015
- AMINA R 23020116025
- KISANDHARAN Y 23020116036
- RIFANA HASSAN 23020116042



POST GRADUATE DEPARTMENT OF PHYSICS,  
MMNSS COLLEGE, KOTTIYAM, KOLLAM.  
(AFFILIATED TO UNIVERSITY OF KERALA)  
(2020 - 2023)



*S. S. S. S. S.*  
DEPARTMENT OF PHYSICS,  
M. M. N. S. S. COLLEGE  
KOTTIYAM.

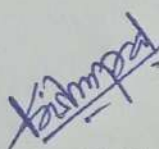
## CERTIFICATE




This is to certify that the project report entitled "OP AMP FILTERS" is a bonafide record of the work carried by

- |                  |             |
|------------------|-------------|
| • GOPIKRISHNAN A | 23020116006 |
| • THUSHARA L     | 23020116015 |
| • AMINA R        | 23020116025 |
| • KISANDHARAN Y  | 23020116036 |
| • RIFANA HASSAN  | 23020116042 |

, Final year B. Sc. Student, MMNSS College, Kottiyam, in partial fulfillment for the award of Bachelor of Science Degree in Physics of Kerala University.

  
Project Guide  
Nair G Krishnaprasad



  
Head of  
Department of PHYSICS  
M. M. N. S. S. COLLEGE  
KOTTIYAM.  
Sutheertha S. Nair

Examiners

1.

2.

# TOUCH SENSORS

## Project Report

submitted in partial fulfillment towards the requirement for the  
Award of Bachelor of Science Degree in Physics.

Submitted by

- GOURI RAJ 23020116007
- THANIMA A 23020116014
- ANANTHAKRISHNAN P S 23020116026
- JISHA CHANDRAN S 23020116035
- SAIKRISHNA L S 23020116043



POST GRADUATE DEPARTMENT OF PHYSICS,  
MMNSS COLLEGE, KOTTIYAM, KOLLAM.  
(AFFILIATED TO UNIVERSITY OF KERALA)  
(2020 - 2023)

*Sutheerthanan*  
DEPARTMENT OF PHYSICS,  
M. M. N. S. S. COLLEGE  
KOTTIYAM.





# CERTIFICATE



This is to certify that the project report entitled "TOUCH SENSORS" is a bonafide record of the work carried by

- |                       |             |
|-----------------------|-------------|
| • GOURI RAJ           | 23020116007 |
| • THANIMA A           | 23020116014 |
| • ANANTHAKRISHNAN P S | 23020116026 |
| • JISHA CHANDRAN S    | 23020116035 |
| • SAIKRISHNA L S      | 23020116043 |

, Final year B. Sc. Student, MMNSS College, Kottiyam, in partial fulfillment for the award of Bachelor of Science Degree in Physics of Kerala University.

Project Guide  
Dr Prabitha B Nair



Head of DEPARTMENT OF PHYSICS  
M. M. N. S. S. COLLEGE  
Department KOTTIYAM  
Sutheertha S. Nair

Examiners

1.

2.

# LASER SECURITY ALARM

## Project Report

submitted in partial fulfillment towards the requirement for the  
Award of Bachelor of Science Degree in Physics.

Submitted by

- **LEKSHMI S KURUP** 23020116008
- **ANIL SANKAR** 23020116027
- **GAYATHRI R** 23020116034



POST GRADUATE DEPARTMENT OF PHYSICS,  
MMNSS COLLEGE, KOTTIYAM, KOLLAM.

(AFFILIATED TO UNIVERSITY OF KERALA)

(2020 - 2023)



*Sutheshan*  
DEPARTMENT OF PHYSICS,  
M. M. N. S. S. COLLEGE  
KOTTIYAM.

# CERTIFICATE



This is to certify that the project report entitled "LASER SECURITY ALARM" is a bonafide record of the work carried by

LEKSHMI S KURUP

23020116008

ANIL SANKAR

23020116027

GAYATHRI R

23020116034

, Final year B. Sc. Student, MMNSS College, Kottiyam, in partial fulfillment for the award of Bachelor of Science Degree in Physics of Kerala University.

Project Guide

Dr Prabitha B Nair



Head of DEPARTMENT OF PHYSICS  
M. M. N. S. S. COLLEGE  
Department KOTTIYAM.  
Sutheertha S. Nair

Examiners

1.

2.



S.No	Reg No	Name of student	Title of project and name of supervising br
1.	63021116001	Abhinandana B.	An Eco-friendly approach for the synthesis of zinc oxide Nanoparticles using santalum album leaves-Green synthesis -Dr. RATHEESH KUMAR V.
2	63021116002	Abhirami R.S.	Green Synthesis & Characterization of zinc oxide nanoparticles. -Dr. SMITHA S.L.
3.	63021116003.	Akhila B.	Synthesis, Characterization and Photocatalytic Activity of W doped TiO <sub>2</sub> nanoparticles ~Dr. PRABITHA B. NAIR
4	63021116004.	Amrutha U.	UV-Visible, Fluorescent Spectral and Computational Studies of BSA Binding with Cefactor. ~ Dr. J. BINDY
5	63021116005	Anoop S.	An investigative study on the structural, morphological, optical, electrochemical properties of La <sub>2</sub> FeMnO <sub>6</sub> double perovskite for energy storage applications ~ Dr. D. SAJAN
6	63021116006	Aparna B.	Synthesis of NiO nanoparticles using Actinidia deliciosa through a bioactive method ~Dr. RATHEESH KUMAR V.

Sl No	Reg No	Name of student	Title of project & name of supervising <sup>tr</sup>
7.	63021116007.	Gopikrishnan J.	Hawking Radiation: An introduction to blackhole thermodynamics ~DR. C. FAIROOZ
8.	63021116008.	Krishnapriya L.	Bi-stable-Reversible Electrochemical Mirror Devices Without Mediators for Optical Modulation ~DR. BISWAPRIYA DEB
9.	63021116009.	Krishnendu A.S.	Bi-derived Piezoelectric Nanogenerators and Capacitive Tactile Sensors from Bacterial Cellulose and Egg Shell Membrane ~DR. ACHU CHANDRAN
10.	63021116011	Pallavi P.S.	UV-Visible, Fluorescent, Spectral and Computational Studies of DNA Binding With Cefaclor ~ DR S. BINOY
11	63021116012	Pranav S.B.	Photophysical Studies of Active Layer in Ternary Organic Solar Cells ~DR. VARI SIVAJI REDDY
12.	63021116013	Sanjay V. Nair	Synthesis, Characterization and Photocatalytic Activity of Sn doped TiO <sub>2</sub> nanoparticles ~DR PRABITHA B. NAIR



Sl No	Reg No	Name of student	Title of project and Name of supervising teacher
13	63021116015	Sradha J.S.	Biosynthesis and characterization of STWex Nanoparticles - Dr SMITHA S.L.
14	63021116010	Nayana S. Kumar	A study on $\text{La}_{0.2}\text{CrMnO}_6$ double perovskite as an Electrode material for Electrochemical Energy Storage Applications.

No. of candidates: 14

*Sulheer*  
HOD.

Signature of HOD



*Sulif*

Signature of Principal.

Principal  
M.M.N.S.S. COLLEGE  
KOTTIYAM



**AN ECO-FRIENDLY APPROACH FOR THE SYNTHESIS  
OF ZINC OXIDE NANOPARTICLES USING SANTALUM  
ALBUM LEAVES – GREEN SYNTHESIS**

*Project report submitted to the*

*University of Kerala*

*in the partial fulfillment of the requirement for the award of the Degree of*

**MASTER OF SCIENCE IN PHYSICS**

**By**

**ABHINANDANA.B**

Candidate code : 63021116001

Subject code : PH 201

Exam code : 63020401



**MMNSS COLLEGE KOTTIYAM**

**2021-2023**





POST GRADUATE DEPARTMENT OF PHYSICS  
MANNAM MEMORIAL NSS COLLEGE, KOTTIYAM  
KOLLAM – 691571

### CERTIFICATE

*This is to certify that the dissertation entitled “AN ECO-FRIENDLY APPROACH FOR THE SYNTHESIS OF ZINC OXIDE NANOPARTICLES USING SANTALUM ALBUM LEAVES – GREEN SYNTHESIS” is an authentic record of the investigations done by ABHINANDANA B (candidate code :63021116001) at the Department of Physics, Mannam Memorial NSS College, Kottiyam, under my supervision and guidance , in partial fulfillment of the requirements for the award of the degree of Master of Science in Physics from University of Kerala and that no part thereof has been presented for any other degree or diploma by any other University or institution.*

Kottiyam

16-08-2023

Dr. Ratheesh Kumar V  
**Dr. RATHEESH KUMAR. V**  
Assistant Professor & Research Guide  
PG Department of Physics  
MMNSS College, Kottiyam  
Kollam-691571







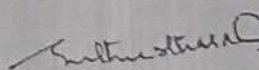
POST GRADUATE DEPARTMENT OF PHYSICS  
MANNAM MEMORIAL NSS COLLEGE, KOTTIYAM  
KOLLAM – 69157

CERTIFICATE

*This is to certify that the dissertation entitled “ AN ECO-FRIENDLY APPROACH FOR THE SYNTHESIS OF ZINC OXIDE NANOPARTICLES USING SANTALUM ALBUM LEAVES-GREEN SYNTHESIS” is an authentic record of the investigation done by ABHINANDANA B (Candidate code :63021116001) under the guidance of Dr. Ratheesh Kumar V at the Department of Physics, Mannam Memorial NSS College, Kottiyam, in the partial fulfillment of the requirements for the award of the degree of Master of Science in Physics from University of Kerala.*

Kottiyam

16-08-2023

  
Dr. Sutheertha S Nair

Head of Department of Physics





# **GREEN SYNTHESIS AND CHARACTERIZATION OF ZINC OXIDE NANOPARTICLES**

*Project report submitted to the*



**University of Kerala**

*In partial fulfilment of the requirement for the award of the Degree of  
Master of Science in Physics*

**A. MANI R S**

**Candidate Code: 63021116002**

**POST GRADUATE DEPARTMENT OF PHYSICS  
MANNAM MANI RIAL NSS COLLEGE  
KOTTAM, KOLLAM**



**2023**

**POST GRADUATE DEPARTMENT OF PHYSICS**  
**MANNAM MEMORIAL NSS COLLEGE, KOTTIYAM**



**CERTIFICATE**

This is to certify that the project report entitled, "**GREEN SYNTHESIS AND CHARACTERIZATION OF ZINC OXIDE NANOPARTICLES**", is a bonafide record of the work done by **HIRAMI R S (Candidate Code: 6302111602)** under my supervision and guidance, towards the partial fulfilment of the requirement for the award of **degree in Physics** from the University of Kerala, during the year 2021-22 and this work has not been submitted elsewhere for the award of any other degree or diploma by any other university or institution.

Signature of Examiners

1.

2.

  
12/01/22  
16/8/23

Dr. Smitha S.L.  
Assistant Professor  
PG Dept. of Physics  
MMNSS College, Kottiyam





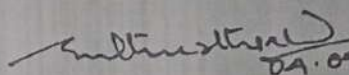
**POST GRADUATE DEPARTMENT OF PHYSICS**  
**MANNAM MEMORIAL NSS COLLEGE, KOTTIYAM**



**CERTIFICATE**

This is to certify that the project report entitled "**GREEN SYNTHESIS AND CHARACTERIZATION OF ZINC OXIDE NANOPARTICLES**", is a bonafide record of the work done by **ABHIRAMI R S** (Candidate Code: **6302111002**) towards the partial fulfillment of the requirement for the award of M.Sc. Degree in Physics from the University of Kerala, under the guidance of **Dr. Smitha S L**, Assistant Professor of Physics, MMNSS College, Kottiyam, Kollam, during the year 2021-2022. This work has not been submitted elsewhere for the award of any other degree or diploma by any other university or institution.



  
04.09.23

Dr. Sutheertha S Nair

Head of the Department



# SYNTHESIS, CHARACTERIZATION AND PHOTOCATALYTIC ACTIVITY OF W DOPED TiO<sub>2</sub> NANOPARTICLES

*Project Report Submitted to the*



University of Kerala

*In Partial fulfilment of the requirements for the reward of the Degree of*

Master Of Science in Physics

*By*

AKHILA B

Candidate code: 63021116003

POST GRADUATE DEPARTMENT OF PHYSICS

MANNAM MEMORIAL NSS COLLEGE

KOTTIYAM, KOLLAM

2021-2023



GRADUATE & RESEARCH DEPARTMENT  
OF PHYSICS  
MAHATMA GANDHI COLLEGE  
THIRUVANANTHAPURAM



CERTIFICATE

This is to certify that the project report entitled "Synthesis, Characterization, and photocatalytic activity of W doped  $\text{TiO}_2$  nanoparticles" is a bonafide record of the work done by Akhila B towards the partial fulfilment of the requirement for the award of MSc Degree in PHYSICS under the University of Kerala during the year 2021-2023 under my supervision and guidance, and this work has not been submitted elsewhere for the award of any degree.

Guided by

*Prabitha B. Nair*  
04/09/23

Dr. Prabitha B. Nair

(Assistant professor in Physics,

MMNSS College, Kottiyam &

Research guide,

Post Graduate & Research

Department of Physics,

MG College, Thiruvananthapuram)





POST GRADUATE DEPARTMENT OF PHYSICS  
MANNAM MEMORIAL NSS COLLEGE KOTTIYAM



CERTIFICATE

This is to certify that the project report entitled "Synthesis, characterization and photocatalytic activity of W doped  $\text{TiO}_2$  nanoparticle", is a bonafide record of the work done by Akhila B towards the partial fulfilment of the requirement for the award of MSc Degree in PHYSICS under the University of Kerala during the year 2021-2023 and this work has not been submitted elsewhere for the award of any degree.

*Sutheertha S. Nair* 04/09/23

Dr. Sutheertha S. Nair  
Head of the Department,  
Department of Physics,  
MMNSS College, Kottiyam

Guide

*Prabitha B. Nair*  
04/09/23

Dr. Prabitha B. Nair  
(Assistant Professor in Physics,  
MMNSS College, Kottiyam &  
Research Guide,  
Post Graduate & Research  
Department of Physics  
MG College, Thiruvananthapuram)





# UV- VISIBLE, FLUORESCENT SPECTRAL AND COMPUTATIONAL STUDIES OF BSA BINDING WITH CEFACLOR

*Project Report Submitted to the*

*University of Kerala*

*In partial fulfilment of the requirements for the reward of the Degree of*

**MASTER OF SCIENCE IN PHYSICS**

*By*

**AMRUTHA U**

Candidate Code : 63021116004

Exam Code : 63020401

Subject Code : PH 201



**MMNSS COLLEGE KOTTIYAM**

**2021-2023**

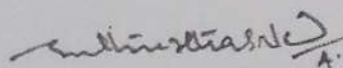


POST GRADUATE DEPARTMENT OF PHYSICS  
MANNAM MEMORIAL NSS COLLEGE, KOTTIYAM



CERTIFICATE

This is to certify that the project report entitled "UV- VISIBLE, FLUORESCENT SPECTRAL AND COMPUTATIONAL STUDIES OF BSA BINDING WITH CEFACLOR" is a bonafide record of the work done by AMRUTHA U towards the partial fulfilment of the requirement for the award of MSc Degree in PHYSICS under the University of Kerala during the year 2021-2023 and this work has not been submitted elsewhere for the award of any degree.

  
4.09.23

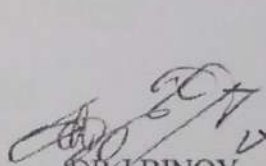
Dr. Sutheertha S. Nair

Head of the Department

Department of Physics

MMNSS College,


Kottiyam

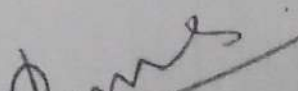
  
4-9-2023  
Dr. J. BINOY  
Asst Professor  
Dept of Physics  
Govt. College for Women, Typpu  
Assistant Professor  
Govt. College for Women  
Thiruvananthapuram

Signature of Examiners :

Examiner 1:

Examiner 2:

  
12/9/2023

  
08/09/23





**An investigative study on the structural,  
morphological, optical, electrochemical properties of  
 $\text{La}_2\text{FeMnO}_6$  double perovskite for energy storage  
applications**

*Project report submitted to the*

*University of Kerala*

*in the partial fulfillment of the requirement for the award of the Degree of*

**MASTER OF SCIENCE IN PHYSICS**

**By**

**ANOOP S.**

Candidate code : 63021116005

Subject code : PH 201

Exam code : 63020401



**MMNSS COLLEGE KOTTIYAM**

**2021-2023**





# DEPARTMENT OF PHYSICS BISHOP MOORE COLLEGE

Mavelikara, Kerala, India, 690110  
Re-assessed and Re-accredited (Third Cycle) with 'A' Grade by NAAC  
Supported by DST-FIST, DRY Star College & KSCSTE NARD Schemes

Dr. D. Sajan  
Head of the Department  
Email: [drsajanbmc@gmail.com](mailto:drsajanbmc@gmail.com)  
Phone: 9495043765

31-08-2023

## CERTIFICATE

This is to certify that the dissertation entitled "An investigative study on the structural, morphological, optical, electrochemical properties of  $\text{La}_2\text{FeMnO}_6$  double perovskite for energy storage applications" is a record of original work carried out by Mr. Anoop S. (Register number: 63021116005) under the joint supervision and guidance of Dr. Sutheertha S Nair, Assistant Professor and Head, Department of Physics, Mannam Memorial NSS College, Kottiyam, and myself during 2021-2023 in partial fulfillment of the requirements for the award of the degree of Master of Science in Physics, under university of Kerala, Thiruvananthapuram. The content of the report, in full or parts have not been submitted to any other Institute or University for the award of any other degree or diploma.

Dr. D. SAJAN  
Associate Professor & Research Guide  
Department of Physics  
Bishop Moore College  
Mavelikara



Dr. D. SAJAN  
Supervising Guide

Dr. Sutheertha S Nair  
Co-guide

**SYNTHESIS OF NICKEL OXIDE  
NANOPARTICLES USING ACTINIDIA  
DELICIOSA THROUGH A BIOACTIVE METHOD**



*Project report submitted to the*

**University of Kerala**

*In partial fulfillment of the requirements for the award of the Degree of*

**Master of Science in Physics**

**APARNA B.**

Candidate Code: 63021116006

Exam Code: 63020401

Subject Code: PH 201

**2021-2023**

Examiners

1.

2.

  
12/9/2023





POST GRADUATE DEPARTMENT OF PHYSICS  
MANNAM MEMORIAL NSS COLLEGE, KOTTIYAM  
KOLLAM - 691571

CERTIFICATE

*This is to certify that the dissertation titled "SYNTHESIS OF NICKEL OXIDE NANOPARTICLES USING ACTINIA DELICIOSA THROUGH A BIOACTIVE METHOD" is an authentic record of the investigations done by APARNNA B. (candidate code :63021117006) at the Department of Physics, Mannam Memorial NSS College, Kottiyam, under my supervision and guidance, in partial fulfillment of the requirements for the award of the degree of Master of Science in Physics from University of Kerala and that no part thereof has been presented for any other degree or diploma by any other University or institutions.*

Kottiyam

16-06-20

*Ratheesh V*

Dr. Ratheesh Kumar V  
**Dr. RATHEESH KUMAR. V**  
Assistant Professor & Research Guide  
PG Department of Physics  
MMNSS College, Kottiyam  
Kollam - 691571





**HAWKING RADIATION : AN  
INTRODUCTION TO BLACK HOLE  
THERMODYNAMICS**

*Project report submitted to the*



**University of Kerala**

*In partial fulfilment of the requirement for the award of the Degree of  
Master of Science in Physics*

*By*

**GOPIKRISHNAN J**

**Candidate Code : 63021116007**

**POST GRADUATE DEPARTMENT OF PHYSICS  
MANNAM MEMORIAL NSS COLLEGE  
KOTTIYAM, KOLLAM**

**2021-2023**



POST GRADUATE DEPARTMENT OF PHYSICS  
TKM COLLEGE OF ARTS AND SCIENCE, KOLLAM



CERTIFICATE

This is to certify that the project report entitled "HAWKING RADIATION- AN INTRODUCTION TO BLACK HOLE THERMODYNAMICS", is a bonafide record of the work done by GOPIKRISHNAN J(Candidate Code: 6302HH6007) under my supervision and guidance, towards the partial fulfilment of the requirement for the award of M.Sc. Degree in Physics from the University of Kerala, during the year 2021-2023 and this work has not been submitted elsewhere for the award of any other degree or diploma by any other university or institution.

Signature of Examiners

1.

2.



*C. Fairros*  
03/02/23

C Fairros

Assistant professor

PG Dept. Of Physics

TKM College of Arts and Science

Kollam

**BISTABLE-REVERSIBLE ELECTROCHEMICAL  
MIRROR DEVICES WITHOUT MEDIATORS FOR OPTICAL  
MODULATION**

*Project Report Submitted to*



**University Of Kerala**

*In partial fulfillment of the requirements for the reward of Degree of*

**Master of Science in Physics**

By

**KRISHNAPRIYA L**

Candidate Code : 63021116008

Course Code : 630

Exam Code : 63020401

Subject Code : PH 201

Under the guidance of

**Dr. BISWAPRIYA DEB**



सीएसआईआर का अंतर्विषयी आयाम  
Interdisciplinary face of CSIR

**Centre For Sustainable Energy Technologies (CSET)**

**CSIR-National Institute for Interdisciplinary Science and Technology,**

**Thiruvananthapuram – 695019,**

**2021 – 2023**





CSIR - National Institute for Interdisciplinary Science and Technology (NIIST)



Council of Scientific & Industrial Research (CSIR)  
Industrial Estate P.O., Trivandrum - 695 019, INDIA



Dr. Biswapriya Deb, Ph.D.

Senior Principal Scientist, Prof. (AcSIR)

Centre For Sustainable Energy Technologies

Tel: +91-471-2515713 (Office)

+91-471-2514200 (Mobile)

E-mail: [biswapriya.deb@nist.res.in](mailto:biswapriya.deb@nist.res.in)

[biswapriya.deb@gmail.com](mailto:biswapriya.deb@gmail.com)

## CERTIFICATE

This is to certify that the work embodied in the project report entitled "Bistable-Reversible Electrochemical Mirror Devices Without Mediators For Optical Modulation" has been carried out by Ms. Krishnapriya L under my supervision and the co-supervision of Nayan Dev Madhavan K at the Centre for Sustainable Energy Technologies (CSET), CSIR-National Institute for Interdisciplinary Science and Technology (CSIR-NIIST), Thiruvananthapuram during the period January to June 2023 in partial fulfillment of the Degree of Master of Science in Physics, Department of Physics, University of Kerala, Mannam Memorial NSS College, Kottiyam. The present work or any part thereof has not been submitted elsewhere for the award of any other degree.

Nayan Dev Madhavan K

Research Scholar

Dr. Biswapriya Deb

Senior Principal Scientist



डॉ. बिष्मप्रिया देब  
Dr. BISWAPRIYA DEB  
वरिष्ठ प्रधान वैज्ञानिक / Senior Principal Scientist  
रासायन विज्ञान तथा प्रौद्योगिकी प्रभाग  
Chemical Sciences and Technology Division  
डी ए स्सी आईआईटी केएन  
CSIR-National Institute for Interdisciplinary  
Science and Technology (NIIST)  
तिरुवनन्तपुरम / Thiruvananthapuram-695 019.

# BIO-DERIVED PIEZOELECTRIC NANOGENERATORS AND CAPACITIVE TACTILE SENSORS FROM BACTERIAL CELLULOSE AND EGG SHELL MEMBRANE

*Project Report Submitted to*



**University Of Kerala**

*In partial fulfilment of the requirements for the reward of Degree of*

**Master of Science in Physics**

By

**KRISHNENDU A S**

Candidate Code : 63021116009

Course Code : 630

Exam Code : 63020401

Subject Code : PH 201

Under the guidance of

**Dr. ACHU CHANDRAN**



**Materials Science and Technology Division,**

**CSIR–National Institute for Interdisciplinary Science and Technology,**

**Thiruvananthapuram – 695019,**

**2021 - 2023**





राष्ट्रीय अंतर्विषयी विज्ञान तथा प्रौद्योगिकी संस्थान  
NATIONAL INSTITUTE FOR INTERDISCIPLINARY SCIENCE AND TECHNOLOGY

वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद् | Council of Scientific and Industrial Research  
इंडस्ट्रियल एस्टेट पी.ओ. पप्पनमकोड, तिरुवनंतपुरम, भारत - 695 019 | Industrial Estate P.O. Pappanamcode, Thiruvananthapuram, India-695 019

CERTIFICATE

It is certified that the thesis entitled '*Bio-derived Piezoelectric Nanogenerators and Capacitive Tactile Sensors from Bacterial Cellulose and Egg Shell Membrane*' submitted by Ms. KRISHNENDU A S (Candidate Code: 63021116009) to the Department of Physics, Mannam Memorial NSS College, Kottiyam, University of Kerala towards the partial fulfilment of the requirements for the reward of the degree of Master of Science in Physics.

This is bonafide and authentic record of work done by Ms. KRISHNENDU A S. at Materials Science & Technology Division of CSIR-National Institute for Interdisciplinary Science and Technology, Thiruvananthapuram under my supervision.

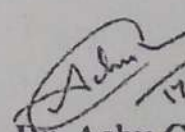
Place: Thiruvananthapuram

Date: 17.08.2023.



डॉ. अचु चन्द्रन  
Dr. Achu Chandran  
वैज्ञानिक एम एस सी  
Scientist, MSTD

सी एस आई आर - राष्ट्रीय अंतर्विषयी विज्ञान तथा प्रौद्योगिकी संस्थान  
CSIR-National Institute for Interdisciplinary  
Science and Technology (NIIST), Govt. of India  
तिरुवनंतपुरम/Thiruvananthapuram-695 019

  
17.08.2023  
Dr. Achu Chandran

Senior Scientist, MSTD





**A STUDY ON  $\text{La}_2\text{CrMnO}_6$   
DOUBLE PEROVSKITE AS AN  
ELECTRODE MATERIAL FOR  
ELECTROCHEMICAL ENERGY  
STORAGE APPLICATIONS**



*Project report submitted to the*

**University of Kerala**

*In partial fulfilment of the requirements for the reward for degree of*

**Master of Science in Physics**

Course code: 630

Exam code: 63020401

Subject code: PH 201

**MMNSS COLLEGE KOTTIYAM**

2021-2023



POST GRADUATE DEPARTMENT OF PHYSICS  
MANNAM MEMORIAL NSS COLLEGE, KOTTIYAM  
KOLLAM-691571



CERTIFICATE

This is to certify that the project report entitled "A Study on  $\text{La}_2\text{CrMnO}_6$  Double Perovskite as an Electrode material for Energy Storage Applications" is a bonafide record of the work done by Nayana S Kumar towards the partial fulfillment of the requirement for the award of MSc degree in PHYSICS under the University of Kerala during the year 2021-2023 and this work has not been submitted elsewhere for the award of any degree.

Place: :

Date : 23/08/2023

DR SUTHEERTHA S NAIR

Department of Physics







## DEPARTMENT OF PHYSICS BISHOP MOORE COLLEGE

Mavelikara, Kerala, India 695113  
We observed and the certificate is given with a Grade of A

### CERTIFICATE

This is to certify that the project work entitled "A Study on  $\text{La}_2\text{CrMnO}_6$  Double Perovskite as an Electrode material for Electrochemical Energy Storage Applications" is bonafide record of the original work done by Nayana S Kumar (Reg. No. 63021116010) under the joint supervision and guidance of Dr. Sutheertha S Nair, Assistant Professor and Head, Department of Physics, Mannam Memorial NSS College, Kottiyam, and myself during 2021-2023 in partial fulfilment of the Requirements for the award of the degree of Master of Science in Physics, under university of Kerala, Thiruvananthapuram., in partial fulfillment of the requirement for the degree of MASTER OF SCIENCE IN PHYSICS during the year 2021-2023.

Dr. D. SAJAN  
Associate Professor & Research Guide  
Department of Physics  
Bishop Moore College  
Mavelikara

Co-guide

Dr. SUTHEERTHA S. NAIR

Supervising Guide:

Dr. D. SAJAN

Place: Mavelikara

Date: 23/08/2023

Associate Professor  
Department of Physics  
Bishop Moore College, Mavelikara





# UV- VISIBLE, FLUORESCENT SPECTRAL AND COMPUTATIONAL STUDIES OF DNA BINDING WITH CEFACLOR

*Project Report Submitted to the*

*University of Kerala*

*In partial fulfilment of the requirements for the reward of the Degree of*

**MASTER OF SCIENCE IN PHYSICS**

*By*

**PALLAVI.P.S**

Candidate Code : 63021116011

Exam Code : 63020401

Subject Code : PH201



**MMNSS COLLEGE KOTTIYAM**

2021-2023

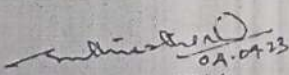


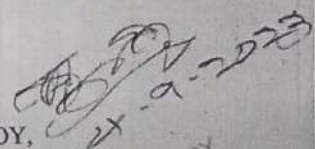
POST GRADUATE DEPARTMENT OF PHYSICS  
MANNAM MEMORIAL NSS COLLEGE, KOTTIYAM



CERTIFICATE

This is to certify that the project report entitled "UV- VISIBLE, FLUORESCENT SPECTRAL AND COMPUTATIONAL STUDIES OF DNA BINDING WITH CEFACLOX" is a bonafide record of the work done by PALLAVI P S towards the partial fulfilment of the requirement for the award of MSc Degree in PHYSICS under the University of Kerala during the year 2021-2023 and this work has not been submitted elsewhere for the award of any degree.

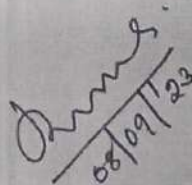
  
Dr Sutheertha S Nair  
Head of the Department  
Department of Physics  
MMNSS College  
Kottiyam

  
DR.J.BINOY,  
Assistant Professor,  
Govt. College for Women,  
Thiruvananthapuram

Signature of Examiners:

Examiner 1:

Examiner 2:

  
08/09/23





# PHOTOPHYSICAL STUDIES OF ACTIVE LAYER IN TERNARY ORGANIC SOLAR CELLS



*The project report submitted to the*

**University of Kerala**

*In Partial fulfillment of the requirement for the reward of the Degree of*

**Master of Science in Physics**

*By*

**PRANAV S B**

Candidate code :63021116012

Subject Code : PH 201

Exam Code :63020401

**2021-23**

Signature of Examiners

1.

2.





Department of Physics  
National Institute of Technology Calicut.



CERTIFICATE

*This is to certify that the dissertation entitled "PHOTOPHYSICAL STUDIES OF ACTIVE LAYER IN TERNARY ORGANIC SOLAR CELLS" is an authentic record of the investigation done by PRANAV S. B. (candidate code:63021116012) under the guidance of Dr. Vari Sivaji Reddy, Associate Professor, Dept. of Physics, National Institute of Technology Calicut in the partial fulfillment of the requirement for the award of the degree of Masters of Science in Physics from University of Kerala*

CALICUT  
13-08-2023



V. S. Reddy 08/08/2023  
Dr. Vari Sivaji Reddy

**Dr. VARI SIVAJI REDDY**  
Associate Professor  
Department of Physics  
National Institute of Technology Calicut  
Calicut - 673601, Kerala INDIA



**POST GRADUATE DEPARTMENT OF PHYSICS**  
**MANNAM MEMORIAL NSS COLLEGE**  
**KOTTIYAM**



*This is to certify that the dissertation entitled "PHOTOPHYSICAL STUDIES OF ACTIVE LAYER IN TERNARY ORGANIC SOLAR CELLS" is an authentic record of the investigation done by PRANAV S. B. (candidate code:63021116012) under the guidance of Dr. Vari Sivaji Reddy, Associate Professor, Dept. of Physics, National Institute of Technology Calicut in the partial fulfillment of the requirement for the award of the degree of Masters of Science in Physics from University of Kerala*

*Sutheertha S. Nair*  
04/09/23

Dr. Sutheertha S. Nair

Head of the Department of Physics

KOTTIYAM

04-09-2023





# SYNTHESIS, CHARACTERIZATION AND PHOTOCATALYTIC ACTIVITY OF Sn DOPED TiO<sub>2</sub> NANOPARTICLES

*Project Report Submitted to the*

**University of Kerala**

*In partial fulfilment of the requirements for the reward of the Degree of*

**MASTER OF SCIENCE IN PHYSICS**

*By*

**SANJAY V. NAIR**

Candidate Code : 63021116013

Exam Code : 63020401

Subject Code : PH 201



**MMNSS COLLEGE KOTTIYAM**

**2021-2023**





**POST GRADUATE & RESEARCH DEPARTMENT  
OF PHYSICS**

**MAHATMA GANDHI COLLEGE, KESAVDASAPURAM**

**TRIVANDRUM - 695004**

**CERTIFICATE**

*This is to certify that the dissertation entitled "SYNTHESIS, CHARACTERISATION AND PHOTOCATALYTIC ACTIVITY OF Sn DOPED TiO<sub>2</sub> NANOPARTICLES" is an authentic record of the investigations done by SANJAY V. NAIR (candidate code : 63021116013) at the Department of Physics, Mahatma Gandhi College, Trivandrum under my supervision and guidance, and that no part thereof has been presented for any other degree or diploma by any other University or institution.*

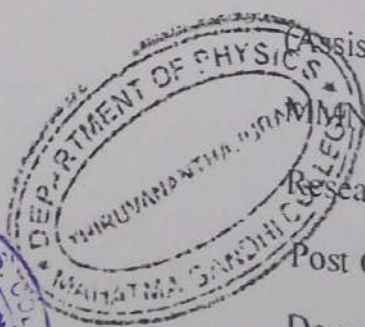
Kesavadasapuram

*Prabitha B. Nair*

**Dr. Prabitha B. Nair**

Assistant Professor in Physics  
MGNSS College Kottiyam &  
Research Guide,

Post Graduate & Research  
Department of Physics,  
MG College, Trivandrum)







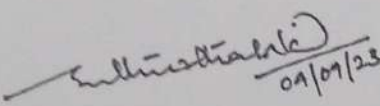
## POST GRADUATE DEPARTMENT OF PHYSICS

MANNAM MEMORIAL NSS COLLEGE, KOTTIYAM

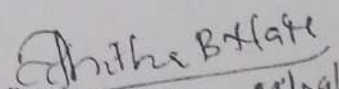
KOLLAM - 691571

### CERTIFICATE

*This is to certify that the dissertation entitled "SYNTHESIS, CHARACTERISATION AND PHOTOCATALYTIC ACTIVITY OF Sn DOPED TiO<sub>2</sub> NANOPARTICLES" is an authentic record of the investigations done by SANJAY V. NAIR (candidate code : 63021116013) under the guidance of Dr. Prabitha B. Nair at the Department of Physics, Mahatma Gandhi College, Trivandrum, in partial fulfillment of the requirements for the award of the degree of Master of Science in Physics from the University of Kerala.*

  
Dr. Sutheertha S. Nair  
Head of the Department  
Department of Physics,  
MMNSS College, Kottiyam



  
Dr. Prabitha B. Nair 04/09/23  
(Assistant Professor in Physics  
MMNSS College Kottiyam &  
Research Guide,  
Post Graduate & Research  
Department of Physics,  
MG College, Trivandrum)

# BIOSYNTHESIS AND CHARACTERIZATION OF SILVER NANOPARTICLES

*Project report submitted to the*



University of Kerala

*In partial fulfilment of the requirement for the award of the Degree of*  
Master of Science in Physics

*By*

SRADHA J S

Candidate Code: 63021116015

POST GRADUATE DEPARTMENT OF PHYSICS  
MANNAM MEMORIAL NSS COLLEGE  
KOTTIYAM, KOLLAM

2021-2023





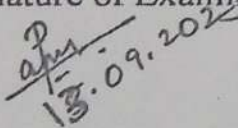
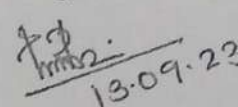
POST GRADUATE DEPARTMENT OF PHYSICS  
MANNAM MEMORIAL NSS COLLEGE, KOTTIYAM

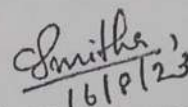


CERTIFICATE

This is to certify that the project report entitled "BIOSYNTHESIS AND CHARACTERIZATION OF SILVER NANOPARTICLES", is a bonafide record of the work done by SRADHA J S (Candidate Code: 63021116015) under my supervision and guidance, towards the partial fulfilment of the requirement for the award of M.Sc. Degree in Physics from the University of Kerala, during the year 2021-2023 and this work has not been submitted elsewhere for the award of any other degree or diploma by any other university or institution.

Signature of Examiners

1.   
13.09.2023
2.   
13.09.23

  
16/9/23

Dr. Smitha S.L.  
Assistant Professor  
PG Dept. of Physics  
MMNSS College, Kottiyam

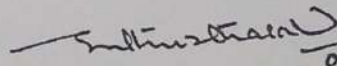


**POST GRADUATE DEPARTMENT OF PHYSICS**  
**MANNAM MEMORIAL NSS COLLEGE, KOTTIYAM**



**CERTIFICATE**

This is to certify that the project report entitled “**BIOSYNTHESIS AND CHARACTERIZATION OF SILVER NANOPARTICLES**”, is a bonafide record of the work done by **SRADHA J S** (Candidate Code: 63021116015) towards the partial fulfilment of the requirement for the award of M.Sc. Degree in Physics from the University of Kerala, under the guidance of **Dr. Smitha S L**, Assistant Professor of Physics, MMNSS College, Kottiyam, Kollam, during the year 2021-2023 and this work has not been submitted elsewhere for the award of any other degree or diploma by any other university or institution.

  
04-09-23

Dr. Sutheertha S Nair

Head of the Department

