### VARIATION OF AIRGLOW AT DIFFERENT GALACTIC LATITUDES

Project report submitted to

### MAHATMA GANDHI UNIVERSITY

in partial fulfillment of the requirement for the degree of

### MASTER OF SCIENCE IN PHYSICS

Submitted by

AKSHAYA T T

Reg.No.200011012992

Under the Guidance of

Ms. NIMMI NARAYANAN



### POST GRADUATE DEPARTMENT OF PHYSICS SREE SANKARA COLLEGE, KALADY 2022



## DEPARTMENT OF PHYSICS

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Ph.No:0484-2462341

### CERTIFICATE

This is to certify that the dissertation entitled "VARIATION OF AIRGLOW AT DIFFERENT GALACTIC LATTITUDES" submitted to Mahatma Gandhi University in the partial fulfillment of the requirement for the award of the degree of MASTER OF SCIENCE IN PHYSICS, is a record of original work done by AKSHAYA T T under the guidance of Ms. NIMMI NARAYANAN, Assistant Professor, Sree Sankara College, Kalady during the academic year 2020-2022.

External Examiner 1. Dr. SINKLHE

Prof. BEN JOS

2.

Head of the Department





# SREE SANKARA COLLLEGE KALADY DEPARTMENT OF PHYSICS POST BOX-1 KALADY,683574 Ph.No.0484 2462341

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Kalady September 2022



A

**NIMMI NARAYANAN** 

Assistant Professor Sree Sankara College ,Kalady

### COMPARISON OF OPTICAL AND STRUCTURAL PROPERTIES OF ANNEALED AND UNANNEALED ALUMINIUM DOPED ZINC OXIDE THIN FILMS BY POWER VARYING RF MAGNETRON SPUTTERING

Project report submitted to Mahatma Gandhi University in partial fulfilment of the requirement for Master Degree of Science in Physics

By ANUMOL. V .JOY Reg. No. 200011012994

Under the supervision of Smt. Priya S S Assistant Professor

POST GRADUATE DEPARTMENT OF PHYSICS SREE SANKARA COLLEGE, KALADY 2022







### SREE SANKARA COLLEGE, KALADY POST GRADUATE DEPARTMENT OF PHYSICS

### **CERTIFICATE**

This is to certify that the project work entitled "COMPARISON OF OPTICAL AND STRUCTURAL PROPERTIES OF ANNEALED AND UNANNEALED ALUMINIUM DOPED ZINC OXIDE THIN FILMS BY POWER VARYING RF MAGNETRON SPUTTERING" is a genuine work of ANUMOL V JOY, Reg No:200011012994 carried out at the Post Graduate Department of Physics, Sree Sankara College, Kalady, in partial fulfilment for the award of Master of Science in Physics from MG University, Kottayam during the year 2020-2022 under my guidance and supervision and the work reported here in does not form part of any other thesis of dissertation.

Prof. Ben Jos

Head of the department of Physics

Guide

External Examiners

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II.

Smt. Priya S S

Supervising

Date 27.09.20

### INFLUENCE OF Zn DOPING ON THE MATERIAL PROPERTIES OF TiO2

### **NANOTUBES**

#### PROJECT REPORT

Submitted to

### MAHATMA GANDHI UNIVERSITY

In partial fulfilment of the requirement for the degree of

### MASTER OF SCIENCE IN PHYSICS

Submitted by

**ASWANICT** 

200011012995

Under the supervision of

Dr. SINITHA B NAIR





POST GRADUATE DEPARTMENT OF PHYSICS

SREE SANKARA COLLEGE, KALADY

2022

### DEPARTMENT OF PHYSICS SREE SANKARA COLLEGE, KALADY



### **CERTIFICATE**

This is to certify that the project work entitled "INFLUENCE OF Zn DOPPING ON THE MATERIAL PROPERTIES OF TiO2 NANOTUBES "is a bonafide work of ASWANI C T, Reg No:200011012995 carried out at the Post Graduate Department of Physics, Sree Sankara College, Kalady, in partial fulfilment for the award of Master of Science in Physics from MG University, Kottayam during the year 2020-2022 under my guidance and supervision and the work reported here in does not form part of any other thesis of dissertation.

Prof. BEN JOSE

Head of the department of Physics

Sree Sankara College Kalady

Dr SINITHA B NAIR

(Supervising Guide)

Asst.Professor, Dept of Physics

Sree Sankara College Kalady

**External Examiners** 

I. B

Π.

DATE HYS

### MODELING OF AIR GLOW AS A FUNCTION OF SOLAR ACTIVITY

Project report submitted to

### MAHATMA GANDHI UNIVERSITY

in partial fulfillment of the requirement for the degree of

### MASTER OF SCIENCE IN PHYSICS

Submitted by

### CHRISTY DEVASSYKUTTY

Reg.No.200011012996

Under the Guidance of

Ms. NIMMI NARAYANAN



POST GRADUATE DEPARTMENT OF PHYSICS

SREE SANKARA COLLEGE, KALADY

2022



## SREE SANKARA COLLEGE KALADY, DEPARTMENT OF PHYSICS

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Ph.No:0484-2462341

#### **CERTIFICATE**

This is to certify that the dissertation entitled "MODELLING OF AIRGLOW AS A FUNCTION OF SOLAR ACTIVITY" submitted to Mahatma Gandhi University in the partial fulfillment of the requirement for the award of the degree of MASTER OF SCIENCE IN PHYSICS is a record of original work done by CHRISTY DEVASSYKUTTY under the guidance of Ms. NIMMI NARAYANAN. Assistant Professor, Sree Sankara College, Kalady during the academic year 2020-2022.

External Examiner 1.

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Head of the Department



## SREE SANKARA COLLLEGE KALADY DEPARTMENT OF PHYSICS

**POST BOX-1** 

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Ph.No.0484 2462341 CERTIFICATE

This is to certify that the dissertion entitled "MODELING OF AIRGLOW AS A FUNCTION OF SOLAR ACTIVITY" submitted to Mahatma Gandhi University in the partial fulfillment of the requirement for the award of the degree of MASTER OF SCIENCE IN PHYSICS, is a record of original work done by CHRISTY DEVASSYKUTTY during the period of her study at Post Graduate Department of Physics, Sree Sankara College Kalady, during the academic year 2020-2022 under my guidance.

DATE 27 09 2022

SANKARA CO

Kalady

receeses the celebrate and a

September 2020

NIMMI NARAYAN

**Assistant Professor** 

Department of Physics

Sree Sankara College, Kalady

## OPTICAL, STRUCTURAL AND ELECTRICAL PROPERTIES OF RF-SPUTTERED ZnO THIN FILMS

### PROJECT REPORT

Submitted to

### MAHATMA GANDHI UNIVERSITY

In partial fulfilment of the requirement for the degree of

### MASTER OF SCIENCE IN PHYSICS

Submitted by

**DEVIKA DASAN** 

200011012997

Under the supervision of

Dr. MANJU T



POST GRADUATE DEPARTMENT OF PHYSICS

SREE SANKARA COLLEGE, KALADY, 2022

### SREE SANKARA COLLEGE, KALADY



### POST GRADUATE DEPARTMENT OF PHYSICS

### **CERTIFICATE**

This is to certify that the project work entitled "OPTICAL, STRUCTURAL AND ELECTRICAL PROPERTIES OF RF-SPUTTERED ZnO THIN FILMS "is a bonafide work of DEVIKA DASAN, Reg No:200011012997 carried out at the Post Graduate Department of Physics, Sree Sankara College, Kalady, in partial fulfilment for the award of Master of Science in Physics from MG University, Kottayam during the year 2020-2022 under my guidance and supervision and the work reported here in does not form part of any other thesis of dissertation.

Prof. BEN JOSE

Dr MANJU T

Head of the department of Physics A COLLEGE.

(Supervising Guide)

Sree Sankara College Kalady

Asst.Professor, Dept of Physics

Sree Sankara College Kalady

**External Examiners** 

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II. Priga S.S.

Park

## SYNTHESIS AND THERMAL DIFFUSIVITY STUDY OF GRAPHENE QUANTUM DOTS BY VARYING VISCOSITY

Dissertation submitted to Mahatma Gandhi University for the partial fulfilment of the requirement for the award of the degree of

### MASTER OF SCIENCE IN PHYSICS

By

### FOUSIA M A

Reg. No: 200011012998

Year: 2020-2022

Under the guidance of

Dr. M KAILASNATH



## INTERNATIONAL SCHOOL OF PHOTONICS COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY KOCHI 680 022



**Department of Physics** 

SREE SANKARA COLLEGE, KALADY

2020-2022

DY John on Johnson

### INTERNATIONAL SCHOOL OF PHOTONICS

ഇന്റർനാഷണൽ സ്കൂൾ ഓഫ് ഫോട്ടോണിക്സ് COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY

കൊച്ചി ശാസ്ത്ര സാങ്കേതിക സർവ്വകലാശാല



KOCHI - 682 022 Kerala, India

Tel.: 0484-2575848, 2577540 : 0484-2862410, 2862411

Date.....

#### **CERTIFICATE**

This is to certify that the M.Sc. project entitled "Synthesis and thermal diffusivity study of Graphene quantum dots by varying viscosity" is the work done by Ms.Fousia M A, Reg. No. 200011012998 at International School of Photonics, Cochin University of Science and Technology, under my guidance in partial fulfillment of the requirements of the degree of Master of Science in Physics from Mahatma Gandhi University, Kottayam during the year 2020-2022.

Project supervisor

Dr. M. Kailasnath

Professor

International School of Photonics, CUSAT

Dr. M. Kailasnath Professor International School of Photonics Cochin University of Science and Technology Kochi - 682 022

### **CERTIFICATE**

This is to certify that the project work entitled "SYNTHESIS AND THERMAL DIFFUSIVITY STUDY OF GRAPHENE QUANTUM DOTS BY VARYING VISCOSITY" is a bonafide work of FOUSIA M A carried out at the International school of Photonics, CUSAT, in partial fulfilment for the award of Master of Science in Physics from MG University, Kottayam during the year 2020-2022 under my guidance and supervision.

Place:

Place: |cal ady | Date: 29 | 09 | 2022

Head of the Department

**Prof. BEN JOSE** 

Sree Sankara College, Kalady

### INFLUENCE OF Zn DOPING ON THE MATERIAL PROPERTIES OF TiO2

### **NANOTUBES**

### PROJECT REPORT

Submitted to

### MAHATMA GANDHI UNIVERSITY

In partial fulfilment of the requirement for the degree of

### MASTER OF SCIENCE IN PHYSICS

Submitted by

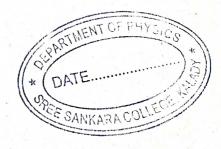
### GOPIKA KRISHNAN 200011012999

Under the supervision of

Dr. SINITHA B NAIR



## POST GRADUATE DEPARTMENT OF PHYSICS SREE SANKARA COLLEGE, KALADY



### DEPARTMENT OF PHYSICS SREE SANKARA COLLEGE, KALADY



### **CERTIFICATE**

This is to certify that the project work entitled "INFLUENCE OF Zn DOPPING ON THE MATERIAL PROPERTIES OF TiO2 NANOTUBES "is a bonafide work of GOPIKA KRISHNAN, Reg No:200011012999 carried out at the Post Graduate Department of Physics, Sree Sankara College, Kalady, in partial fulfilment for the award of Master of Science in Physics from MG University, Kottayam during the year 2020-2022 under my guidance and supervision and the work reported here in does not form part of any other thesis of dissertation.

Prof. BEN JOSE

Head of the department of Physics

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Dr SINITHA B NAIR

(Supervising Guide)

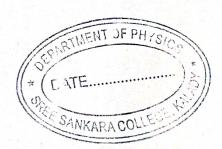
Asst.Professor, Dept of Physics

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**External Examiners** 

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## OPTICAL, STRUCTURAL AND ELECTRICAL PROPERTIES OF RF-SPUTTERED ZnO THIN FILMS

### PROJECT REPORT

Submitted to

### MAHATMA GANDHI UNIVERSITY

In partial fulfilment of the requirement for the degree of

### MASTER OF SCIENCE IN PHYSICS

Submitted by

KEERTHANA C.S

200011013000

Under the supervision of

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POST GRADUATE DEPARTMENT OF PHYSICS SREE SANKARA COLLEGE, KALADY,2022

### SREE SANKARA COLLEGE, KALADY



### POST GRADUATE DEPARTMENT OF PHYSICS

### **CERTIFICATE**

This is to certify that the project work entitled "OPTICAL, STRUCTURAL AND ELECTRICAL PROPERTIES OF RF-SPUTTERED ZnO THIN FILMS "is a bonafide work of KEERTHANA C.S, Reg No:200011013000 carried out at the Post Graduate Department of Physics, Sree Sankara College, Kalady, in partial fulfilment for the award of Master of Science in Physics from MG University, Kottayam during the year 2020-2022 under my guidance and supervision and the work reported here in does not form part of any other thesis of dissertation.

Prof BEN

Head of the department of Physics

Sree Sankara College Kalady

Dr MANJU T

(Supervising Guide)

Asst.Professor, Dept of Physics

Sree Sankara College Kalady

External Examiners

II. PRIYA S.S. Pruje

## SYNTHESIS AND THERMAL DIFFUSIVITY STUDY OF GRAPHENE QUANTUM DOTS BY VARYING CONCENTRATION

Dissertation submitted to Mahatma Gandhi University for the partial fulfilment of the requirement for the award of the degree of

### MASTER OF SCIENCE IN PHYSICS

By

### LAKSHMI P R

Reg. No: 200011013002

Year: 2020-2022

Under the guidance of

Dr. M KAILASNATH



## INTERNATIONAL SCHOOL OF PHOTONICS COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY KOCHI 680 022





Department of Physics

SREE SANKARA COLLEGE, KALADY

2020-2022

### INTERNATIONAL SCHOOL OF PHOTONICS

ഇന്റർനാഷണൽ സ്കൂൾ ഓഫ് ഫോട്ടോണിക്സ് COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY കൊച്ചി ശാസ്ത്ര സാങ്കേതിക സർവ്വകലാശാല



KOCHI - 682 022 Kerala, India

Tel.: 0484-2575848, 2577540 : 0484-2862410, 2862411

Date.....

#### CERTIFICATE

This is to certify that the M.Sc. project entitled "Synthesis and thermal diffusivity study of Graphene quantum dots by varying concentration" is the work done by Ms. Lakshmi P R, Reg. No. 200011013002 at International School of Photonics, Cochin University of Science and Technology, under my guidance in partial fulfillment of the requirements of the degree of Master of Science in Physics from Mahatma Gandhi University, Kottayam during the year 2020-2022.

Project supervisor

Dr. M. Kailasnath

Professor

International School of Photonics, CUSAT

Dr. M. Kailasnath
Professor
International School of Photonics
Cochin University of Science and Technology
Kochi - 682 022

### CERTIFICATE

This is to certify that the project work entitled "SYNTHESIS AND THERMAL DIFFUSIVITY STUDY OF GRAPHENE QUANTUM DOTS BY VARYING CONCENTRATION" is a bonafide work of LAKSHMI P R carried out at the International School of Photonics, CUSAT, in partial fulfilment for the award of Master of Science in Physics from MG University, Kottayam during the year 2020-2022 under my guidance and supervision.

Place: Kalady

Date: 29/09/22

Prof. BEN JOSE

Head of the Department

Sree Sankara College, Kalady

### MODELING OF AIR GLOW AS A FUNCTION OF SOLAR ACTIVITY

Project report submitted to

### MAHATMA GANDHI UNIVERSITY

in partial fulfillment of the requirement for the degree of

### MASTER OF SCIENCE IN PHYSICS

Submitted by

LIYA JACOB

Reg.No.200011013003

Under the Guidance of

Ms. NIMMI NARAYANAN



## POST GRADUATE DEPARTMENT OF PHYSICS SREE SANKARA COLLEGE, KALADY 2022



### SREE SAKARA COLLEGE KALADY,

### **DEPARTMENT OF PHYSICS**

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Ph.No:0484-2462341

### **CERTIFICATE**

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External Examiner 1.

Prof.BEN JOS

2.

Head of the Department





## SREE SANKARA COLLLEGE KALADY DEPARTMENT OF PHYSICS

### **POST BOX-1**

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### Ph.No.0484 2462341 CERTIFICATE

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Kalady

September 2020

NIMMI NARAYAN

Assistant Professor

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### OPTICAL, STRUCTURAL AND ELECTRICAL PROPERTIES OF ALUMINIUM DOPED ZnO THIN FILM

### PROJECT REPORT

Submitted to

### MAHATMA GANDHI UNIVERSITY

In partial fulfilment of the requirement for the degree of

### MASTER OF SCIENCE IN PHYSICS

By

**MERIN BENNY** 

200011013005

Under the supervision of

Dr. MANJU T



POST GRADUATE DEPARTMENT OF PHYSICS
SREE SANKARA COLLEGE, KALADY

### SREE SANKARA COLLEGE, KALADY



### POST GRADUATE DEPARTMENT OF PHYSICS

### CERTIFICATE

This is to certify that the project work entitled "OPTICAL, STRUCTURAL AND ELECTRICAL CHARACTERISATION OF RF-SPUTTERED ALUMINIUM DOPED ZnO THIN FILMS" is a bonafide work of MERIN BENNY, Reg No:200011013005 carried out at the Post Graduate Department of Physics, Sree Sankara College, Kalady, in partial fulfilment for the award of Master of Science in Physics from MG University, Kottayam during the year 2020-2022 under my guidance and supervision and the work reported here in does not form part of any other thesis of dissertation.

Prof. Ben Jos

Head of the Department of Physics

Sree Sankara College, Kalady

Dr. Manju. T

(Supervising Guide)

Asst. Professor, Dept. of Physics

Sree Sankara College, Kalady

**External Examiners** 

II. 20030 19 2123

### SYNTHESIS AND THERMAL DIFFUSIVITY STUDY OF GRAPHENE QUANTUM DOTS BY VARYING VISCOSITY

Dissertation submitted to Mahatma Gandhi University for the partial fulfilment of the requirement for the award of the degree of

### MASTER OF SCIENCE IN PHYSICS

By

### SREELAKSHMI SATHEESAN

Reg. No: 200011013007

Year: 2020-2022

Under the guidance of

Dr. M KAILASNATH



## INTERNATIONAL SCHOOL OF PHOTONICS COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY KOCHI 680 022



Department of Physics
SREE SANKARA COLLEGE, KALADY
2020-2022

Principal Evalued 1/29/213

### INTERNATIONAL SCHOOL OF PHOTONICS

ഇന്റർനാഷണൽ സ്കൂൽ ഓഫ് ഫോട്ടോണിക്സ് COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY കൊപ്പ് ഭാസ്ത്ര സാടേഷിക സർവ്വകലായാല



KOCH-582 222 Familia, India Tel. 0464-2575646, 2077540 0464-2502410, 2502411

Date

### CERTIFICATE

This is to certify that the M.Sc. project entitled "Synthesis and thermal diffusivity study of Graphene quantum dots by varying viscosity" is the work done by Ms.Sreelakshmi Satheesan, Reg. No. 200011013007 at International School of Photonics, Cochin University of Science and Technology, under my guidance in partial fidfillment of the requirements of the degree of Master of Science in Physics from Mahatma Gandhi University, Kottayam during the year 2020-2022.

Project supervisor

Dr. M. Kailasvath

Profesion

International School of Photonics, CUSAT

De AC Nocomments

## EFFECT OF Cu DOPPING ON THE MATERIAL PROPERTIES OF TiO2 NANOTUBES

### PROJECT REPORT

Submitted to

### MAHATMA GANDHI UNIVERSITY

In partial fulfilment of the requirement for the degree of

### MASTER OF SCIENCE IN PHYSICS

Submitted by

SURYA PS

200011013008

Under the supervision of

Dr. SINITHA B NAIR



POST GRADUATE DEPARTMENT OF PHYSICS
SREE SANKARA COLLEGE, KALADY

### SREE SANKARA COLLEGE, KALADY



### DEPARTMENT OF PHYSICS

### CERTIFICATE

This is to certify that the project work entitled "EFFECT OF Cu DOPPING ON THE MATERIAL PROPERTIES OF TiO2 NANOTUBES" is a bonafide work of SURYA P S, Reg No:200011013008 carried out at the Post Graduate Department of Physics, Sree Sankara College, Kalady, in partial fulfilment for the award of Master of Science in Physics from MG University, Kottayam during the year 2020-2022 under my guidance and supervision and the work reported here in does not form part of any other thesis of dissertation.

Prof. BEN JOSE

Head of the department of Physics

Sree Sankara College Kalady

Dr SINITHA B NAIR

Supervising Guide)

Asst.Professor, Dept of Physics

Sree Sankara College Kalady

**External Examiners** 

II. 10/22

OATE 30/9/22 CO

## OPTICAL, STRUCTURAL AND ELECTRICAL PROPERTIES OF RF-SPUTTERED ALUMINIUM DOPED ZnO THIN FILMS

Project Report submitted to

### MAHATMA GANDHI UNIVERSITY

In partial fulfilment of the requirement for the degree of

### MASTER OF SCIENCE IN PHYSICS

By

**SURYAPRABHA MR** 

200011013009

Under the supervision of

Dr. MANJU T



POST GRADUATE DEPARTMENT OF PHYSICS
SREE SANKARA COLLEGE, KALADY

### SREE SANKARA COLLEGE, KALADY



#### POST GRADUATE DEPARTMENT OF PHYSICS

### CERTIFICATE

This is to certify that the project work entitled "OPTICAL, STRUCTURAL AND ELECTRICAL CHARACTERISATION OF RF-SPUTTERED ALUMINIUM DOPED ZnO THIN FILMS" is a bonafide work of SURYAPRABHA MR, Reg No:200011013009 carried out at the Post Graduate Department of Physics, Sree Sankara College, Kalady, in partial fulfilment for the award of Master of Science in Physics from MG University, Kottayam during the year 2020-2022 under my guidance and supervision and the work reported here in

does not form part of any other thesis of dissertation.

Prof Ben Jos

Head of the department of Physics

Sree Sankara College, Kalady

Dr. Manju T

(Supervising Guide)

Asst. Professor, Dept. of Physics

Sree Sankara College, Kalady

**External Examiners** 

### EFFECT OF Cu DOPPING ON THE MATERIAL PROPERTIES OF TIO2 NANOTUBES

### PROJECT REPORT

Submitted to

### MAHATMA GANDHI UNIVERSITY

In partial fulfilment of the requirement for the degree of

### MASTER OF SCIENCE IN PHYSICS

Submitted by

VARNANA WILSON

200011013010

Under the supervision of

Dr. SINITHA B NAIR



POST GRADUATE DEPARTMENT OF PHYSICS
SREE SANKARA COLLEGE, KALADY

### SREE SANKARA COLLEGE, KALADY



### DEPARTMENT OF PHYSICS

### CERTIFICATE

This is to certify that the project work entitled "EFFECT OF Cu DOPPING ON THE MATERIAL PROPERTIES OF TiO2 NANOTUBES" is a bonafide work of VARNANA WILSON, Reg No:200011013010 carried out at the Post Graduate Department of Physics, Sree Sankara College, Kalady, in partial fulfilment for the award of Master of Science in Physics from MG University, Kottayam during the year 2020-2022 under my guidance and supervision and the work reported here in does not form part of any other thesis of dissertation.

Prof. BEN JOSE

Head of the department of Physics

Sree Sankara College Kalady

Dr SINITHA B NAIR

Supervising Guide)

Asst.Professor, Dept of Physics

Sree Sankara College Kalady

**External Examiners** 

I. Ann 30/19/2022

### COMPARISON OF OPTICAL AND STRUCTURAL PROPERTIES OF ANNEALED AND UNANNEALED ALUMINIUM DOPED ZINC OXIDE THIN FILMS BY TIME VARYING RF MAGNETRON SPUTTERING

Project report submitted to Mahatma Gandhi University in partial fulfilment of the requirement for Master Degree of Science in Physics

By MEGHA K. R Reg. No. 200011013004

Under the supervision of Smt. Priya S S Assistant Professor

POST GRADUATE DEPARTMENT OF PHYSICS SREE SANKARA COLLEGE, KALADY 2022





## SREE SANKARA COLLEGE, KALADY POST GRADUATE DEPARTMENT OF PHYSICS

#### CERTIFICATE

This is to certify that the project work entitled "COMPARISON OF OPTICAL AND STRUCTURAL PROPERTIES OF ANNEALED AND UNANNEALED ALUMINIUM DOPED ZINC OXIDE THIN FILMS BY TIME VARYING RF MAGNETRON SPUTTERING" is a genuine work of MEGHA .K.R ,Reg No:200011013004 carried out at the Post Graduate Department of Physics, Sree Sankara College, Kalady , in partial fulfilment for the award of Master of Science in Physics from MG University, Kottayam during the year 2020-2022 under my guidance and supervision and the work reported here in does not form part of any other thesis of dissertation .

Prof. Ben Jos

Head of the department of Physics

Guide

External Examiners

I. D. Mo

II.

Smt. Priya S S

Supervising

### SYNTHESIS AND THERMAL DIFFUSIVITY STUDY OF GRAPHENE QUANTUM DOTS BY VARYING CONCENTRATION

Dissertation submitted to Mahatma Gandhi University for the partial fulfilment of the requirement for the award of the degree of

#### MASTER OF SCIENCE IN PHYSICS

By

ANUMOL

Reg. No:200011012993

Year: 2020-2022

Under the guidance of

Dr. M KAILASNATH



# INTERNATIONAL SCHOOL OF PHOTONICS COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY KOCHI 680 022



Department of Physics
SREE SANKARA COLLEGE, KALADY
2020-2022

## INTERNATIONAL SCHOOL OF PHOTONICS

ഇന്റർനാഷണൽ സ്കൂൾ ഓഫ് ഫോട്ടോണിക്സ് COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY കൊച്ചി ശാസ്ത്ര സാങ്കേതിക സർവ്വകലാശാല



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Tel : 0484-2575848, 2577540 0484-2862410, 2862411

Date.....

#### CERTIFICATE

This is to certify that the M.Sc. project entitled "Synthesis and thermal diffusivity study of Graphene quantum dots by varying concentration" is the work done by Ms. Anumol. Reg. No. 200011012993 at International School of Photonics, Cochin University of Science and Technology, under my guidance in partial fulfillment of the requirements of the degree of Master of Science in Physics from Mahatma Gandhi University, Kottayam during the year 2020-2022.

Project supervisor

Dr. M. Kailasnath

Professor

International School of Photonics, CUSAT

Dr. M. Kailasnath Professor International School of Photonics Cochin University of Science and Technology Kochi - 082 022

#### CERTIFICATE

This is to certify that the project work entitled "SYNTHESIS AND THERMAL DIFFUSIVITY STUDY OF GRAPHENE QUANTUM DOTS BY VARYING CONCENTRATION" is a bonafide work of ANUMOL carried out at the International School of Photonics, CUSAT, in partial fulfilment for the award of Master of Science in Physics from MG University, Kottayam during the year 2020-2022 under my guidance and supervision.

Place: Kalady

Date: 29/9/2022

Prof. BEN JOSE

Head of the Department

Sree Sankara College, Kalady



Examiner: Dr. SINITHA B. NAIR CET



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#### **CERTIFICATE**

This is to certify that **ABHIRAMI A S,** Adm. No. E7867, First Semester B. Sc. Physics has completed a project titled **'Organic Manure Making'** as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

Dr. Minimol K. C.

**Course Coordinator** 

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#### **CERTIFICATE**

This is to certify that **AJINA CHANDRAN**, Adm. No. E8162, First Semester B. Sc. Physics has completed a project titled '**Organic Manure Making**' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **AKSHAY SIVAN**, Adm. No. E8369, First Semester B. Sc. Physics has completed a project titled '**Organic Manure Making**' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **ANUGRAHA KRISHNAN**, Adm. No. E7860, First Semester B. Sc. Physics has completed a project titled **'Organic Manure Making'** as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **ARJUNAN C R,** Adm. No. E8456, First Semester B. Sc. Physics has completed a project titled **'Organic Manure Making'** as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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This is to certify that **CHYTHANNYA MURALEEDHARAN**, Adm. No. E8370, First Semester B. Sc. Physics has completed a project titled **'Organic Manure Making'** as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **FELIX VADAKKUMCHERY**, Adm. No. E8074, First Semester B. Sc. Physics has completed a project titled '**Organic Manure Making**' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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This is to certify that **JUWELL ROSE BABU**, Adm. No. E8132, First Semester B. Sc. Physics has completed a project titled 'Organic Manure Making' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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This is to certify that **KRISHNA VIJAYAN**, Adm. No. E8017, First Semester B. Sc. Physics has completed a project titled 'Organic Manure Making' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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This is to certify that MALAVIKA PRABHAKAR, Adm. No. E7806, First Semester B. Sc. Physics has completed a project titled 'Organic Manure Making' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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This is to certify that **NIKHIL BALAKRISHNAN**, Adm. No. E8160, First Semester B. Sc. Physics has completed a project titled '**Organic Manure Making**' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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This is to certify that **RANJITH E T**, Adm. No. E7904, First Semester B. Sc. Physics has completed a project titled '**Organic Manure Making**' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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This is to certify that **RESHMA RAVI**, Adm. No. E8081, First Semester B. Sc. Physics has completed a project titled '**Organic Manure Making**' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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This is to certify that **SAHEERA RAHIM**, Adm. No. E8426, First Semester B. Sc. Physics has completed a project titled **'Organic Manure Making'** as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **SARA ABRAHAM**, Adm. No. E8290, First Semester B. Sc. Physics has completed a project titled **'Organic Manure Making'** as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **SASNA UNNI**, Adm. No. E8414, First Semester B. Sc. Physics has completed a project titled '**Organic Manure Making**' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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This is to certify that **SIVANI SIVADAS**, Adm. No. E8292, First Semester B. Sc. Physics has completed a project titled '**Organic Manure Making**' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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This is to certify that **STEEVA ROSE BIJU**, Adm. No. E7828, First Semester B. Sc. Physics has completed a project titled '**Organic Manure Making**' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **SURYANARAYANAN S**, Adm. No. E8043, First Semester B. Sc. Physics has completed a project titled '**Organic Manure Making**' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **ABHISHEK LALU**, Adm. No. E8364, First Semester B. Sc. Physics has completed a project titled '**Organic Manure Making**' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **ALBERT WILSON KACHAPPILLY**, Adm. No. E8443, First Semester B. Sc. Physics has completed a project titled '**Organic Manure Making**' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **JEFFIN JOY**, Adm. No. E7927, First Semester B. Sc. Physics has completed a project titled '**Organic Manure Making**' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **JOYAL M B,** Adm. No. E8430, First Semester B. Sc. Physics has completed a project titled 'Organic Manure Making' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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This is to certify that **LINCHUMOL BENNY**, Adm. No. E8342, First Semester B. Sc. Physics has completed a project titled 'Organic Manure Making' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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This is to certify that **MOHAMMED BILAL K S,** Adm. No. E8395, First Semester B. Sc. Physics has completed a project titled **'Organic Manure Making'** as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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This is to certify that **SANDRA MARIA JOHN**, Adm. No. E8148, First Semester B. Sc. Physics has completed a project titled **'Organic Manure Making'** as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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This is to certify that **SHILPA ANTOO**, Adm. No. E8255, First Semester B. Sc. Physics has completed a project titled '**Organic Manure Making**' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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This is to certify that **ALEENA JOY**, Adm. No. E8304, First Semester B. Sc. Physics has completed a project titled '**Organic Manure Making**' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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This is to certify that **AMAL SANTHOSH**, Adm. No. E8032, First Semester B. Sc. Physics has completed a project titled '**Organic Manure**' **Making**' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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This is to certify that **JYOTHISH SHAJU**, Adm. No. E7822, First Semester B. Sc. Physics has completed a project titled 'Organic Manure Making' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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This is to certify that **NAVANEETH SABU**, Adm. No. E7844, First Semester B. Sc. Physics has completed a project titled '**Organic Manure Making**' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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This is to certify that **PARVATHY VIKRAMAN**, Adm. No. E8038, First Semester B. Sc. Physics has completed a project titled 'Organic Manure Making' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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This is to certify that **SNEHA R NAIR**, Adm. No. E8041, First Semester B. Sc. Physics has completed a project titled **'Organic Manure Making'** as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **AJINA CHANDRAN**, Adm. No. E8162, Second Semester B. Sc. Physics has completed a project titled **'Organic Farming'** as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **AKSHAY SIVAN**, Adm. No. E8369, Second Semester B. Sc. Physics has completed a project titled '**Organic Farming**' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **ANUGRAHA KRISHNAN**, Adm. No. E7860, Second Semester B. Sc. Physics has completed a project titled **'Organic Farming'** as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **ARJUNAN C R**, Adm. No. E8456, Second Semester B. Sc. Physics has completed a project titled **'Organic Farming'** as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **CHYTHANNYA MURALEEDHARAN**, Adm. No. E8370, Second Semester B. Sc. Physics has completed a project titled '**Organic Farming**' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **FELIX VADAKKUMCHERY**, Adm. No. E8074, Second Semester B. Sc. Physics has completed a project titled **'Organic Farming'** as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **JUWELL ROSE BABU**, Adm. No. E8132, Second Semester B. Sc. Physics has completed a project titled '**Organic Farming**' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **KRISHNA VIJAYAN**, Adm. No. E8017, Second Semester B. Sc. Physics has completed a project titled **'Organic Farming'** as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that MALAVIKA PRABHAKAR, Adm. No. E7806, Second Semester B. Sc. Physics has completed a project titled 'Organic Farming' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **NIKHIL BALAKRISHNAN**, Adm. No. E8160, Second Semester B. Sc. Physics has completed a project titled '**Organic Farming**' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **RANJITH E T**, Adm. No. E7904, Second Semester B. Sc. Physics has completed a project titled **'Organic Farming'** as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **RESHMA RAVI**, Adm. No. E8081, Second Semester B. Sc. Physics has completed a project titled '**Organic Farming**' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **SAHEERA RAHIM**, Adm. No. E8426, Second Semester B. Sc. Physics has completed a project titled **'Organic Farming'** as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **SARA ABRAHAM**, Adm. No. E8290, Second Semester B. Sc. Physics has completed a project titled **'Organic Farming'** as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **SASNA UNNI**, Adm. No. E8414, Second Semester B. Sc. Physics has completed a project titled **'Organic Farming'** as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **SIVANI SIVADAS**, Adm. No. E8292, Second Semester B. Sc. Physics has completed a project titled **'Organic Farming'** as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **STEEVA ROSE BIJU**, Adm. No. E7828, Second Semester B. Sc. Physics has completed a project titled **'Organic Farming'** as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **SURYANARAYANAN S**, Adm. No. E8043, Second Semester B. Sc. Physics has completed a project titled **'Organic Farming'** as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **ABHISHEK LALU**, Adm. No. E8364, Second Semester B. Sc. Physics has completed a project titled '**Organic Farming**' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **ALBERT WILSON KACHAPPILLY**, Adm. No. E8443, Second Semester B. Sc. Physics has completed a project titled **'Organic Farming'** as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **JEFFIN JOY**, Adm. No. E7927, Second Semester B. Sc. Physics has completed a project titled **'Organic Farming'** as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **JOYAL M B**, Adm. No. E8430, Second Semester B. Sc. Physics has completed a project titled **'Organic Farming'** as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **LINCHUMOL BENNY**, Adm. No. E8342, Second Semester B. Sc. Physics has completed a project titled '**Organic Farming**' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **MOHAMMED BILAL K S**, Adm. No. E8395, Second Semester B. Sc. Physics has completed a project titled '**Organic Farming**' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **SANDRA MARIA JOHN**, Adm. No. E8148, Second Semester B. Sc. Physics has completed a project titled **'Organic Farming'** as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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This is to certify that **SHILPA ANTOO**, Adm. No. E8255, Second Semester B. Sc. Physics has completed a project titled **'Organic Farming'** as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **ABHIRAMI ANANTHAKRISHNAN**, Adm. No. E8067, Second Semester B. Sc. Physics has completed a project titled **'Organic Farming'** as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **ALEENA JOY**, Adm. No. E8304, Second Semester B. Sc. Physics has completed a project titled **'Organic Farming'** as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **AMAL SANTHOSH**, Adm. No. E8032, Second Semester B. Sc. Physics has completed a project titled '**Organic Farming**' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **JYOTHISH SHAJU**, Adm. No. E7822, Second Semester B. Sc. Physics has completed a project titled '**Organic Farming**' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **NAVANEETH SABU**, Adm. No. E7844, Second Semester B. Sc. Physics has completed a project titled **'Organic Farming'** as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

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#### **CERTIFICATE**

This is to certify that **PARVATHY VIKRAMAN**, Adm. No. E8038, Second Semester B. Sc. Physics has completed a project titled '**Organic Farming**' as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

Dr. Minimol K. C.

**Course Coordinator** 

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Principal



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#### **CERTIFICATE**

This is to certify that **SNEHA R NAIR**, Adm. No. E8041, Second Semester B. Sc. Physics has completed a project titled **'Organic Farming'** as part of the Massive Open Online Course of Mahatma Gandhi University on 'Organic Farming' during the academic year 2022-23.

Dr. Minimol K. C.

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#### **Certificate of Completion**

No. IOCT/010	AL EEGUA 100E	
This is to certify that	ALEESHA JUSE	of class
I B. Sc Physics	has successfully completed the Add-on C	
and Compatibles" (34 hours) con-	nducted by the Department of Physics from Jai	nuary 2023 to May
2023 The programme was conduc	cted as part of INDUSTRY ON CAMPUS (IOC), an	initiative of ASDC,
ASAP, Government of Kerala, in ass	sociation with Government Polytechnic College,	Perumbavoor.

Dr. Preethis Nair Principal, Sree Sankara

College, Kalady VAPPAN

Dr. Aiju thomas 683 Principal, Govt Polytechnic

College, Perumbavoor

IQAC Co-ordinator Kalady

Ďr. Manju T

Assoc. Prof. Ben Jos

Head, Dept. of Physics, Sree Sankara College Sree Sankara College, Kalady Dr. Sinitha B. Naix

Course Coordinator Sree Sankara College Kalady

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#### Certificate of Completion

No. IOCT/011	
This is to certify that	ANAGHA SATHEESH of class
I B.Sc Physics	of class
2023. The programme was conducted of	s successfully completed the Add-on Course on "Arduino d by the Department of Physics from January 2023 to May s part of INDUSTRY ON CAMPUS (IOC), an initiative of ASDC, on with Government Polytechnic College, Perumbayoor.

Dr. Preeth Name Dr. Aiju Thomas

Principal, Sree Sankara 683 Principal, Govt Polytechnic College, Kalady Prollege, Perumbayoor PRINCIPAL

OVI, POLYTECHNIC COLLEGE

Dr. Manju T

IQAC Co-ordinator Sree Sankara College Kalady

Assoc. Prof. Ben Jos

Head, Dept. of Physics, Sree Sankara College, Kalady Dr. Sinitha B. Naik

Course Coordinator Sree Sankara College

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#### Certificate of Completion

NO	. 10CT/01	2		
Thi	s is to cert	ify that	ANAND SUBRAMANYAN	of class
and	Compatib	les" (34 hours) co	onducted by the Department of Physics from January 2023	to May
202	3. The prog	ramme was cond	ucted as part of INDUSTRY ON CAMPUS (IOC), an initiative o	f ASDC,
ASA	P, Governm	ent of Kerala, in as	ssociation with Government Polytechnic College, Perumbavoo	or.

Dr. Preethi Noir

Principal, Sree Sankara College, Kalady

SREE SANKARA COLLE

Principal, Govt Polytechnic

College, Perumbavoor
PRINCIPAL
OVI, POLYTECHNIC COLLEGE

⊅r. Manju T

IQAC Co-ordinator Sree Sankara College Kalady

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Head, Dept. of Physics, Sree Sankara College, Kalady Dr. Sinitha B. Naix







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#### **Certificate of Completion**

No. IOCT/013 ANANYA P.M. of class This is to certify that ...... IB.Sc Physics has successfully completed the Add-on Course on "Arduino and Compatibles" (34 hours) conducted by the Department of Physics from January 2023 to May 2023. The programme was conducted as part of INDUSTRY ON CAMPUS (IOC), an initiative of ASDC, ASAP, Government of Kerala, in association with Government Polytechnic College, Perumbayoor.

Dr. Preethi Nair

Principal, Sree Sankara Bancipal, Govt Polytechnic College, Kalady, DY, P.C College, Perumbavoor

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POLYTECHNIC COLLEGE

Dr. Aiju Thomas

Dr. Manju

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Head, Dept. of Physics, Sree Sankara College Sree Sankara College, Kalady Dr. Sinitha B. Naix







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#### Certificate of Completion

No. IOCT/014	· ·
This is to certify that	BHAVANA MANOJ
and Compatibles" (34 hours) co	has successfully completed the Add-on Course on "Arduinonducted by the Department of Physics from January 2023 to May
, see and the see and the see and the see	sociation with Government Polytechnic College, Perumbayoor.

Dr. Preethi Nair

PRINCIPAL

Dr. Aiju Thomas

Principal, Sree Sankara 683 5 Principal, Govt Polytechnic College, Kalady APPADY P College, Perumbavoor SREE SANKARA COLLEGE SOVI, POLYTECHNIC COLLEGE

IQAC Co-ordinator Sree Sankara College Sree Sankara College, Kalady Kalady

Dr. Manju T

Assoc. Prof. Ben Jos Head, Dept. of Physics,

Dr. Sinitha B. Nair







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Head, Dept. of Physics,

Sree Sankara College Sree Sankara College, Kalady

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#### Certificate of Completion

1.01 2001, 525		
This is to certify that	FATHIMA NAZRIN	of class
•	has successfully completed the Add-on Cou	
and Compatibles" (34 hours) con	nducted by the Department of Physics from Janua	ary 2023 to May
2023. The programme was conduc	cted as part of INDUSTRY ON CAMPUS (IOC), an in	itiative of ASDC,
ASAP, Government of Kerala, in ass	sociation with Government Polytechnic College, Per	rumbavoor.

Dr. Aiju Thomas

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Principal, Sree Sankara 544 Principal, Govt Polytechnic College, Kalady PADY PO. College, Perumbayoor PRINCIPAL

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#### **Certificate of Completion**

This is to certify that	GAYATHRI S	of class
•	. has successfully completed the Add-o	
and Compatibles" (34 hours) cond	ucted by the Department of Physics from	n January 2023 to May
2023. The programme was conducted	ed as part of INDUSTRY ON CAMPUS (IOC)	, an initiative of ASDC,
ASAP, Government of Kerala, in asso	ciation with Government Polytechnic Colle	ge, Perumbavoor.

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#### **Certificate of Completion**

NO. 10C1/01/	
This is to certify that	MALAVIKA A. MANUMOHAN of class
-	has successfully completed the Add-on Course on "Arduino
and Compatibles" (34 hours) condu	ucted by the Department of Physics from January 2023 to May
2023. The programme was conducte	ed as part of INDUSTRY ON CAMPUS (IOC), an initiative of ASDC,
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#### **Certificate of Completion**

No. 10CT/018	NANO/A N/NOD	
This is to certify that	NAVYA VINOD	of class
	has successfully completed the Add	
and Compatibles" (34 hours) con-	ducted by the Department of Physics fro	om January 2023 to May
2023. The programme was conduc	ted as part of INDUSTRY ON CAMPUS (10	C), an initiative of ASDC,
ASAP, Government of Kerala, in asso	ociation with Government Polytechnic Co	llege, Perumbavoor.

Dr. Aiju Thomas Dr. Preethi Nois

Principal, Sree Sankara 354 Principal, Govt Polytechnic O College, Perumbavoor College, Katery APPADY

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#### Certificate of Completion

NO. 10C1/019		
This is to certify that	NIRANJANA RAJAN	of class
	has successfully completed the Add-on Co	
	conducted by the Department of Physics from Janu	
2023. The programme was con	ducted as part of INDUSTRY ON CAMPUS (IOC), an i	nitiative of ASDC,
ASAP, Government of Kerala, in	association with Government Polytechnic College, Pe	erumbavoor.

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### Certificate of Completion

NO. IOCT/020	•
This is to certify that	PRANAV C.S.
I B.Sc Physics	bas and of class
2023. The programme was condi	has successfully completed the Add-on Course on "Arduino onducted by the Department of Physics from January 2023 to May ucted as part of INDUSTRY ON CAMPUS (IOC), an initiative of ASDC, association with Government Polytechnic College, Perumbayoor.

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#### **Certificate of Completion**

	10CT/021		
This	is to certify that	RENIYA P. ZACHARIAH	of class
••••••		has successfully completed the Add-on Co	
and	Compatibles" (34 hours) co	onducted by the Department of Physics from Janu	Jary 2023 to May
2023	. The programme was cond	ucted as part of INDUSTRY ON CAMPUS (IOC), an i	nitiative of ASDC,
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Dr. Préethi Nair

Principal, Sree Sankara College, Kalady

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#### **Certificate of Completion**

, <u>-</u>		
This is to certify that	REVATHY K.H.	of olane
I B.Sc Physics	has successfully completed the Add-on Cou	Of Class
and Compatibles" (34 hours)	conducted by the Department of Physics from Janu	ary 2023 to May
2023. The programme was co	onducted as part of INDUSTRY ON CAMPUS (IOC), an ir	nitiative of ASDC
	in association with Government Polytechnic College. Pe	

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#### Certificate of Completion

	1001/025	
7	his is to certify that O	f class
	I B.Sc Physics  Has successfully completed the Add-on Course on "A	rduino
	nd Compatibles" (34 hours) conducted by the Department of Physics from January 2023	
2	23. The programme was conducted as part of INDUSTRY ON CAMPUS (IOC), an initiative of	ASDC,
A	AP, Government of Kerala, in association with Government Polytechnic College, Perumbavoo	r.

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College, Perumbavoor

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#### Certificate of Completion

10. 1001/021		
This is to certify that	SUMMAYA BAKKAR	of class
	s successfully completed the Add-on Course or	n "Arduino
	d by the Department of Physics from January 20	
2023. The programme was conducted as	s part of INDUSTRY ON CAMPUS (IOC), an initiative	e of ASDC,
ASAP, Government of Kerala, in association	on with Government Polytechnic College, Perumba	voor.

Dr. Preethi Nair

TOCT /024

Aiju Thomas

Principal, Sree Sankacaw. sagrincipal Govt Polytechnic College, Kalady OVAPPADY College, Perumbavoor

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#### **Certificate of Completion**

10. 1001/025		
This is to certify that	ABHIRAMI A.S.	of class
II B.Sc Physics ha		
and Compatibles" (34 hours) conducte	ed by the Department of Physics fro	m January 2023 to May
2023. The programme was conducted a	as part of INDUSTRY ON CAMPUS (100	C), an initiative of ASDC,
ASAP, Government of Kerala, in associati	ion with Government Polytechnic Co	llege, Perumbavoor.

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#### Certificate of Completion

NO. 10CT/026	
This is to certify that	ABHIRAMI ANANTHAKRISHNAN of class
II B.Sc Physics	
and Compatibles" (34 hours)	conducted by the Department of Physics from January 2023 to May
2023. The programme was con-	ducted as part of INDUSTRY ON CAMPUS (IOC), an initiative of ASDC,
ASAP, Government of Kerala, in a	association with Government Polytechnic College, Perumbavoor.

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cipal, Sree Sankaraes salvinapial, Govt Polytechnic College, Kaladia PPADY P. College, Perumbavoor PRINCIPAL PRINCIPAL

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Assoc. Prof. Ben Jos

Dr. Sinitha B. Naik







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#### **Certificate of Completion**

No. IOCT/027			
This is to certify that	ALEENA JOY	of class	
•			
and Compatibles" (34 hours) conducted by the Department of Physics from January 2023 to May			
2023. The programme was conducted as part of INDUSTRY ON CAMPUS (IOC), an initiative of ASDC,			
ASAP, Government of Kerala, in association with Government Polytechnic College, Perumbavoor.			

Dr. Preeth Nomas Dr. Aiju Thomas

Principal, Sree Sankaga, 68 Principal, Govt Polytechnic College, Kaladyoovappa0 College, Perumbavoor PRINCIPAL PRINCIPAL

20VI, POLYTECHNIC COLLEGE

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Dr. Sinitha B. Naik







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#### Certificate of Completion

NO. 10CT/028	
This is to certify that	JUWELL ROSE BABU of class
and Compatibles" (34 hours) conducted 2023. The programme was conducted as	successfully completed the Add-on Course on "Arduino by the Department of Physics from January 2023 to May part of INDUSTRY ON CAMPUS (IOC), an initiative of ASDC, with Government Polytechnic College, Perumbayoor.

Dr. Preethi Noir Dr. Aiju Thomas

Principal, Sree Sankara 683 544 Principal, Govt Polytechnic College, Kalado VAPPADY College, Perumbavoor

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#### **Certificate of Completion**

No. IOCT/029 II B.Sc Physics has successfully completed the Add-on Course on "Arduino and Compatibles" (34 hours) conducted by the Department of Physics from January 2023 to May 2023. The programme was conducted as part of INDUSTRY ON CAMPUS (IOC), an initiative of ASDC. ASAP, Government of Kerala, in association with Government Polytechnic College, Perumbayoor.

Dr. Preeth Neir Dr. Aiju Thomas Principal, Sree Servaçãos Principal, Govt Polytechnic College, Kalady P.O. College, Perumbayoor

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### **Certificate of Completion**

NO. 10CT/030	•
This is to certify that	MALAVIKA PRARHAKAD
and Compatibles" (34 hours) cond	MALAVIKA PRABHAKAR  has successfully completed the Add-on Course on "Arduino lucted by the Department of Physics from January 2023 to May sed as part of INDUSTRY ON CAMPUS (IOC), an initiative of ASDC, ociation with Government Polytechnic College, Perumbayoor.
	A 30/1 CIGHIDA VOOL

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College, Kalady DY P.O.

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Principal, Govt Polytechnic College, Perumbavoor

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#### **Certificate of Completion**

NO. 10C1/031			
This is to certify that	PARVATHY VIKRAMAN	of class	
	has successfully completed the Add-on Course		
	ucted by the Department of Physics from January		
2023. The programme was conducted as part of INDUSTRY ON CAMPUS (IOC), an initiative of ASDC,			
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Dr. Preethi Nair

KARA COLLEGE

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Aiju Thomas Principal, Govt Polytechnic

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Dr. Sinitha B. Naik Course Coordinator Sree Sankara College Kalady

Principal, Sree Sankara Principal, Governmentor



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#### **Certificate of Completion**

NO. 10C1/032		
This is to certify that	RESHMA RAVI	of class
•		
	onducted by the Department of Physics from Ja	
2023. The programme was cond	lucted as part of INDUSTRY ON CAMPUS (IOC), ar	n initiative of ASDC,
ASAP, Government of Kerala, in a	ssociation with Government Polytechnic College,	Perumbavoor.

Dr. Manju T

Dr. Preethi Noin Ailu Thomas

Principal, Sree Sankara 883 544 College, Perumbavoor College, Kalado, PRINCIPAL PRINCIPAL OVI., POLYTECHNIC COLLEGE

**IOAC Co-ordinator** Head, Dept. of Physics, Sree Sankara College Sree Sankara College, Kalady Kalady

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#### Certificate of Completion

No.	IOCT/033	CANDDA MADIA IOUN	
This	is to certify that	SANDRA MARIA JOHN of c	class
•••			uino
and	Compatibles" (34 hours)	conducted by the Department of Physics from January 2023 to	May
2023	. The programme was con	ducted as part of INDUSTRY ON CAMPUS (IOC), an initiative of As	SDC,
ASA	P, Government of Kerala, in	association with Government Polytechnic College, Perumbavoor.	K

Dr. Preethi Nair

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#### **Certificate of Completion**

100 1001/001		
This is to certify that	SURYANARAYANAN S.	of class
	has successfully completed the Add-on Cours	
	ducted by the Department of Physics from Januar	
2023. The programme was conduc	ted as part of INDUSTRY ON CAMPUS (IOC), an init	iative of ASDC,
ASAP, Government of Kerala, in ass	ociation with Government Polytechnic College, Peru	ımbavoor.

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#### **Certificate of Completion**

This is to certify that	SURYANARAYANAN S.	of class
II B.Sc Physics	has successfully completed the Add-on Course on	"Arduino
	cted by the Department of Physics from January 2023	
	d as part of INDUSTRY ON CAMPUS (IOC), an initiative of	
	ation with Government Polytechnic College, Perumbayo	

No. TOCT/034

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Principal, Sree Sankera Principal, Guve . ....

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#### Certificate of Completion

NO. 10C1/035		
This is to certify that	ADILA AJEED	of class
•	has successfully completed the Add-on Co	
and Compatibles" (34 hours) condu	icted by the Department of Physics from Janu	Jary 2023 to May
2023. The programme was conducted	ed as part of INDUSTRY ON CAMPUS (IOC), an i	nitiative of ASDC
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#### **Certificate of Completion**

NO. 10C1/036		
This is to certify that	AHALLYA T.S.	of class
I M.Sc Physics		se on "Arduino
	conducted by the Department of Physics from Januar	
2023. The programme was co	nducted as part of INDUSTRY ON CAMPUS (IOC), an init	iative of ASDC,
ASAP, Government of Kerala, ir	n association with Government Polytechnic College, Peru	mbavoor.

Dr. Preethi Nair

TOOM /026

Principal, Sree Sankara

Principal, Government of Principal, Government Principal, Govt Polytechnic

Dr. Ajju Thomas

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#### **Certificate of Completion**

NO. 10C1/03/		
This is to certify that	ANAND JAYAKUMAR	of class
•	has successfully completed the Add-on Cou	
and Compatibles" (34 hours)	) conducted by the Department of Physics from Janua	ary 2023 to May
2023. The programme was co	onducted as part of INDUSTRY ON CAMPUS (IOC), an in	itiative of ASDC,
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Dr. Preethi Nair

TOOM /027

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#### **Certificate of Completion**

This is to certify that	HARIKRISHNAN V.N.	of class
	onducted by the Department of Physics from Janua	
2023. The programme was cond	ducted as part of INDUSTRY ON CAMPUS (IOC), an init	tiative of ASDC,
ASAP, Government of Kerala, in c	association with Government Polytechnic College, Peru	umbavoor.

Dr. Preethi Nair Dr. Aiju Thomas Principal, Sree Sankara

TOCT/038

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Dr. Sinitha B. Nair







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#### **Certificate of Completion**

NO. 10C1/039	
This is to certify that	KARTHIKA GOPAKUMAR of class
I M.Sc Physics	nas successfully completed the Add-on Course on "Arduino
and Compatibles" (34 hours) conduc	ted by the Department of Physics from January 2023 to May
2023. The programme was conducted	as part of INDUSTRY ON CAMPUS (IOC), an initiative of ASDC,
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Dr. Sinitha B. Naix







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#### **Certificate of Completion**

No. 10CT/040		
This is to certify that	MANESH S. KUMAR	of class
•	s successfully completed the Add-on Course or	
and Compatibles" (34 hours) conducted	d by the Department of Physics from January 20	23 to May
2023. The programme was conducted as	is part of INDUSTRY ON CAMPUS (IOC), an initiativ	e of ASDC,
ASAP, Government of Kerala, in association	ion with Government Polytechnic College, Perumbo	voor.

Dr. Preethi Nair

Principal, Sree Sankara College Kalady

SANKARA COLLEGE

P/v Dr. Aiju/Thomas

Principal, Govt Polytechnic POLYTECHNIC COLLEGE

Dr. Manju T

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Dr. Sinitha B. Nair