

Smt. Radhabai Sarda Arts, Commerce & Science College,

Anjangaon Surji. District- Amravati (Maharashtra) 444705

NAAC Accredited 'A' with CGPA 3.21

#### **DEPARTMENT OF PHYSICS**

Certificate Course

Basics of Thin Film Technology

Session 2023-2024

#### DEPARTMENT OF PHYSICS

#### Report

Department of Physics has conducted Certificate Course entitled "Basics of thin film technology" consisting of 30 clock hours for B.Sc. students between 1/02/2024 to 20/02/2024. Total 48 students from B.Sc. part I were enrolled and successfully completed the above course. The basics ideas about thin film technology, its synthesis and characterization and possible applications in various fields were exposed to students by theoretical and experimental methods. Finally students were evaluated through course end examination. With the successful completion of the course students acquired the described course outcomes with specific knowledge.

DEPARTMENT OF PHYSICS CMT.RADHABA: SARDA COLLEGE ANJANGAON SURJI

PRINCIPAL Smt.Radhabai Sarda Aris, Commerce & Science College Anjangaon Surji



#### DEPARTMENT OF PHYSICS

Date: 2/1/2024

To,

The Hon'ble Principal, Smt. Radhabai Sarda College, Anjangaon Surji.

Subject: Permission for introducing Certificate Course for session 2023-2024

Respected Sir,

Department of Physics in its departmental meeting has decided to introduce a certificate course 'Basics Thin Film Technology' for the session academic session 2023-2024. The course will consist of 30 clock hour's duration including theoretical and practical work. So you are kindly requested to grant permission for the same.

Thanking you in anticipation.

Granded

PRINCIPAL Smt.Radhabai Sarda Aris, Commerce & Science College Anjangson Surji Yours Faithfully,

HEAD

DEPARTMENT OF PHYSICS TRADHABA SARDA COLLEGE WJANGAON SURJI



#### DEPARTMENT OF PHYSICS

Date: 7/1/2024

#### **Notice**

All the students of Science Faculty are hereby informed that Department of Physics has introduced Certificate Course entitled 'Basics of Thin Film Technology' for session 2023-2024. The course will commence from 1/02/2024 and consists of 30 clock hours. The interested students should forward their names to Shri R. B. Mankar on or before 30/01/2024.

DEPARTMENT OF PHYSICS SMT.RADHABA: SARDA COLLEGE ANJANGAON SURJI



#### DEPARTMENT OF PHYSICS

Course	Certificate course	
Title of course	Basics of thin film technology	
Session	2023-2024	
Duration of course	30 hours	
	Syllabus	
Unit I	Introduction to Film technology Thermodynamics and reactivity surfaces, Film formation: Nucleation, growth modes, Microstructure, Effect of substrate and growth rate	7 hours
Unit II	Thin film synthesis Physical Vapor Deposition techniques: Thermal evaporation, Resistive evaporation, Electron beam evaporation, Chemical Vapor Deposition techniques: Metal organic CVD (MOCVD), Plasma Enhanced CVD (PECVD), Thermally activated CVD, Spray pyrolysis	8 hours
Unit III	Thin film Characterization X-ray diffraction technique, UV- spectroscopy technique, FE-SEM technique, EDAX technique	8 hours
Unit IV	Applications Electrical and optical properties Application to Renewable energy technology Thin film solar cells	7 hours
Reference Book	<ol> <li>Thin Film Materials Technology by Hideaki Adachi, Kiyotaka Wa</li> <li>Hand book of Thin Film Technology by Hamid R Khan</li> <li>Introduction to Nanoscience and Nanotechnology by K.</li> <li>K. Chattopadhyay, A.N. Banerjee</li> </ol>	

DEPARTMENT OF PHYSICS





#### **DEPARTMENT OF PHYSICS**

Course	Certificate course	
Title of course	Basics of thin film techr	nology
Session	2023-2024	0 4
Duration of course	30 hours	
	Time Table and pr	oposed plan
Date	Time	Syllabus to be covered
1/02/2024	9.00 am – 11.00 am	
2/02/2024	9.00 am – 11.00 am	*****
3/02/2024	9.00 am – 11.00 am	Unit I
5/02/2024	9.00 am – 11.00 am	
6/02/2024	9.00 am – 11.00 am	
7/02/2024	9.00 am – 11.00 am	1127.11
8/02/2024	9.00 am – 11.00 am	Unit II
9/02/2024	9.00 am – 11.00 am	
10/02/2024	9.00 am – 11.00 am	
12/02/2024	9.00 am – 11.00 am	Unit III
13/02/2024	9.00 am – 11.00 am	
14/02/2024	9.00 am – 11.00 am	
15/02/2024	9.00 am – 11.00 am	Unit IV
16/02/2024	9.00 am – 11.00 am	
17/02/2024	9.00 am – 11.00 am	Examination
20/02/2024	4.00 pm	Result, certificate distribution



DEPARTMENT OF PHYSICS SMT.RADHABA; SARDA COLLEGE ANJANGAON SURJI



## DEPARTMENT OF PHYSICS

Course: Certificate Course Title of Course: Basics of thin Film Technology

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## DEPARTMENT OF PHYSICS

Course: Certificate Course Title of Course: Basics of Thin Film Technology

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Mr. Sahil Bhashkar Shingnapure	Ku. Rutuja Raosaheb Pakhan	Ku. Ruchika Sanjaysingh Khojare	Ku. Priyanka Siddharth Sardar	Ku. Prema Anil Makode	Mr. Nakul Divakar Tayde	Ku. Mahi Santosh Dhokane	Mr. Kuldip Ravindra Reche	Ku. Krutika Arunrao Arbad	Ku. Komal Prashant Potdukhe	Mr. Kaushal Jitendra Tayade	Mr. Kartik Ganesh Singh Jarole	Ku. Janhvi Prashant Pise	Ku. Ishika Sachinrao Chaukhande	Ku. Gayatri Rajesh Yewale	Ku. Gayatri Bajrangsinha Rajpurohit	Ku. Gauri Satish Kadu	Ku. Gauri Anil Maskare	Name of student
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#### Smt Radhabai Sarda Arts, commerce & Science College, Anjangaon Surji Department of Physics

#### Certificate course in Basics of Thin Film Technology

Time: 2 Hours

Q. 1	Att	empt any four	
	a)	What are the different factors affecting the thickness of film?	(4)
	b)	Give the applications of thin films	(4)
	c)	State the drawbacks of Physical Vapor Deposition techniques	(4)
	d)	Explain how substrate affects the growth of thin film	(4)
	e)	Explain four probe technique to measure resistivity of thin film	(4)
	f)	What are the advantages of CBD technique over PVD techniques?	(4)
Q.2	Atte	empt any two	
	a)	Explain briefly Chemical Bath Deposition technique for thin film synthesis.	(7)
	b)	Explain briefly Spray Pyrolysis technique for thin film deposition.	(7)
	c)	Explain various steps involved in thin film formation	(7)
		End	

Max Marks: 30

### Shri Sarda Education Society (Trust)'s Smt. Radhabai Sarda Arts, Commerce & Science College, Anjangaon Surji. District- Amravati 444705

#### DEPARTMENT OF PHYSICS

#### Certificate course

Title of course

: Basics of Thin Film Technology

Date of Examination: 17./2/2024

Max Marks

:30

Attendance sheet

	. Attenua	nce sheet
S.N.	Name of Student	Signature
1	Ku. Aarti Subhash Sagane	Sagene
2	Ku. Adiba Anjum Mukhtar Khan	di Aign
3	Mr. Aditya Suresh Bundile	-08
4	Ku. Akanksha Narandra Bhonde	Ankhanale
5	Mr. Akshay Devendra Sherkar	Theretor
6	Ku. Anisha Shrikrushna Kalpande	De.
7	Mr. Anuj Shriram Datir	Barto
8	Mr. Atharva Nitinrao Mankar	(Am)
9	Ku. Chanchal Jivan Dhule	Phule
10	Ku. Damini Suresh Neware	Revare.
11	Mr. Dev Manoj Ghadekar	Gol
12	Mr. Dipak Bhimrao More	Dipak-B-more
13	Ku. Divya Rambhau Gujar	ajin
14	Ku. Divyani Dinesh Dhurve	Jame,
15	Ku. Gauri Anil Maskare	Quaskare
16	Ku. Gauri Satish Kadu	y kachu
17	Ku. Gayatri Bajrangsinha Rajpurohit	Crayofres
18	Ku. Gayatri Rajesh Yewale	Gevjetri.
9	Ku. Ishika Sachinrao Chaukhande	Shakharole
20 1	Ku. Janhvi Prashant Pise	joise
1 1	Mr. Kartik Ganesh Singh Jarole	
2 1	Mr. Kaushal Jitendra Tayade	1
3 F	Ku. Komal Prashant Potdukhe	Boldware
4 K	Ku. Krutika Arunrao Arbad	BAATOOD.
5 N	Mr. Kuldip Ravindra Reche	Olu





26	Ku. Mahi Santosh Dhokane	Mahi
27	Mr. Nakul Divakar Tayde	Markacle
28	Ku. Prerna Anil Makode	Imalgude
29	Ku. Priyanka Siddharth Sardar	Quada.
30	Ku. Ruchika Sanjaysingh Khojare	Obligase
31	Ku. Rutuja Raosaheb Pakhan	IR AND MAIN
32	Mr. Sahil Bhashkar Shingnapure	S.B. stingnerpuso.
33	Ku. Sakshi Naresh Rekhate	Spekhale
34	Ku. Sakshi Santosh Bhongade	S.s. Bhongade
35	Ku. Sanika Ajabrao Ghule	. Dahule
36	Mr. Shantanu Sunilrao Patukale	Strtu
37	Ku. Shital Rajendra Bhave	8Bhave_
38	Ku. Shivani Manikaro Shirole	Oshirole.
39	Ku. Shivani Ravindra Ghule	Deb.
40	Ku. Shravani R. Khalokar	Rhalokaz
41	Ku. Shrutika Rajendara Gurav	ERLL.
42	Ku. Switi Radheshyam Shinde	Definde
43	Ku. Tanaya Satish Kharad	Feborad
44	Ku. Tanvi Ganesh Gorde	Pods
45	Ku. Tanvi Sunil Dongardive	Dingardine
46	Mr. Tejas Sureshrao Jawanjal	Estan !
47	Ku. Unnati Dinesh Ruchake	Melsele
48	Ku. Vedika Namdev Yeul	theas.



DEPARTMENT OF PHYSICS SMT.RADHABA: SARDA COLLEGE

#### Shri Sarda Education Society (Trust)'s Smt. Radhabai Sarda Arts, Commerce & Science College, Anjangaon Surji. District- Amravati 444705

#### **DEPARTMENT OF PHYSICS**

#### Certificate course

: Basics of thin Film Technology Title of course

Date of Examination: 17/2/2024

Max Marks : 30

#### Marks sheet

S.N.	Name of Student	Mar	ks Obtained
1	Ku. Aarti Subhash Sagane	20	Twenty
2	Ku. Adiba Anjum Mukhtar Khan	20	Twenty
3	Mr. Aditya Suresh Bundile	18	Eighteen
4	Ku. Akanksha Narandra Bhonde	21	Twenty one
5	Mr. Akshay Devendra Sherkar	18	Eighteen
6	Ku. Anisha Shrikrushna Kalpande	21	Twenty one
7	Mr. Anuj Shriram Datir	17	Seventeen
8	Mr. Atharva Nitinrao Mankar	19	Nineteen
9	Ku. Chanchal Jivan Dhule	28	Twenty Eight
10	Ku. Damini Suresh Neware	20	Twenty
11	Mr. Dev Manoj Ghadekar	18	Eighteen
12	Mr. Dipak Bhimrao More	23	Twenty three
13	Ku. Divya Rambhau Gujar	22.	Twenty two
14	Ku. Divyani Dinesh Dhurve	21	Twenty one
15	Ku. Gauri Anil Maskare	22	Twenty two
16	Ku. Gauri Satish Kadu	22	Tweny two
17	Ku. Gayatri Bajrangsinha Rajpurohit	22	Twenty two
18	Ku. Gayatri Rajesh Yewale	21	Twenty One
19	Ku. Ishika Sachinrao Chaukhande	20	Twenty
20	Ku. Janhvi Prashant Pise	20	Towenty
21	Mr. Kartik Ganesh Singh Jarole	20	Twenty
22	Mr. Kaushal Jitendra Tayade	17	Seventeen
23	Ku. Komal Prashant Potdukhe	20	Twenty
24	Ku. Krutika Arunrao Arbad	26	Twenty our
25	Mr. Kuldip Ravindra Reche	15	Fitten





26	Ku. Mahi Santosh Dhokane	20	Twenty
27	Mr. Nakul Divakar Tayde	16	Sixteen
28	Ku. Prerna Anil Makode	27	Twenty Seven
29	Ku. Priyanka Siddharth Sardar	23	Tweny three
30	Ku. Ruchika Sanjaysingh Khojare	23	Tweny three
31	Ku. Rutuja Raosaheb Pakhan	18	Eighteen
32	Mr. Sahil Bhashkar Shingnapure	16	Sixteen
33	Ku. Sakshi Naresh Rekhate	23	Twenty three
34	Ku. Sakshi Santosh Bhongade	23	Twenty three
35	Ku. Sanika Ajabrao Ghule	21	Twenty one
36	Mr. Shantanu Sunilrao Patukale	16	Sixteen
37	Ku. Shital Rajendra Bhave	19	Mineteen
38	Ku. Shivani Manikaro Shirole	20	Twenty
39	Ku. Shivani Ravindra Ghule	20	Twenty
40	Ku. Shravani R. Khalokar	20	Twenty
41	Ku. Shrutika Rajendara Gurav	19	Mineteen
42	Ku. Switi Radheshyam Shinde	16	Sixteen
43	Ku. Tanaya Satish Kharad	18	Eighteen
44	Ku. Tanvi Ganesh Gorde	21	Tweny one
45	Ku. Tanvi Sunil Dongardive	22	Twenty ho
46	Mr. Tejas Sureshrao Jawanjal	15	Fifteen
47	Ku. Unnati Dinesh Ruchake	18	Eighteen
48	Ku. Vedika Namdev Yeul	20	Twenty.



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DEPARTMENT OF PHYSICS SMT.RADHABAI SARDA COLLEGE ANJANGAON SURJI



Smt. Radhabai Sarda Arts, Commerce & Science College, Shri Sarda Education Society (Trust)'s

Anjangaon Surji, District- Amravati (Maharashtra) NAAC Accredited 'A' with CGPA 3.21

# Department of Physics

## Certificate

This is to certify that

Spfi/Ku. Chanchal Jivan Dhule Class B.Sc. I

has completed a Certificate Course entitled "Basics of Thin Film Technology" conducted by Departments of Physics from 1/2/2024 to 20/2/2024 and ranked 1.

Dung.

Shri R. B. Mankar Convener

Ben

Dr Bashisth Choubey Principal



Smt. Radhabai Sarda Arts, Commerce & Science College, Shri Sarda Education Society (Trust)'s

Anjangaon Surji, District- Amravati (Maharashtra) NAAC Accredited 'A' with CGPA 3.21

Department of Physics

## Certificate

This is to certify that

Shri/Ku. Prerna Anil Makode Class B.Sc. I

has completed a Certificate Course entitled "Basics of Thin Film Technology" conducted by Departments of Physics from 1/2/2024 to 20/2/2024 and ranked 2.



Shri R. B. Mankar Convener

Ber

Dr Bashisth Choubey Principal

Smt. Radhabai Sarda Arts, Commerce & Science College, Anjangaon Surji.

District- Amravati (Maharashtra) 444705 NAAC Accredited 'A' with CGPA 3.21

#### DEPARTMENT OF PHYSICS

Certificate course in

Basics of Thin Film Technology

Application Form (Session 2023-2024)

1. Applicant's name: ky. Chanchal Jivan Dhule

2. Father's Name : Jivan Shaikaushna Dhule

3. Address : At. Post Pandhari (Kha)

To: Anjangaon Suzji Dist: Armoavati

4. Email : poatikdhule 16@gmail.com

5. Mobile No. : 9860036054

6. Gender : Female

7. Date of Birth : 14-09-2003

8. Studying in Class: B.Sc-I

9. Subjects Offered: Eng. Mar, Phy, Computer Sci, Mothe

10. College ID : 4669

I certify that the information I have given in this application is true. I am aware of rules and regulations of certificate course

Applicant's Signature

Smt. Radhabai Sarda Arts, Commerce & Science College, Anjangaon Surji.

District- Amravati (Maharashtra) 444705

NAAC Accredited 'A' with CGPA 3.21

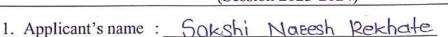
#### DEPARTMENT OF PHYSICS

Certificate course in

Basics of Thin Film Technology

Application Form

(Session 2023-2024)



2. Father's Name : Nasesh kisan Rekhate

3. Address : Shivaji Nagaz,

Anjangaon Sueji.

4. Email : Sakshi Eekhate 14 @gmail.com

5. Mobile No. : 7020124902

6. Gender : Female

7. Date of Birth : 14 / 01 / 2005

8. Studying in Class: B.Sc-I

9. Subjects Offered: Eng, Maz Phy Maths computer sci.

10. College ID : 47.57

I certify that the information I have given in this application is true. I am aware of rules and regulations of certificate course

Applicant's Signature



#### Smt. Radhabai Sarda Arts, Commerce & Science College,

Anjangaon Surji, District- Amravati (Maharashtra)

NAAC Accredited 'A' with CGPA 3.21

#### **Department of Physics**

### Certificate

This is to certify that

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Shri R. B. Mankar Convener

Dr Bashisth Choubey Principal