# DR. AMBEDKAR COLLEGE,

# DEEKSHABHOOMI, NAGPUR-10

## DEPARTMENT OF PHYSICS

Name of the Programme : **Certificate Course in Nanoscience and Technology for BSc Students**

Date of the Programme :(**1/2/2020 -30/4/2020**)

Number of Participants : 25

Hosted by :Department of Physics

## Report of Certificate Course in Nanoscience and Technology for BSc Students

A Certificate Course in Nanoscience and Technology for the students of BSc was organized by Department of Physics from 1/2/2020 to 30/4/2020. The sanction for this course was obtained from Department of Lifelong Learning and Extension under Jeevan Shikshan Abhiyan on No Grant Basis. This scheme was under Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur.

Under this scheme, 25 students were admitted. Students were taught the prescribed syllabus along with practical and Project.

Classes were conducted by the faculty members of Physics Department.

A total fee of 500/ Rs was charged per student. The whole course was coordinated by Head of the Department of Physics Dr K.G. Rewatkar. Classes were conducted every day for a duration of 1 hour and faculty members of Physics used to engage the class for about 1 hour.

At the end of the course, a test was conducted and result was declared amongst the students.

Certificates were distributed amongst the students after the completion of the certificate course.

## Certificate Course in Nanoscience and Nanotechnology

Session 2019 – 2020

Date : 1st February to 30th April

| Sr. No. | Students Name | Semester |
|---|---|---|
| 1 | Mansi Sabne | Sem IV |
| 2 | Bhupali Kalita | Sem IV |
| 3 | Fatema Fidvi | Sem II |
| 4 | Samrudhi Shahu | Sem II |
| 5 | Vaishnavi Uikey | Sem II |
| 6 | Devashish Katare | Sem II |
| 7 | Gaurav Balapure | Sem II |
| 8 | Ashwin Chavan | Sem II |
| 9 | Shrutika Patinga | Sem II |
| 10 | Arya Akhare | Sem IV |
| 11 | Aditya Waghaye | Sem VI |
| 12 | Jatin Singh Machhirke | Sem VI |
| 13 | Tushar Gahane | Sem VI |
| 14 | Shreyash More | Sem IV |
| 15 | Nikita Sonawane | Sem IV |
| 16 | Nayan Adwani | Sem II |
| 17 | Renu Yadav | Sem IV |
| 18 | Ankit Mishra | Sem IV |
| 19 | Sakshi Channe | Sem IV |
| 20 | Shreya Akhand | Sem IV |
| 21 | Sheetal Lakra | Sem IV |
| 22 | Gauri Belkhede | Sem IV |
| 23 | Chaitanya Hanote | Sem II |
| 24 | Rahul Wasnik | Sem IV |
| 25 | Dhanvijay Bansod | Sem IV |

Head

Sample copy

Dr. K. G. Kewalkar

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY
Established by Government of Central Provinces Education Department by Notification No. 513 dated the 1st of August, 1923 & presently a State University governed by Maharashtra Public Universities Act, 2016 (Mah. Act No. VI of 2017)

**DEPARTMENT OF LIFELONG LEARNING AND EXTENSION**

Gurunanak Bhavan, University Campus, Amravati Road, Nagpur - 440 033. Phone : 2530860
E-mail : doll_rtmnu@gmail.com

To,
The Principal
Dr. Ambedkr College,
Nagpur,

No.DOLLE/245/19
Dated : 22.10. 2019

**Subject :** **Sanction for Conducting Short Term Courses under Jeevan Shikshan Abhiyan on No Grant Basis.**

Sir/Madam,

With reference to your proposal for conducting Short Term courses indicated below under Jeevan Shikshan Abhiyan of this Department, I am to inform you that your proposal has been accepted by the Department and your College has been granted permission to conduct the course on the following conditions:

**Details of the Course**

| Sr. No. | Name of the Course | Duration | No. of Candidates to be admitted | Fees to be Charged per Student | Fees to be Deposited With the Deptt. |
|---|---|---|---|---|---|
| 1 | Certificate Course in Nanoscience and Nanotechnology | 3 Months | 25 | 500/- | 10% |
| 2 | Certificate Course in Serology and n DNA Analysis | 3 Months | 25 | 8000/- | 10% |
| 3 | Certificate Course in Bioinformatics | 3 Months | 25 | 25000/- | 10% |
| 4 | Certificate Course in Electronics | 3 Months | 25 | 1000/- | 10% |
| 5 | Certificate Course in Verbal Proficiency in English | 3 Months | 25 | 200/- | 10% |

**Rules & Regulations of this Department regarding these courses should be strictly followed.**

1. **This sanction is valid for this particular Batch only.**
2. Fees for the course should be charged as per the norms prescribed.
3. Expenditure on the course should be incurred as per norms.
4. Course should be started within a Month from **the date of sanction.**
   Please communicate your acceptance within **a month and submit Initial Report Along with list of students admitted.**

Your's faithfully,

pwatkar 22/10/2019
Director

Sample copy

Rashtrasant Tukdoji Maharaj Nagpur University

## Board of Lifelong Learning and Extension

# *CERTIFICATE*

Award this certificate to shri/smt./Ku. Mansi Sabne

On satisfactory completion of the **Nanoscience and Nanotechnology** Certificate course under Jeevan Shikshan Abhiyan run by Department of Lifelong Learning and Extension in Collaboration with **Dr. Ambedkar College Deekshabhoomi Nagpur from 01/02/2020 to 30/04/2020**

He/**She** Passed at the examination in Grade A

Dr. K. G. Rewatkar
Course Co-ordinator
Dr. Ambedkar College
Deekshabhoomi Nagpur

HEAD
DEPARTMENT OF PHYSICS
DR. AMBEDKAR COLLEGE
Deekshabhoomi, Nagpur-10.

Dr. (Mrs.) B. A. Mehere
Principal, Dr. Ambedkar
College Deekshabhoomi
Nagpur

Officiating Principal,
Dr. Ambedkar College,
Deekshabhoomi,
NAGPUR.

Director
Dept. of Lifelong Learning and
Extension, R.T.M. Nagpur University

Director
Dept. of Lifelong Learning & Education
Rashtrasant Tukadoji Maharaj
Nagpur University

# Syllabus

## Certificate course in Nanoscience and Nanotechnology

**Course module 10 Point**

**Unit I: Introduction to Nanoscience and Nanotechnology,**

Difference between nano-material's and bulk materials, Reduction of dimensions 3D, 2D, 1D, 0D materials, various morphologies of nano-materials, Bottom up and top down approaches, size dependent physical properties, Nano cluster.

**Unit II: Nano material characterizations**

Determination of size of nanoparticles by particle analyzer (BET) and XRD and Debye- Scherer's formula, Surface electron microscopy, transmission electron microscopy.

**Unit-III Synthesis of Nonmaterial's**

**Physical method:** Bottom up-Ball Milling, Melt mixing, Physical vapour deposition, Chemical methods: Chemical vapour deposition, Synthesis of metal Sol-gel method, Coprecipitation, Wet chemical method, capping techniques (introduction)

**Unit-IV. Properties of Nano-materials**

Mechanical, Thermal, Electrical, Optical, Magnetic and Structural properties of nanomaterials. Carbon nanostructures (CNT) - Fabrication, structure, electrical properties and mechanical properties (Introduction)

Text and Reference Books:


1. Nanotechnology: Principles & Practicals. Sulbha K. Kulkarni, Capital Publishing Co.New Delhi.

2. Carbon nanotechnology.. recent developments in Chemistry, Physics, materials science and device applications, -Elsevier Science

3. Nanostructures & Nanomaterials Synthesis, Properties & Applications. Guozhong Cao, Imperials College Press London.

4. Physics, Chemistry and Application of Nanostructures, world scientific co.

5. Nanomaterials: Synthesis, Properties & Applications. Edited by A.S. Edelstein & R.C.Commorata. Institute of Physics Publishing, Bristol & Philadelphia.

# Syllabus

## Certificate course in Nanoscience and Nanotechnology

**Practical**

**Course module 10 Point**

1. Synthesis nanomaterials by following techniques

    1. sol gel method, 2. cop-precipitation 3. combustion method 4. vapour deposition

2. Study of X-ray diffractograph of nanocrystalline materials and determination of various parameters
3. Study of Transmissions electron microscopy,
4. Study of dielectric parameters of nanomaterials
5. Study of morphological parameters by using surface electron microscope
6. Study of BH-curve of nano- material
7. Study of magnetic susceptibility and Curie temperature measurement using Gouy Balance

**Project:**

**Course module 30 Point**

**Research project**

Students are required to carry out a research project of three months duration related to Nanoscience/Nanotechnology. Each student is assigned with a supervisor from amongst the panel of teachers. Student will be required to write a report on the basis of research/training on nanomaterials in an established research laboratory/ industry. Research project involved a structured investigation of research nature. The length of the report is expected not to exceed more than 50 pages.

# Dr. Ambedkar College Deekshabhoomi Nagpur

**Course:** Certificate Course in Nanoscience and Nanotechnology

## Teaching Plan

| Lecture (Hr) | Date | Topic of Lecture | Faculty |
|---|---|---|---|
| **7 Hr** | **Module 1: Introduction of Nanoscience and nanotechnology** | | |
| 1 Hr | 01/02/2020 | nanomaterials and bulk materials | |
| 1 Hr | 03/02/2020 | nanomaterials and bulk materials | |
| 1 Hr | 04/02/2020 | Difference between them | |
| 1 Hr | 05/02/2020 | Reduction of dimensions 3D, 2D, 1D, 0D materials | Dr. K. G. Rewatkar |
| 1 Hr | 06/02/2020 | Reduction of dimensions 3D, 2D, 1D, 0D materials | |
| 1 Hr | 07/02/2020 | various morphologies of nanomaterials | |
| 1 Hr | 08/02/2020 | various morphologies of nanomaterials | |
| **8 Hr** | **Module 2: Synthesis of Nanomaterials** | | |
| 1 Hr | 10/02/2020 | Bottom up and top down approaches | |
| 1 Hr | 11/02/2020 | Physical synthesis methods | |
| 1 Hr | 12/02/2020 | Physical synthesis methods | |
| 1 Hr | 13/02/2020 | Wet chemical, Sol-gel | Dr. A. N. Wazalwar |
| 1 Hr | 14/02/2020 | HCR Technique | |
| 1 Hr | 15/02/2020 | Chemical synthesis methods | |
| 1 Hr | 17/02/2020 | Chemical synthesis methods | |
| 1 Hr | 18/02/2020 | size dependent physical properties | |
| **5 Hr** | **Module 3: Characterization of Nanomaterials** | | |
| 1 Hr | 19/02/2020 | Nano cluster | |
| 1 Hr | 20/02/2020 | Determination of size of nanoparticles by particle analyzer(BET) | |
| 1 Hr | 21/02/2020 | Determination of size of nanoparticles by Debye- Scherer's formula | Dr. N. S. Meshram |
| 1 Hr | 22/02/2020 | Characterization technique of SEM | |
| 1 Hr | 24/02/2020 | Characterization technique of TEM | |
| **10 Hr** | **Module 4: Application of Nanomaterials** | | |
| 1 Hr | 25/02/2020 | application of nanomaterials in Medical field | |
| 1 Hr | 26/02/2020 | application of nanomaterials in Defense | |
| 1 Hr | 27/02/2020 | application of nanomaterials in Fuel cell Technology | |
| 1 Hr | 28/02/2020 | application of nanomaterials in Engineering | |
| 1 Hr | 29/02/2020 | application of nanomaterials in Biotechnology | Dr. A. R. Bansod |
| 1 Hr | 02/03/2020 | application of nanomaterials in Chemistry | |
| 1 Hr | 03/03/2020 | application of nanomaterials in Genetics | |
| 1 Hr | 04/03/2020 | application of nanomaterials in Quantum computing | |
| 1 Hr | 05/03/2020 | application of nanomaterials in Digital Electronics | |
| 1 Hr | 06/03/2020 | application of nanomaterials in Magnetism | |
| | | **Total lecture in Hrs ( 30 ).** | |

Dr. K. G. Rewatkar
HEAD
Course Coordinator
DEPARTMENT OF PHYSICS
DR. AMBEDKAR COLLEGE

# Dr. Ambedkar College Deekshabhoomi Nagpur

**Course:** Certificate Course in Nanoscience and Nanotechnology

**Teaching Plan**

| Lecture No. | Date | Topic of Lecture | Faculty |
|---|---|---|---|
| 1 | 01/02/2020 | nanomaterials and bulk materials | Dr. K. G. Rewatkar |
| 2 | 03/02/2020 | nanomaterials and bulk materials | |
| 3 | 04/02/2020 | Difference between them | |
| 4 | 05/02/2020 | Reduction of dimensions 3D, 2D, 1D, 0D materials | |
| 5 | 06/02/2020 | Reduction of dimensions 3D, 2D, 1D, 0D materials | |
| 6 | 07/02/2020 | various morphologies of nanomaterials | |
| 7 | 08/02/2020 | various morphologies of nanomaterials | |
| 8 | 10/02/2020 | Bottom up and top down approaches | Dr. A. N. Wazalwar |
| 9 | 11/02/2020 | Physical synthesis methods | |
| 10 | 12/02/2020 | Physical synthesis methods | |
| 11 | 13/02/2020 | Wet chemical, Sol-gel | |
| 12 | 14/02/2020 | HCR Technique | |
| 13 | 15/02/2020 | Chemical synthesis methods | |
| 14 | 17/02/2020 | Chemical synthesis methods | |
| 15 | 18/02/2020 | size dependent physical properties | Dr. N. S. Meshram |
| 16 | 19/02/2020 | Nano cluster | |
| 17 | 20/02/2020 | Determination of size of nanoparticles by particle analyzer(BET) | |
| 18 | 21/02/2020 | Determination of size of nanoparticles by Debye- Scherer's formula | |
| 19 | 22/02/2020 | Characterization technique of SEM | |
| 20 | 24/02/2020 | Characterization technique of TEM | |
| 21 | 25/02/2020 | application of nanomaterials in Medical field | Dr. A. R. Bansod |
| 22 | 26/02/2020 | application of nanomaterials in Defence | |
| 23 | 27/02/2020 | application of nanomaterials in Fuel cell Technology | |
| 24 | 28/02/2020 | application of nanomaterials in Engineering | |
| 25 | 29/02/2020 | application of nanomaterials in Biotechnology | |
| 26 | 02/03/2020 | application of nanomaterials in Chemistry | |
| 27 | 03/03/2020 | application of nanomaterials in Genetics | |
| 28 | 04/03/2020 | application of nanomaterials in Quantum computing | |
| 29 | 05/03/2020 | application of nanomaterials in Digital Electronics | |
| 30 | 06/03/2020 | application of nanomaterials in Magnetism | |

Dr. K. G. Rewatkar

Course Coordinator

HEAD
DEPARTMENT OF PHYSICS
DR. AMBEDKAR COLLEGE
Deekshabhoomi, Nagpur-10

RASHTRASANT TUKDOJI MAHARAJ NAGPUR UNIVESITY

# DEPARTMENT OF LIFELONG LEARNING AND EXTENSION

## INITIAL REPORT UNDER JEEVAN SHIKSHAN COURSES

1. Name of Course : **Certificate course in Nanoscience and Nanotechnology**
2. Name of the college/ Departments organizing: **Department of Physics, Dr. Ambedkar College Deekshabhoomi Nagpur** Phone 9822426769
3. Name of address of the course co-ordinator: **Dr. K. G. Rewatkar, Professor, Dept. of Physics, Dr. Ambedkar College Deekshabhoomi Nagpur** Phone 9822426769
4. Venue of the course with full address : **Dr. Ambedkar College Deekshabhoomi Nagpur**
5. Date of starting the course : **01/02/2020**
6. Timing of the course : **2:00-3:00 PM**
   (Attach a copy of time table
7. Duration : **30 Hours**
8. Medium of instruction : **English**
9. No. of students admitted : **25**
   (Attach a list with Names)
10. Accommodation available : **Yes**
    (Class Rooms) with furniture
    Keeping in view the No. of
    Candidates to be admitted to
    The course
11. Information of the faculty members

| Sr. No. | Name | Topics to be taught | Full Postal Address | Phone No. if any |
|---|---|---|---|---|
| 1 | Dr. K. G. Rewatkar | Basics of Nanoscience and Nanotechnology | Dept. of Physics, Dr. Ambedkar College Deekshabhoomi Nagpur | 9822426769 |
| 2 | Dr. A. N. Wazalwar | Synthesis methods of Nanomaterials | Dept. of Physics, Dr. Ambedkar College Deekshabhoomi Nagpur | 9611055888 |
| 3 | Dr. N. S. Meshram | Characterization of Nanomaterials | Dept. of Physics, Dr. Ambedkar College Deekshabhoomi Nagpur | 9970032785 |
| 4 | Dr. A. R. Bansod | applications of Nanoscience and Nanotechnology | Dept. of Physics, Dr. Ambedkar College Deekshabhoomi Nagpur | 9923024400 |

12. Any other matter relating the course : **No**
13. Total fees charged per student : **Rs. 500/-**
14. Amount of Enrolment : **Rs. 11250 /-**
    Fees to be deposited with the Dept.

Dr. (Mrs.) B. A. Mehere

Signature and Seal of the
College/Head of the institution
Officiating Principal,
Dr. Ambedkar College,
Deekshabhoomi,
NAGPUR.

Dr. K. G. Rewatkar

Signature and Seal of the
Course Co-ordinator
HEAD
DEPARTMENT OF PHYSICS
DR. AMBEDKAR COLLEGE

23/11/2021

# Dr. Ambedkar College Deekshabhoomi Nagpur

## Department of Physics

### Certificate Course in Nanoscience and Nanotechnology

### Time –Table 2019-2020

w.e.f. 01/02/2020

| Day | Time | Teacher |
|---|---|---|
| Monday | 2:00 PM -3:00 PM | Dr. K. G. Rewatkar |
| Tuesday | - | - |
| Wednesday | 2:00 PM -3:00 PM | Dr. A. N. Wazalwar |
| Thursday | - | - |
| Friday | 2:00 PM -3:00 PM | Dr. N. S. Meshram/ Dr. A. R. Bansod |
| Saturday | - | - |

Dr. (Mrs.) B. A. Mehere

Signature and Seal of the
College/Head of the institution

Officiating Principal,
Dr. Ambedkar College,
Deekshabhoomi,
NAGPUR.

Dr. K. G. Rewatkar

Signature and Seal of the
Course Co-ordinator

HEAD
DEPARTMENT OF PHYSICS
DR. AMBEDKAR COLLEGE
Deekshabhoomi, Nagpur-10

Rashtrasant Tukdoji Maharaj Nagpur University

# Board of Lifelong Learning and Extension

Name of Exam: **Certificate course in Nanoscience and Nanotechnology**

## SCORESHEET

| Sr. No. | Name of Student | Marks Obtained out of 100 | Grade |
|---|---|---|---|
| 1 | Mansi Sabne | 84 | A |
| 2 | Bhupal Kalita | 82 | A |
| 3 | Fatema Fidvi | 83 | A |
| 4 | Samrudhi Shahu | 84 | A |
| 5 | Vaishnavi Uikey | 82 | A |
| 6 | Devashish Katare | 81 | A |
| 7 | Gaurav Balapure | 83 | A |
| 8 | Ashwin Chavan | 81 | A |
| 9 | Shrutika Patinga | 84 | A |
| 10 | Arya Akhare | 83 | A |
| 11 | Aditya Waghaye | 82 | A |
| 12 | Jatin singhn Machhirke | 81 | A |
| 13 | Tushar Gahane | 86 | A |
| 14 | Shreyash More | 81 | A |
| 15 | Nikita Sonawane | 88 | A |
| 16 | Nayan Adwani | 82 | A |
| 17 | Renu Yadav | 86 | A |
| 18 | Ankit Mishra | 84 | A |
| 19 | Sakshi Channe | 85 | A |
| 20 | Shreya Akhand | 81 | A |
| 21 | Sheetal Lakra | 82 | A |
| 22 | Gauri Belkhede | 86 | A |
| 23 | Chatanya Hanote | 84 | A |
| 24 | Rahul Wasnik | 82 | A |
| 25 | Dhanvijay Bansod | 86 | A |

Dr. K. G. Rewatkar
Course Co-ordinator
Dr. Ambedkar College
Deekshabhoomi Nagpur

HEAD
DEPARTMENT OF PHYSICS
DR. AMBEDKAR COLLEGE
Deekshabhoomi, Nagpur-10

Dr. (Mrs.) B. A. Mehere
Principal
Dr. Ambedkar College
Deekshabhoomi Nagpur

Officiating Principal,
Dr. Ambedkar College,
Deekshabhoomi,
NAGPUR

No - Acl 379/2019-20

Date: 05/03/

To,
The Director,
Deptt. of Lifelong learning And
Extension, R.T.M. Nagpur University

**Subject:** **Initial report of short term certificate courses started and enrollment fees.**

Respected Sir,

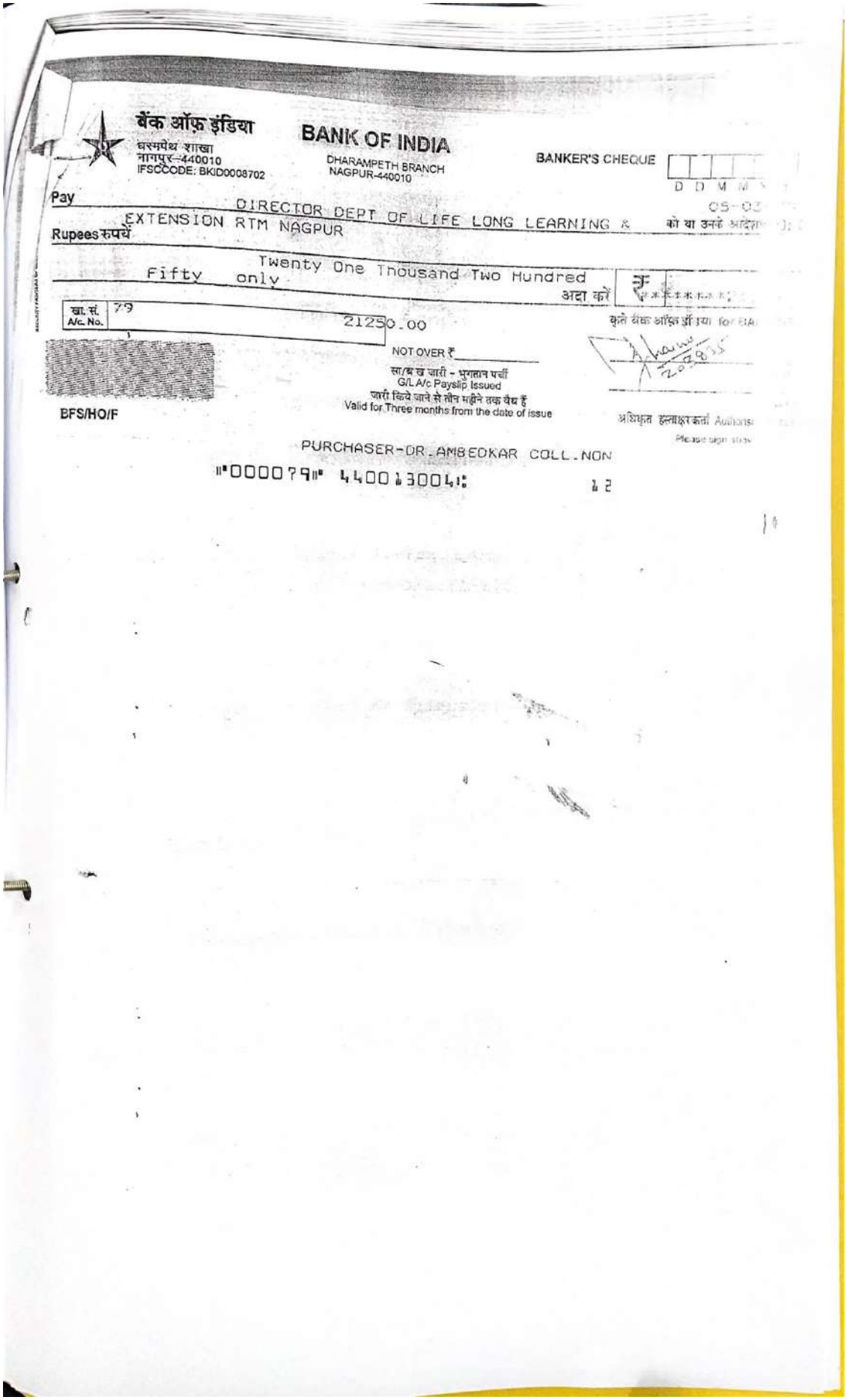
This is with reference to your letter no. DOLLE/245/19 dated 22/10/2019 [illegible] permission to conduct short term certificate courses in our college. This [illegible] two of the sanctioned courses namely, Certificate course in Nanoscience and Nanotechnology and Certificate course in Serology and DNA analysis has been started in the [illegible] accordingly. Please find enclosed herewith the Initial report, list of students admitted [illegible] No- 0000/ of an amount of Rs. 21,250/- towards enrollment fees.

1) Certificate course in Nanoscience and Nanotechnology – Rs. 1250/- (10 % of Rs. 500@ [illegible])
2) Certificate course in Serology and DNA analysis – Rs. 20,000/- (10 % of Rs.[illegible]@25)

Thanking you.

06/03/20.

[illegible]
Prof. C.V. [illegible]
Officiating
Incharge
Deptt. of [illegible]
Nagpur



बैंक ऑफ़ इंडिया
धरमपेठ शाखा
नागपुर-440010
IFSCCODE: BKID0008702

BANK OF INDIA
DHARAMPETH BRANCH
NAGPUR-440010

BANKER'S CHEQUE

D D M M

05-03

Pay DIRECTOR DEPT OF LIFE LONG LEARNING & EXTENSION RTM NAGPUR को या उनके आदेश

Rupees रुपये Twenty One Thousand Two Hundred Fifty only अदा करें ₹ 21250.00

खा. सं. A/c. No. 79

कृते बैंक ऑफ़ इंडिया for BA

NOT OVER ₹

सा/ब ख जारी - भुगतान पर्ची
G/L A/c Payslip Issued
जारी किये जाने से तीन महीने तक वैध है
Valid for Three months from the date of issue

BFS/HO/F

अधिकृत हस्ताक्षरकर्ता Authorise

Please sign here

PURCHASER-DR.AMBEDKAR COLL.NON

"000079" 440013004: 12

## Certificate Course in Nanoscience and Nanotechnology

Session 2019 – 2020

Date : 1st February to 30th April

| Sr. No. | Students Name | Semester |
|---|---|---|
| 1 | Mansi Sabne | Sem IV |
| 2 | Bhupali Kalita | Sem IV |
| 3 | Fatema Fidvi | Sem II |
| 4 | Samrudhi Shahu | Sem II |
| 5 | Vaishnavi Uikey | Sem II |
| 6 | Devashish Katare | Sem II |
| 7 | Gaurav Balapure | Sem II |
| 8 | Ashwin Chavan | Sem II |
| 9 | Shrutika Patinga | Sem II |
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| 11 | Aditya Waghaye | Sem VI |
| 12 | Jatin Singh Machhirke | Sem VI |
| 13 | Tushar Gahane | Sem VI |
| 14 | Shreyash More | Sem IV |
| 15 | Nikita Sonawane | Sem IV |
| 16 | Nayan Adwani | Sem II |
| 17 | Renu Yadav | Sem IV |
| 18 | Ankit Mishra | Sem IV |
| 19 | Sakshi Channe | Sem IV |
| 20 | Shreya Akhand | Sem IV |
| 21 | Sheetal Lakra | Sem IV |
| 22 | Gauri Belkhede | Sem IV |
| 23 | Chaitanya Hanote | Sem II |
| 24 | Rahul Wasnik | Sem IV |
| 25 | Dhanvijay Bansod | Sem IV |

Head

* * * * * *