



COLLEGE OF ENGINEERING BHUBANESWAR

Plot No.1 (A), CNI Complex, Patia, Bhubaneswar – 751024, Odisha, India.

[AFFILIATED TO BPUT, ODISHA]

www.coeb.ac.in

DEPARTMENT OF CIVIL ENGINEERING

AD. COURSE

Course Titles: Introduction to Engineering Seismology

Branch: Civil Engineering

Programme: B.Tech

Year of Student: 3rd Year

Course Objective:

1. Know the basics of earthquake engineering
2. Develop an insight into mechanics of earthquake, hazards and its consequences and also covers earthquake measurement and instrumentation.
3. Able to understand earthquake hazard and know seismic optional of the region and better way of estimating the future seismic hazard.
4. Know the Concept of Intensity and Magnitude; different earthquake scales. Seismic instruments, earthquake data and interpretation of seismic data.

SYLLABUS

Total Lecture Hours: 36

Module –I

8 Hours

Introduction: The Wave Equation, The Momentum Equation, The Seismic Wave Equation, Plane Waves, Polarizations of P and S Waves, Basic seismological theory, waves on a string, stress and strain, seismic waves. Snell's law, General Plane Wave, Plane wave reflection and transmission. Dispersion in seismic surface waves,

Module –II

8 Hours

Normal modes of the earth, Investigation of Earthquake Source Properties with Normal Mode Data, Basic normal mode theory, Refraction seismology- P-wave refraction, S- wave refraction, Two Horizontal Layers, Two Layer Dipping Model, Reflection seismology- Reflection Seismic Method, Direct and refraction ray travel times, Dipping layer, Seismic waves in a spherical earth- Body waves, Primary waves, Secondary waves, Surface waves, Rayleigh waves, Love waves, Stoneley waves.

Module –III

12 Hours

Body wave travel time studies: Amplitude variation along the Earth's surface, Amplitude variation along Interface Inside the Earth for P and S waves. Anisotropic earth structure-Seismic anisotropy, Deformation experiments and rheology, Anisotropic models. Attenuation and Anelasticity-Coherency and Green's Functions, Data and Signal Processing, Phase Velocity, Attenuation Coefficients, One-Dimensional Phase and Q Model Inversion.

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Module –IV

8 Hours

Earth's Layers: Crust, Mantle, and Core, Most Abundant Elements of the Earth, Seismic Discontinuities. Earthquake focal mechanisms, Moment Tremor- Introduction, Applications, Features. Brief on Earthquake geodesy and hazard monitoring. Estimation of source parameters, geological investigations and historical record of earthquakes, Seismology and Plate tectonics, Convergent margins, Seafloor spreading, lithosphere.

Course Outcomes:

After successfully completing the course, students will be able to

- CO1: Explain how earth processes create hazards to life and property;
- CO2: Understanding all facts of earthquake hazards, will be able to quantify different earthquake hazards and its effects (e.g. site effects, liquefaction, landslides etc) using different methods, which facilitate in planning new structures/project and retrofit old buildings and infrastructures
- CO3: Describe the quantification of earthquake size: Concept of Intensity and Magnitude; different earthquake scales. Seismic instruments, earthquake data and interpretation of seismic data and seismic hazard estimation with examples.
- CO4: Get better understanding of earthquake hazard and know seismic optional of the region and better way of estimating the future seismic hazard.

Text Books

1. Seth Stein and Michael Wysession, "An Introduction to Seismology, Earthquakes and Earth Structure", , Wiley-Blackwell Publisher, 1st edition,2008
2. Havskov, J. and Alguacil, G. Springer, Netherlands, "Instrumentation in Earthquake Seismology", Springer publisher, 2nd edition, 2016.
3. Bozorgnia, Y. and Bertero, "Earthquake Engineering - From Engineering Seismology to Performance - Based Engineering" CRC Press Washington, 2004.


Digital Learning Resources


Course Name	Introduction To Engineering Seismology
Course Link	http://nptel.ac.in/courses/105108076/
Course Instructed	Prof. Anbazhagan Panjamani, Department of Civil Engineering IISC Bangalore


Evaluation Criteria

- Mandatory attendance of 75% for each student.
- Conduction of two internal assessments and students has to secure 50% marks in each assessment.
- Certificates will be awarded to each student fulfilling the above criteria.

Design and Developed By **Mr. Biswa Ranjan Tripathy** and **Mr. Pradeepta Kishore Dehury**


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H.O.D, Civil Engineering
H.O.D
Civil Engineering Department
College of Engineering, Bhubaneswar



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NOTICE

Add On Certificate Courses 2020-2021

Ref No: COEB/CIVIL/2020/37

Date: 06/09/2020

It is for the information of all the students of 3rd /5th /7th semester B.Tech that the Department of Civil Engineering is going to start the following Add-on courses for Academic year 2020-2021 in ON_LINE Mode. All the students are instructed to enroll their names for the following courses on or before 12/09/2020. The classes will be commenced from **14/09/2020**. The students can contact their respective co-coordinators for enrollment and further detail.

Sl No.	Name of Add-on Course	Semester	Duration in Hrs	Name of Course Co-ordinators
1.	Earth Science for Civil Engineering	3 rd	36	Mrs. Nibedita Sahoo
2.	Introduction To Engineering Seismology	5 th	38	Mrs. Salini Patra
3.	Water Economics And Governance	7 th	40	Ms. Sipra Mallick

The class timing will be from 5.30 pm to 7.30 pm.

Mamata

HOD

Civil Engineering Department

H.O.D
Civil Engineering Department
College of Engineering, Bhubaneswar

Copy to:

1. Office of the Registrar for kind Information.
2. Office of the Principal for kind information.
3. Departmental Notice Board.
4. Guard File

A. Bhuje

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COLLEGE OF ENGINEERING BHUBANESWAR (COEB)
ADD-ON COURSE

STUDENT ENROLLMENT SHEET

Name of the Department: CIVIL ENGINEERING

Course Title: Introduction To Engineering Seismology

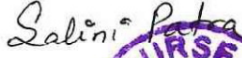
Semester : 5th

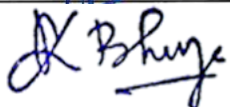
Academic Year: 2020-2021

ONLINE MODE

Student's Declaration/Undertaking

1. I do hereby undertake to participate in the above mentioned add on course.
2. I do hereby, promise to abide by the admissible rules and regulations, concerning discipline, attendance, etc. of the department, and also to follow the Code of Conduct prescribed for the students of the Institute, as in force from time to time.

Sl. No.	Registration No.	Name of the Student	Remarks by the Course Coordinator
1	1801219014	ARJITA NARAYAN	Certified that the Enrollment Sheet is prepared by taking the consents of the students to enroll themselves in this Certificate Course (Add-On) to be conducted in Virtual Mode (ON-LINE) during the Pandemic COVID'19 through the link to be provided by the department. They have also gone through the declaration/undertaking to be strictly abide by them during the course period. Course Coordinator (Signature with Seal)  
2	1801219024	BADAL KUMAR MOHAPATRA	
3	1801219029	BIBHAS KUMAR SETHI	
4	1801219052	DIPTI RANJAN MAHALIK	
5	1801219054	GIRISH CHANDRA MAJHI	
6	1801219069	KUMAR SOURAV	
7	1801219070	KUMAR SOURAV	
8	1801219077	MANISH KUMAR VERMA	
9	1801219096	PRABHAT KUMAR SRIWASTAV	
10	1801219102	PRATIK PRASUN	
11	1801219105	PRINCE KUMAR	
12	1801219117	RAKESH KUMAR MALIK	
13	1801219125	SANATHA KUMAR NAYAK	
14	1801219133	SAROJ KUMAR NAYAK	
15	1801219152	SOUMYA RANJAN DAS	
16	1801219184	ABHISEK NAYAK	
17	1801219185	ABINASH PRADHAN	
18	1801219186	ALINA ROUT	
19	1801219187	ALOK KUMAR PARIDA	
20	1801219188	AMAN SRIVASTAVA	
21	1801219189	AMARESH GAYA	
22	1801219190	ANIL KUMAR MEHER	
23	1801219191	ARNAPURNA MALLIK	
24	1801219192	ARUN KUMAR MISHRA	
25	1801219193	ASHMITA MISHRA	
26	1801219194	ASWINI KUMAR RAY	
27	1801219195	BANAMALI PRADHAN	
28	1801219196	BIBHUTI SETHI	
29	1801219197	BISHNU PRASAD BEHERA	
30	1801219198	CHANDAN KUMAR SWAIN	
31	1801219199	CHANDRA SHEKHAR NAYAK	


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COLLEGE OF ENGINEERING BHUBANESWAR (COEB)
ADD-ON COURSE

STUDENT ENROLLMENT SHEET

Name of the Department: CIVIL ENGINEERING

Course Title: Introduction To Engineering Seismology

Semester : 5th Academic Year: 2020-2021 ONLINE MODE

Student's Declaration/Undertaking
1. I do hereby undertake to participate in the above mentioned add on course.
2. I do hereby, promise to abide by the admissible rules and regulations, concerning discipline, attendance, etc. of the department, and also to follow the Code of Conduct prescribed for the students of the Institute, as in force from time to time.

Table with columns: Sl. No., Registration No., Name of the Student, Remarks by the Course Coordinator. Contains student names like CHELIN MOHANTY, CHINMAYA KUMAR SETHY, etc.

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Course Coordinator (Signature with Seal) [Signature and Seal]

[Signature] PRINCIPAL College of Engineering Bhubaneswar



COLLEGE OF ENGINEERING BHUBANESWAR (COEB)

DEPARTMENT OF CIVIL ENGINEERING

ADD ON/CERTIFICATE COURSE

STUDENT ATTENDANCE SHEET

Semester: 5th

ONLINE MODE
Sheet No. 17

Programme: B.Tech in Civil Engineering

Name of the Course: Introduction To Engineering Seismology

Academic Year: 2020-21

Date & Signature of the Student

Remarks

Sl. NO.	REGISTRATION NO.	NAME OF THE STUDENT	Date:	Date:	Date:	Date:	Date:	Date:	Date:
1	1801219014	ARJITA NARAYAN	P	P	P	P	P	P	P
2	1801219024	BADAL KUMAR MOHAPATRA	P	P	P	P	P	P	P
3	1801219029	BIBHAS KUMAR SETHI	P	P	P	P	P	P	P
4	1801219052	DIPTI RANJAN MAHALIK	P	P	P	P	P	P	P
5	1801219054	GIRISH CHANDRA MAJHI	P	P	P	P	P	P	P
6	1801219069	KUMAR SOURAV	P	P	P	P	P	P	P
7	1801219070	KUMAR SOURAV	P	P	P	P	P	P	P
8	1801219077	MANISH KUMAR VERMA	P	P	P	P	P	P	P
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17	1801219185	ABINASH PRADHAN	P	P	P	P	P	P	P
18	1801219186	ALINA ROUT	P	P	P	P	P	P	P
19	1801219187	ALOK KUMAR PARIDA	P	P	P	P	P	P	P
20	1801219188	AMAN SRIVASTAVA	P	P	P	P	P	P	P
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22	1801219190	ANIL KUMAR MEHER	P	P	P	P	P	P	P
23	1801219191	ARNAPURNA MALLIK	P	P	P	P	P	P	P
24	1801219192	ARUN KUMAR MISHRA	P	P	P	P	P	P	P
25	1801219193	ASHMITA MISHRA	P	P	P	P	P	P	P
26	1801219194	ASWINI KUMAR RAY	P	P	P	P	P	P	P
27	1801219195	BANAMALI PRADHAN	P	P	P	P	P	P	P

[Signature]
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Course Coordinator (Signature with Seal)

[Signature]



Signature of the Course Coordinator



COLLEGE OF ENGINEERING BHUBANESWAR (COEB)

DEPARTMENT OF CIVIL ENGINEERING

ADD ON/CERTIFICATE COURSE

STUDENT ATTENDANCE SHEET

ONLINE MODE

Sheet No. 01

Programme: B.Tech in Civil Engineering

Semester: 5th

Name of the Course: Introduction To Engineering Seismology

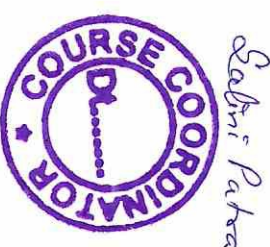
Duration: 28 days
Academic Year: 2020-21

Sl. No.	REGISTRATION NO.	NAME OF THE STUDENT	Date & Signature of the Student										Remarks			
			Date:	Date:	Date:	Date:	Date:	Date:	Date:	Date:	Date:	Date:				
28	1801219196	BIBHUTI SETHI	P	P	P	P	P	P	P	P	P	P	P	P	P	
29	1801219197	BISHNU PRASAD BEHERA	P	P	P	P	P	P	P	P	P	P	P	P	P	
30	1801219198	CHANDAN KUMAR SWAIN	P	P	P	P	P	P	P	P	P	P	P	P	P	
31	1801219199	CHANDRA SHEKHAR NAYAK	P	P	P	P	P	P	P	P	P	P	P	P	P	
32	1801219200	CHELIN MOHANTY	P	P	P	P	P	P	P	P	P	P	P	P	P	
33	1801219201	CHINMAYA KUMAR SETHY	P	P	P	P	P	P	P	P	P	P	P	P	P	
34	1801219202	DEBADATTA MALLIK	P	P	P	P	P	P	P	P	P	P	P	P	P	
35	1801219203	DEEPANJALI JENA	P	P	P	P	P	P	P	P	P	P	P	P	P	
36	1801219204	DIBYA RANJAN BEHERA	P	P	P	P	P	P	P	P	P	P	P	P	P	
37	1801219205	DIPTHEEMAYEE DAS	P	P	P	P	P	P	P	P	P	P	P	P	P	
38	1801219206	ELORA PRIYADARSINI SATAPATHY	P	P	P	P	P	P	P	P	P	P	P	P	P	
39	1801219207	HAREKRISHNA BOHIDAR	P	P	P	P	P	P	P	P	P	P	P	P	P	
40	1801219208	JITENDRA KUMAR PARIDA	P	P	P	P	P	P	P	P	P	P	P	P	P	
41	1801219209	KALANDI GIRI	P	P	P	P	P	P	P	P	P	P	P	P	P	
42	1801219211	LIPSA JAYASINGH	P	P	P	P	P	P	P	P	P	P	P	P	P	
43	1801219212	LOPAMUDRA DALABEHERA	P	P	P	P	P	P	P	P	P	P	P	P	P	
44	1801219213	MAHESWAR BINDHANI	P	P	P	P	P	P	P	P	P	P	P	P	P	

(Signature)
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Course Coordinator (Signature with Seal)



Signature of the Course Coordinator



COLLEGE OF ENGINEERING BHUBANESWAR (COEB)

DEPARTMENT OF CIVIL ENGINEERING

ADD ON/CERTIFICATE COURSE

STUDENT ATTENDANCE SHEET

Semester: 5th

Sheet No. 02

ONLINE MODE

Programme: B.Tech in Civil Engineering

Name of the Course: Introduction To Engineering Seismology

Academic Year: 2020-21

Date & Signature of the Student

Remarks

Sl. NO.	REGISTRATION NO.	NAME OF THE STUDENT	Date:	Date:	Date:	Date:	Date:	Date:	Date:
1	1801219014	ARJITA NARAYAN	P	P	P	P	P	P	P
2	1801219024	BADAL KUMAR MOHAPATRA	P	P	P	P	P	P	P
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16	1801219184	ABHISEK NAYAK	P	P	P	P	P	P	P
17	1801219185	ABINASH PRADHAN	P	P	P	P	P	P	P
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19	1801219187	ALOK KUMAR PARIDA	P	P	P	P	P	P	P
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26	1801219194	ASWINI KUMAR RAY	P	P	P	P	P	P	P
27	1801219195	BANAMALI PRADHAN	P	P	P	P	P	P	P

Signature of the Course Coordinator

College of Engineering Bhubaneswar

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Course Coordinator (Signature with Seal)

Sabini Parbe





COLLEGE OF ENGINEERING BHUBANESWAR (COEB)

DEPARTMENT OF CIVIL ENGINEERING
ADD ON/CERTIFICATE COURSE

STUDENT ATTENDANCE SHEET

ONLINE MODE

Sheet No. 02

Programme: B.Tech in Civil Engineering

Semester: 5th

Name of the Course: Introduction To Engineering Seismology

Duration : 3 hrs
Academic Year: 2020-21

Sl. NO.	REGISTRATION NO.	NAME OF THE STUDENT	Date & Signature of the Student												Remarks	
			Date:	Date:	Date:	Date:	Date:	Date:	Date:	Date:	Date:	Date:	Date:	Date:		
28	1801219196	BIBHUTI SETHI	P	P	P	P	P	P	P	P	P	P	P	P	P	
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44	1801219213	MAHESWAR BINDHANI	P	P	P	P	P	P	P	P	P	P	P	P	P	
Signature of the Course Coordinator																

[Signature]
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Course Coordinator (Signature with Seal)





COLLEGE OF ENGINEERING BHUBANESWAR (COEB)

DEPARTMENT OF CIVIL ENGINEERING
ADD ON/CERTIFICATE COURSE

STUDENT ATTENDANCE SHEET

Semester: 5th

ONLINE MODE
Sheet No. 03

Programme: B.Tech in Civil Engineering

Name of the Course: Introduction To Engineering Seismology

Duration : 3 hrs
Academic Year: 2020-21

Date & Signature of the Student

Remarks

[Signature]
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College of Engineering Bhubaneswar

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Course Coordinator (Signature with Seal)



SL. NO.	REGISTRATION NO.	NAME OF THE STUDENT	Date:	Date:	Date:	Date:	Date:	Date:	Date:
1	1801219014	ARJITA NARAYAN	P	P	P	P	P	P	P
2	1801219024	BADAL KUMAR MOHAPATRA	P	P	P	P	P	P	P
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18	1801219186	ALINA ROUT	P	P	P	P	P	P	P
19	1801219187	ALOK KUMAR PARIDA	P	P	P	P	P	P	P
20	1801219188	AMAN SRIVASTAVA	P	P	P	P	P	P	P
21	1801219189	AMARESH GAYA	P	P	P	P	P	P	P
22	1801219190	ANIL KUMAR MEHER	P	P	P	P	P	P	P
23	1801219191	ARNAPURNA MALLIK	P	P	P	P	P	P	P
24	1801219192	ARUN KUMAR MISHRA	P	P	P	P	P	P	P
25	1801219193	ASHMITA MISHRA	P	P	P	P	P	P	P
26	1801219194	ASWINI KUMAR RAY	P	P	P	P	P	P	P
27	1801219195	BANAMALI PRADHAN	P	P	P	P	P	P	P

Signature of the Course Coordinator



COLLEGE OF ENGINEERING BHUBANESWAR (COEB)

DEPARTMENT OF CIVIL ENGINEERING

ADD ON/CERTIFICATE COURSE

STUDENT ATTENDANCE SHEET

ONLINE MODE

Sheet No. 63

Programme: B.Tech in Civil Engineering

Semester: 5th

Name of the Course: Introduction To Engineering Seismology

Duration : 38 hrs Academic Year: 2020-21

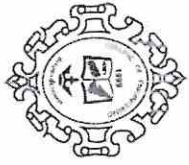
SL. NO.	REGISTRATION NO.	NAME OF THE STUDENT	Date & Signature of the Student										Remarks
			Date:	Date:	Date:	Date:	Date:	Date:	Date:	Date:	Date:	Date:	
28	1801219196	BIBHUTI SETHI	P	P	P	P	P	P	P	P	P	P	
29	1801219197	BISHNU PRASAD BEHERA	P	P	P	P	P	P	P	P	P	P	
30	1801219198	CHANDAN KUMAR SWAIN	P	P	P	P	P	P	P	P	P	P	
31	1801219199	CHANDRA SHEKHAR NAYAK	P	P	P	P	P	P	P	P	P	P	
32	1801219200	CHELIN MOHANTY	P	P	P	P	P	P	P	P	P	P	
33	1801219201	CHINMAYA KUMAR SETHY	P	P	P	P	P	P	P	P	P	P	
34	1801219202	DEBADATTA MALLIK	P	P	P	P	P	P	P	P	P	P	
35	1801219203	DEEPANJALI JENA	P	P	P	P	P	P	P	P	P	P	
36	1801219204	DIBYA RANJAN BEHERA	P	P	P	P	P	P	P	P	P	P	
37	1801219205	DIPTEEMAYEE DAS	P	P	P	P	P	P	P	P	P	P	
38	1801219206	ELORA PRIYADARSINI SATAPATHY	P	P	P	P	P	P	P	P	P	P	
39	1801219207	HAREKRISHNA BOHIDAR	P	P	P	P	P	P	P	P	P	P	
40	1801219208	JITENDRA KUMAR PARIDA	P	P	P	P	P	P	P	P	P	P	
41	1801219209	KALANDI GIRI	P	P	P	P	P	P	P	P	P	P	
42	1801219211	LIPSA JAYASINGH	P	P	P	P	P	P	P	P	P	P	
43	1801219212	LOPAMUDRA DALABEHERA	P	P	P	P	P	P	P	P	P	P	
44	1801219213	MAHESWAR BINDHANI	P	P	P	P	P	P	P	P	P	P	
Signature of the Course Coordinator													

[Signature]
PRINCIPAL
 College of Engineering Bhubaneswar

Certified that this Certificate course is conducted in virtual mode (ON- LINE) because of the Pandemic COVID-19. The attendance is taken with the remarks P-Present and A-Absent for the students.

Course Coordinator (Signature with Seal)

[Signature]
COURSE COORDINATOR



COLLEGE OF ENGINEERING BHUBANESWAR
PLOT NO-1(A), CNI COMPLEX, PATIA, BHUBANESWAR, KHORDHA, ODISHA-751024



Certificate of Completion

This is to certify that Mr./Ms. PRATIK PRASUN student of the Department

of Civil Engg. semester Fifth bearing registration number 1801219102

has successfully completed the ADD-ON Course titled Introduction To Engineering Seismology

conducted at College of Engineering Bhubaneswar in the academic year 2020-21

TRUE COPY™

Course-Coordinator

Principal

PRINCIPAL
College of Engineering Bhubaneswar



COLLEGE OF ENGINEERING BHUBANESWAR
PLOT NO-1(A), CNI COMPLEX, PATIA, BHUBANESWAR, KHORDHA, ODISHA-751024



Certificate of Completion

This is to certify that Mr./Ms. PRINCE KUMAR, student of the Department


of Civil Engg. semester Fifth bearing registration number 1801219105


has successfully completed the ADD-ON Course titled Introduction To Engineering Seismology

conducted at College of Engineering Bhubaneswar in the academic year 2020-21.

TRUE COPY


Course-Coordinator


Principal


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College of Engineering Bhubaneswar



COLLEGE OF ENGINEERING BHUBANESWAR
PLOT NO-1(A), CNI COMPLEX, PATIA, BHUBANESWAR, KHORDHA, ODISHA-751024




Certificate of Completion

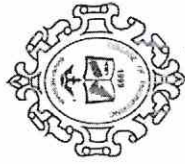
This is to certify that Mr./Ms. RAKESH KUMAR MALIK student of the Department
of Civil Engg. semester Fifth bearing registration number 1801219117
has successfully completed the ADD-ON Course titled Introduction To Engineering Seismology
conducted at College of Engineering Bhubaneswar in the academic year 2020-21.

TRUE COPY


Course-Coordinator


Principal


PRINCIPAL
College of Engineering Bhubaneswar



COLLEGE OF ENGINEERING BHUBANESWAR

PLOT NO-1(A), CNI COMPLEX, PATIA, BHUBANESWAR, KHORDHA, ODISHA-751024



Certificate of Completion

This is to certify that Mr./Ms. SANATHA KUMAR NAYAK, student of the Department


of Civil Engg. semester Fifth bearing registration number 1801219125


has successfully completed the ADD-ON Course titled Introduction To Engineering Seismology

conducted at College of Engineering Bhubaneswar in the academic year 2020-21.

TRUE COPY


Course-Coordinator


Principal


PRINCIPAL
College of Engineering Bhubaneswar



COLLEGE OF ENGINEERING BHUBANESWAR

PLOT NO-1(A), CNI COMPLEX, PATIA, BHUBANESWAR, KHORDHA, ODISHA-751024



Certificate of Completion

This is to certify that Mr./Ms. SAROJ KUMAR NAYAK, student of the Department

of Civil Engg. semester Fifth bearing registration number 1801219133

has successfully completed the ADD-ON Course titled Introduction To Engineering Seismology

conducted at College of Engineering Bhubaneswar in the academic year 2020-21

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Course-Coordinator

Principal

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College of Engineering Bhubaneswar