To,
The Principal
SSES Amt's Science College,
Congress Nagar, Nagpur-12

Subject: Permission to conduct the add on courses in the Physics department (2022-2023)

Respected Sir,

This is to request you that, we wish to conduct the add on courses in Physics department these are the certificate courses of thirty hours' time duration.

The details of the courses are submitted here with.

Hence please permit to run the same and oblige me.

Thanking you

Yours sincerely

2/07/2022

Dr. S. W. Anwane
Professor and Head
Department of Physics
Shri Shivaji Education Society Amravati's
SCIENCE COLLEGE
Congress Nagar, Nagpur.

Permitted

Shri Shivaji Education Society Amravati's

Science College, Nagpur

Certificate Course in Environmental Physics: Understanding Climate Change, Atmospheric Dynamics, and Renewable Energy

Course Coordinator – Dr. G. L. Jadhav

Shri Shivaji Education Society Amravati's

Science College, Congress Nagar, Nagpur

DEPARTMENT OF PHYSICS

2022-2023

Course Module and Syllabus

Course Title: Environmental Physics: Understanding Climate Change, Atmospheric Dynamics, and Renewable Energy

Course Coordinator: Dr. G. L. Jadhav

Course Overview: Environmental Physics explores the application of fundamental physics principles to understand and address critical environmental challenges. This Add-On Course provides students with a comprehensive understanding of climate change, atmospheric dynamics, and renewable energy technologies from a physics perspective. Through theoretical concepts, practical applications, and case studies, students will gain insights into the physics behind environmental phenomena and solutions.

Course Duration: [10 Week] 30 Hour: (16 August 2022 to 22 October 2022)

Course Objectives:

- Understand the fundamental principles of environmental physics and their applications.
- Analyse the physics of climate change, including greenhouse gas dynamics and climate feedback mechanisms.
- Explore atmospheric physics concepts, such as atmospheric circulation, weather patterns, and air pollution.
- Examine renewable energy technologies, including solar, wind, hydroelectric, and geothermal energy, from a physics perspective.
- Critically evaluate the role of physics in addressing environmental challenges and developing sustainable solutions.

Course Structure:

Unit I: Introduction to Environmental Physics, Climate Change Physics

- Overview of environmental physics
- Importance of physics in understanding environmental phenomena
- Historical perspectives and current trends
- Greenhouse effect and radiative forcing
- Climate feedback mechanisms
- Modelling climate dynamics using physics-based approaches.

Unit II: Atmospheric Physics

- Atmospheric composition and structure

- Atmospheric circulation patterns
- Dynamics of weather systems and extreme events

Unit III: Air Pollution and Aerosol Physics

- Sources and effects of air pollutants
- Aerosol formation and dynamics
- Physics of atmospheric chemistry and pollution mitigation strategies

Unit IV: Renewable Energy Physics

- Principles of solar energy conversion
- Wind energy dynamics and turbine technology.
- Hydroelectric and geothermal energy generation
- Physics-based analysis of renewable energy systems

Assessment: Final Exam will be taken using MCQ type questions.

Prerequisites

- Basic understanding of physics principles (e.g., mechanics, thermodynamics)
- Recommended for students with an interest in environmental science, sustainability, or energy studies.

Course Materials:

- Textbooks on environmental physics, climate science, and renewable energy
- Scientific papers, reports, and online resources

Course Outcomes:

- **Understand the Fundamentals of Climate Change**: Explain the scientific principles underlying climate change, including the greenhouse effect, radiative forcing, and the role of greenhouse gases.
- **Evaluate Human Impact on Climate**: Assess the impact of human activities on climate, including emissions of greenhouse gases, deforestation, and land use changes.
- **Understand Renewable Energy Technologies**: Explain the principles and applications of various renewable energy technologies, such as solar, wind, hydro, and bioenergy.

By achieving these outcomes, students will be equipped with the knowledge and skills necessary to understand and address the challenges of climate change, atmospheric dynamics, and renewable energy.

Actions Taken Report

The Add-on course on was successful in meeting its objectives. The theoretical knowledge gained by the participants will benefit them in future. Future iterations of the course will build upon the feedback received to ensure continued improvement. The course syllabus was developed to include topics such as the curriculum was designed to provide theoretical knowledge. Necessary resources were procured.

❖ **The Structure of Syllabus and system of evaluation: -**

Course	Theory Paper	Marks
Certificate Course in Environmental Physics: Understanding Climate Change, Atmospheric Dynamics, and Renewable Energy	Theory paper- Environmental Physics: Understanding Climate Change, Atmospheric Dynamics, and Renewable Energy ***Theory examination will be of MCQ pattern having 50 questions each with equal marks.***	Theory 100

Internal Quality Assurance Cell
(IQAC)
S. S. E. S. A. Science College
Congress Nagar, Nagpur.

SEAL

Principal
S. S. E. S. Amravati's
Science College, Nagpur

Shri Shivaji Education Society Amravati's

Science College, Congress Nagar, Nagpur

Session 2022-23

Certificate course (10 weeks)

(Environmental Physics: Understanding Climate Change, Atmospheric Dynamics, and Renewable Energy)

Timetable

Sr. No.	Day	Theory
1	Friday	GLJ (C8) Theory 4.00 PM – 5.00 PM
2	Saturday	GLJ (C8) Theory, 4.00 PM – 5:00 PM GLJ (C8) Theory, 5.00 PM – 6:00 PM

Shri Shivaji EducationSociety Amaravati's

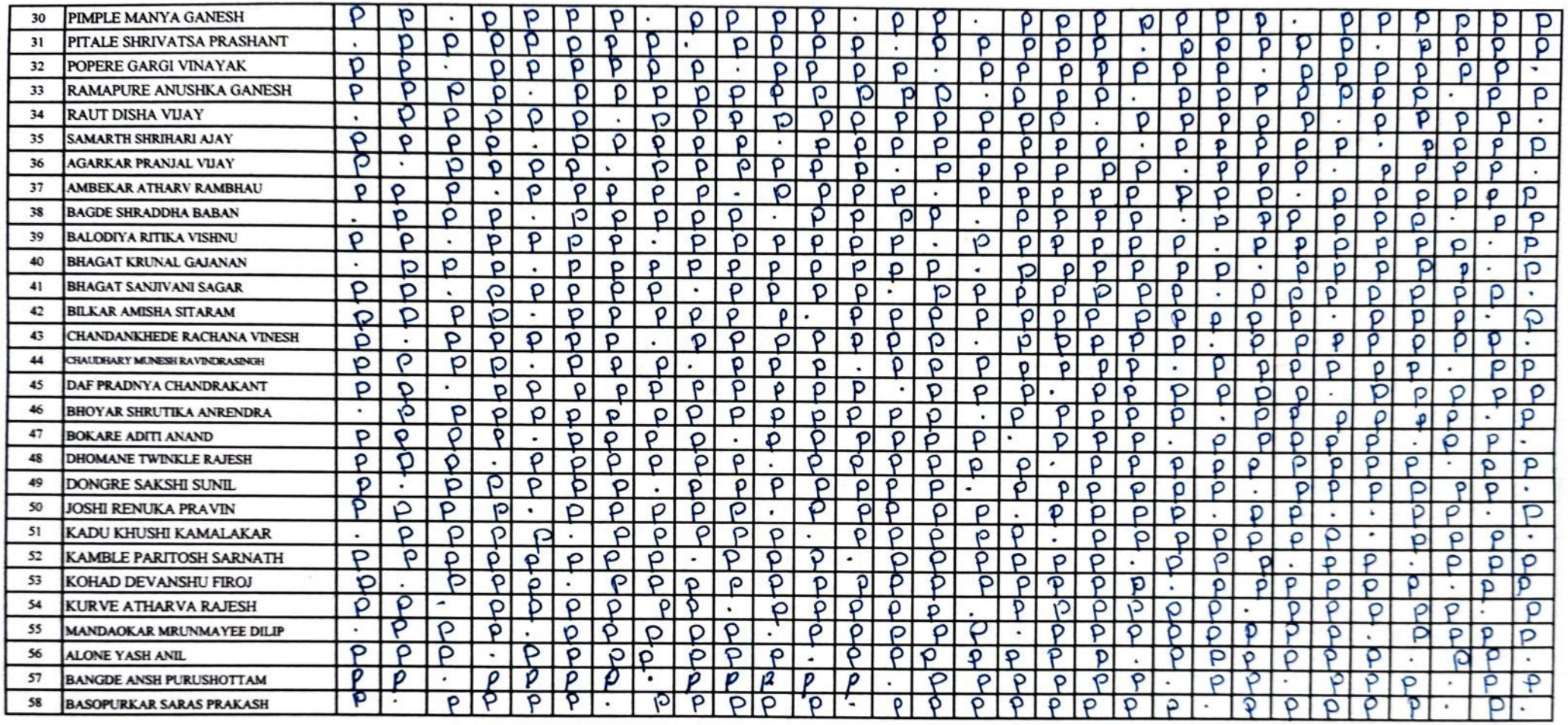
Science College,Congress Nagar, Nagpur

Certificate Course on Environmental Physics: Understanding Climate Change, Atmospheric Dynamics, and Renewable Energy (10 Week)

Theory Class Attendance Sheet

2022-2023

Sr. No.	Students Full Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	BAGDE SAKSHI SATISH	P	P	.	P	P	P	P	P	.	P	P	P	P	P	P	P	.	P	P	P	P	P	P	.	P	P	.	P	P	P
2	BHALAVI SIDDHESH RAMESHWAR	P	-	P	P	P	P	.	P	P	P	P	P	P	.	P	P	P	P	.	P	P	.	P	P	P	P	P	.	P	.
3	CHOUDHARY DHANSHREE NARENDRA	.	P	P	P	P	.	P	P	P	P	P	.	P	P	P	P	.	P	P	P	.	P	P	P	P	P	P	P	.	P
4	DHOLE ISHA ANIL	P	P	P	P	P	P	.	P	P	P	P	P	.	P	P	P	P	.	P	P	P	.	P	P	P	.	P	P	.	P
5	GEDAM ROHIT DIPAK	P	P	P	P	P	P	P	.	P	P	P	P	P	P	P	.	P	P	P	P	P	P	.	P	P	P	.	P	P	P
6	GEDAM DIKSHA RAVINDRA	P	.	P	P	P	P	.	P	P	P	P	.	P	P	P	P	.	P	P	P	P	P	P	.	P	P	P	P	P	P
7	GHUTKE SHWETA CHARAN	P	P	.	P	P	P	P	.	P	P	P	P	.	P	P	P	P	.	P	P	P	P	.	P	P	P	P	P	P	P
8	JANGADE SANJANA SADANAND	.	P	P	P	P	P	.	P	P	P	P	P	P	.	P	P	P	P	.	P	P	P	P	.	P	P	.	P	P	P
9	JOSHI SANCHIT MADHUSUDAN	P	P	P	P	P	.	P	P	P	.	P	P	P	P	.	P	P	P	P	.	P	P	P	P	P	P	P	.	P	P
10	MESHRAM AYUSH BHARAT	.	P	P	P	P	P	P	P	P	P	.	P	P	P	P	P	P	.	P	P	P	P	P	P	.	P	P	P	P	.
11	BALAPURE PARI GAJANAN	P	P	P	.	P	P	P	P	.	P	P	P	P	P	.	P	P	P	P	P	P	P	P	.	P	P	P	P	P	P
12	BANSOD NIKHIL MILIND	P	P	P	P	.	P	P	P	P	P	P	P	.	P	P	P	P	P	P	P	P	.	P	P	P	P	P	P	.	P
13	BEDEKAR TUSHAR VAIBHAV	.	P	P	P	P	.	P	P	P	P	P	P	P	.	P	P	P	P	P	.	P	P	P	P	P	.	P	P	P	P
14	BHIWGADE SHRINAY YOGESH	P	P	.	P	P	P	P	P	P	P	P	P	P	P	.	P	P	P	P	P	.	P	P	P	P	P	P	P	.	P
15	DHADSE VAISHNAVI VIJAY	.	P	P	P	P	P	P	P	.	P	P	P	P	.	P	P	P	P	P	P	P	P	P	.	P	.	P	.	P	P
16	DHAKATE SAKSHI PRAMOD	P	P	P	P	P	P	.	P	P	P	P	P	P	P	.	P	P	.	P	.	P	P	P	P	P	P	P	P	.	P
17	JADHAV AASTHA SANJU	.	P	.	P	P	P	P	.	P	P	P	P	P	P	P	P	.	P	P	P	P	.	P	P	P	P	.	P	P	.
18	JOSHI ARTI SUBHASH	P	P	P	.	P	P	P	P	P	.	P	P	P	P	P	.	P	P	P	P	P	P	.	P	P	P	P	P	P	P
19	KHAPRE MUSKAN PRAKASH	P	P	P	P	P	P	.	P	P	P	.	P	P	P	P	P	.	P	P	.	P	P	P	.	P	P	.	P	P	P
20	KUKDE ABHINAV BHUPENDRA	.	P	.	P	P	P	P	.	P	P	P	.	P	P	P	P	P	.	P	P	P	P	.	P	P	P	P	P	P	P
21	MEENA RUCHI MAHENDRA	P	P	P	P	P	.	P	P	P	P	P	P	.	P	P	P	P	P	.	P	P	P	P	.	P	P	P	.	P	P
22	MESHRAM NIKHITA RAVIKANT	P	.	P	P	P	P	P	.	P	P	P	P	.	P	P	P	P	P	P	.	P	P	P	P	P	.	.	P	P	P
23	MOHOD SAKSHI SADASHIVRAO	.	P	P	P	P	.	P	P	P	.	P	P	P	P	P	.	.	P	P	P	P	P	P	P	.	P	P	P	P	.
24	MOTWANI VARUN DOLAT	P	P	.	P	.	P	P	P	P	P	P	P	.	P	P	P	P	P	P	P	.	P	P	P	P	.	P	P	P	P
25	MOUNDEKAR VINKU MANIK	P	P	P	.	P	P	.	P	P	P	P	P	P	.	P	P	.	P	P	P	P	.	P	P	P	P	.	P	.	P
26	NARWADE SARTHAK ARUNRAO	.	P	P	P	P	P	P	.	.	P	P	P	P	P	.	P	P	P	P	P	P	P	.	P	P	P	P	.	P	P
27	PATLE SONALI SURESH	P	P	P	.	P	P	P	P	P	.	P	.	P	P	P	.	P	P	P	P	.	P	P	P	.	P	P	P	.	P
28	PAROCHE PALAK SATISH	P	P	P	P	P	P	P	P	P	P	P	P	.	P	P	P	P	.	P	P	P	P	.	P	P	P	P	P	P	P
29	PAUNIKAR YASHWANT RAJU	.	P	P	P	.	P	P	.	P	P	P	P	P	.	P	P	P	P	P	P	P	P	P	P	.	P	.	P	P	P



30	PIMPLE MANYA GANESH
31	PITALE SHRIVATSA PRASHANT
32	POPERE GARGI VINAYAK
33	RAMAPURE ANUSHKA GANESH
34	RAUT DISHA VIJAY
35	SAMARTH SHRIHARI AJAY
36	AGARKAR PRANJAL VIJAY
37	AMBEKAR ATHARV RAMBHAU
38	BAGDE SHRADDHA BABAN
39	BALODIYA RITIKA VISHNU
40	BHAGAT KRUNAL GAJANAN
41	BHAGAT SANJIVANI SAGAR
42	BILKAR AMISHA SITARAM
43	CHANDANKHEDE RACHANA VINESH
44	CHAUDHARY MUNESH RAVINDRASINGH
45	DAF PRADNYA CHANDRAKANT
46	BHOYAR SHRUTIKA ANRENDRA
47	BOKARE ADITI ANAND
48	DHOMANE TWINKLE RAJESH
49	DONGRE SAKSHI SUNIL
50	JOSHI RENUKA PRAVIN
51	KADU KHUSHI KAMALAKAR
52	KAMBLE PARITOSH SARNATH
53	KOHAD DEVANSHU FIROJ
54	KURVE ATHARVA RAJESH
55	MANDAOKAR MRUNMAYEE DILIP
56	ALONE YASH ANIL
57	BANGDE ANSH PURUSHOTTAM
58	BASOPURKAR SARAS PRAKASH

59	BODKHE PRATIKSHA DILIP	P	P	P	.	P	P	P	P	.	P	P	P	P	.	P	P	P	P	P	.	P	P	P	P	P	.	P	P	P	.
60	BOMLE TANMAY VIJAY	P	.	P	P	P	P	.	P	P	P	P	P	P	P	P	-	P	P	P	P	P	P	,	P	P	P	P	.	P	P
61	BOTHLIKAR MUNISH SADASHIV	.	P	P	P	P	P	P	.	P	P	P	P	P	P	P	P	.	P	P	P	P	P	P	P	P	P	P	P	P	.
62	CHATAP DIPTI NILKANTH	P	P	P	P	P	.	P	P	P	P	P	P	.	P	P	P	P	P	.	P	P	P	P	P	P	.	P	P	P	P
63	DATAR MITALI SUNIL	P	.	P	P	P	P	P	P	P	.	P	P	P	P	P	P	P	P	P	P	.	P	P	P	P	P	.	P	P	P
64	DINESHWAR PUNAM BHOLRAM	.	P	P	P	P	P	P	P	P	P	.	P	P	P	P	P	P	P	P	.	P	P	P	P	P	P	P	-	P	.
65	DESHMUKH SOHAM PRASHANT	P	P	P	.	P	P	P	P	P	P	.	P	P	.	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	.
66	DESHPANDE MIUKTA RAVINDRA	P	P	P	P	.	P	P	P	P	P	P	.	P	P	P	.	P	P	P	P	P	P	P	.	P	P	P	P	P	P
67	DURGE RUPALI RAJU	P	.	P	P	P	P	P	P	P	P	P	P	.	P	P	P	P	P	P	P	.	P	P	P	P	P	.	P	P	P
68	GADGE ANIKET PARSHURAM	.	P	P	P	P	.	P	P	P	P	.	P	P	P	P	P	P	P	P	P	P	.	P	P	P	P	P	.	P	P
69	GEETEY PRATHA RAJESH	P	P	P	P	P	P	.	P	P	P	P	.	P	P	P	P	P	.	P	P	P	P	P	.	P	P	P	P	P	.
70	KALE NISHANT UMRAO	P	P	P	.	P	P	P	P	.	P	P	P	P	P	P	.	P	P	P	P	.	P	P	P	P	P	P	P	P	P
71	MADAVI GAURAV FANDULAL	.	P	P	P	P	P	P	.	P	P	P	P	P	P	.	P	P	P	P	.	P	P	P	P	P	P	P	P	.	P
72	MAHEVASH ZAMANI ATAUR	P	P	P	.	P	P	P	P	.	P	P	P	P	.	P	P	P	P	P	P	.	P	P	P	.	P	P	P	P	P
73	MANIKWAR PRATIKSHA KAILAS	P	.	P	P	P	P	P	P	P	P	P	P	.	P	P	P	P	P	P	P	P	P	P	P	P	P	.	P	.	P
74	MARAVI YOGESH RAMNATH	P	P	.	P	P	P	P	.	P	P	.	P	P	P	P	P	P	.	P	P	P	P	.	P	P	P	P	.	P	P
75	MEHETRE SANKET VISHNU	.	P	P	P	P	.	P	P	P	P	P	.	P	P	P	P	P	P	.	P	P	P	P	.	P	P	P	P	P	.
76	MESHRAM LIPAKSHI RAJANAND	P	P	P	P	.	P	P	P	P	.	P	P	P	P	P	P	P	P	P	.	P	P	P	P	-	P	P	P	P	.
77	NAGPURE SIDDHSHWAR MOHAN	P	.	P	P	P	.	P	P	P	P	P	P	.	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
78	NAGRALE MOUSAM MAHENDRA	.	P	P	P	P	P	P	P	P	P	.	P	P	P	P	P	P	.	P	P	P	P	P	P	P	P	.	P	P	P
79	NAMIRA KAUSAR WASEEM	P	P	P	.	P	P	P	.	P	P	P	P	P	P	P	.	P	P	P	P	.	P	P	P	P	P	P	.	P	P
80	NAVGHARE DIKSHA RAJENDRRA	.	P	P	P	P	.	P	P	P	P	P	.	P	P	P	P	P	P	.	P	P	P	.	P	P	P	P	.	P	P
81	TAJNE VAIBHAVI DEVENDRA	P	P	P	P	P	P	.	P	P	P	P	P	.	P	P	P	P	P	.	P	P	P	P	.	P	P	P	P	.	P
82	THAKRE MRUNMAYI SUBHASH	.	P	.	P	P	P	P	P	P	.	P	P	P	P	.	P	P	P	P	.	P	P	P	.	P	P	P	.	P	P

[signature]

Dr. G.L. Jadhav

Shri Shivaji Education Society Amaravati's

Science College Congress Nagar, Nagpur

Department of Physics

(2022-2023)

Add-on Certificate Corse on Environmental Physics: Understanding Climate Change, Atmospheric Dynamics, and Renewable Energy

THEORY EXAM

Date: 29/10/2022 **Max. Time: 2 Hour**
Max. Marks: 100 **Marks Obtained:**

Student Name: ----------

Sign. Of Invigilator:

Note: i) All questions are compulsory and carry equal marks
ii) Tick the correct option

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1. Which of the following gases is primarily responsible for trapping heat in the Earth's atmosphere?
   a) Oxygen
   b) Nitrogen
   c) Carbon dioxide
   d) Hydrogen

2. The greenhouse effect is primarily caused by:
   a) Ozone depletion
   b) Deforestation
   c) Industrial pollution
   d) Greenhouse gases

3. Which of the following is a major greenhouse gas released by agricultural activities?
   a) Methane
   b) Carbon monoxide
   c) Sulfur dioxide
   d) Nitrous oxide

4. The term "albedo" refers to:
   a) Earth's rotation on its axis
   b) Earth's magnetic field
   c) Earth's reflection of sunlight
   d) Earth's atmospheric pressure

5. Which of the following is a positive feedback mechanism contributing to global warming?
   a) Increased cloud cover
   b) Expansion of sea ice
   c) Melting of permafrost
   d) Increased volcanic activity
6. The phenomenon known as "El Niño" is characterized by:
   a) Warmer-than-average sea surface temperatures in the Pacific Ocean
   b) Cooler-than-average sea surface temperatures in the Pacific Ocean
   c) Increased rainfall in South America
   d) Decreased hurricane activity

7. Which renewable energy source relies on the gravitational pull of the moon?
   a) Solar power
   b) Wind power
   c) Tidal power
   d) Geothermal power

8. The conversion of sunlight into electricity is achieved through:
   a) Photovoltaic cells
   b) Wind turbines
   c) Hydroelectric dams
   d) Nuclear reactors

9. Which of the following is NOT a greenhouse gas?
   a) Water vapor
   b) Methane
   c) Ozone
   d) Nitrogen

10. The primary source of energy for the Earth's climate system is:
    a) Geothermal energy
    b) Solar energy
    c) Wind energy
    d) Nuclear energy

11. The ozone layer is found in which layer of the Earth's atmosphere?
    a) Troposphere
    b) Stratosphere
    c) Mesosphere
    d) Thermosphere

12. Which of the following is a consequence of ocean acidification?
    a) Increased coral reef growth
    b) Enhanced fish population
    c) Weakened shells of marine organisms
    d) Decreased sea level

13. The Intergovernmental Panel on Climate Change (IPCC) was established by:

a) United Nations Environment Programme (UNEP)
b) World Health Organization (WHO)
c) World Meteorological Organization (WMO)
d) European Space Agency (ESA)

14. The term "climate" refers to:
    a) Short-term variations in weather patterns
    b) Long-term average weather conditions
    c) Daily changes in atmospheric pressure
    d) Seasonal changes in temperature

15. Which of the following is NOT a renewable energy source?
    a) Solar energy
    b) Nuclear energy
    c) Wind energy
    d) Biomass energy

16. The process by which carbon is transferred from the atmosphere to the lithosphere is known as:
    a) Photosynthesis
    b) Respiration
    c) Sedimentation
    d) Erosion

17. The "Kyoto Protocol" aimed to:
    a) Reduce greenhouse gas emissions
    b) Increase deforestation rates
    c) Promote fossil fuel consumption
    d) Expand nuclear power generation

18. Which of the following is a consequence of deforestation?
    a) Increased carbon sequestration
    b) Enhanced biodiversity
    c) Soil erosion
    d) Reduced greenhouse gas emissions

19. The primary source of anthropogenic methane emissions is:
    a) Agricultural activities
    b) Industrial processes
    c) Transportation
    d) Energy production

20. The phenomenon of "acid rain" is caused by the emission of:
    a) Carbon dioxide
    b) Sulfur dioxide and nitrogen oxides
    c) Methane
    d) Ozone

21. The Paris Agreement aims to:
    a) Limit global warming to well below 2 degrees Celsius

b) Increase global deforestation
c) Reduce renewable energy investments
d) Encourage fossil fuel subsidies

22. The process of water evaporating from the surface of plants is called:
    a) Precipitation
    b) Transpiration
    c) Condensation
    d) Infiltration

23. Which of the following is a natural cause of climate change?
    a) Volcanic eruptions
    b) Deforestation
    c) Industrial pollution
    d) Urbanization

24. The "ozone hole" is most prominent over:
    a) North America
    b) Europe
    c) Antarctica
    d) Asia

25. The term "carbon footprint" refers to:
    a) Total amount of carbon stored in an ecosystem
    b) Total amount of carbon dioxide emitted by human activities
    c) Total amount of carbon sequestered by forests
    d) Total amount of carbon found in fossil fuels

26. The term "albedo" refers to:
    a) The rate of deforestation
    b) The reflectivity of a surface
    c) The amount of precipitation in a region
    d) The pH level of ocean water

27. What is the main cause of the depletion of the ozone layer in the stratosphere?
    a) Carbon emissions
    b) Chlorofluorocarbons (CFCs)
    c) Nitrous oxide emissions
    d) Methane emissions

28. Which of the following is NOT a greenhouse gas?
    a) Water vapor
    b) Carbon monoxide
    c) Methane
    d) Nitrous oxide

29. The Intergovernmental Panel on Climate Change (IPCC) was established by:
    a) United Nations Environment Programme (UNEP)
    b) World Meteorological Organization (WMO)
    c) United Nations Development Programme (UNDP)

d) United Nations Educational, Scientific and Cultural Organization (UNESCO)

30. The term "global dimming" refers to:
    a) Increase in global temperatures
    b) Decrease in global temperatures
    c) Decrease in solar radiation reaching the Earth's surface
    d) Increase in solar radiation reaching the Earth's surface

31. Which of the following is NOT a natural factor influencing climate change?
    a) Solar variability
    b) Volcanic eruptions
    c) Orbital variations
    d) Human activities

32. The Keeling Curve is a graph that shows the:
    a) Concentration of ozone in the atmosphere
    b) Concentration of carbon dioxide in the atmosphere
    c) Temperature variation in the troposphere
    d) Sea level rise over time

33. The Milankovitch cycles are associated with changes in:
    a) Solar radiation
    b) Earth's magnetic field
    c) Atmospheric pressure
    d) Earth's orbital parameters

34. Which of the following is a positive feedback mechanism contributing to climate change?
    a) Increased cloud cover reflecting more sunlight
    b) Melting of sea ice decreasing albedo
    c) Increased vegetation absorbing more carbon dioxide
    d) Enhanced ocean circulation transporting heat

35. The process of evapotranspiration involves:
    a) Conversion of water vapor into liquid water
    b) Conversion of liquid water into water vapor by plants
    c) Formation of clouds from water vapor
    d) Precipitation of water from clouds

36. The phenomenon known as "urban heat island effect" is primarily caused by:
    a) Increased greenhouse gas emissions in cities.
    b) Concrete and asphalt surfaces absorbing heat
    c) Higher population density in urban areas
    d) Industrial activities concentrated in cities

37. Which of the following is NOT a primary greenhouse gas?
    a) Methane
    b) Water vapor
    c) Ozone
    d) Nitrous oxide

38. The primary mechanism responsible for the transfer of heat from the Earth's surface to the atmosphere is:
    a) Conduction
    b) Convection
    c) Radiation
    d) Latent heat transfer

39. Which of the following is a consequence of ocean acidification?
    a) Increased coral reef growth
    b) Decreased shellfish populations
    c) Expansion of mangrove forests
    d) Enhanced fishery productivity

40. The Montreal Protocol is an international agreement aimed at reducing the emissions of:
    a) Carbon dioxide
    b) Methane
    c) Ozone-depleting substances
    d) Sulfur dioxide

41. What is the primary greenhouse gas responsible for global warming?
    a) Oxygen (O_2)
    b) Nitrogen (N_2)
    c) Carbon dioxide (CO_2)
    d) Hydrogen (H_2)

42. Which layer of the Earth's atmosphere contains the ozone layer?
    a) Troposphere
    b) Stratosphere
    c) Mesosphere
    d) Thermosphere

43. What is the main cause of the enhanced greenhouse effect?
    a) Natural variations in the Earth's orbit
    b) Volcanic eruptions
    c) Increased levels of greenhouse gases from human activities
    d) Solar flares

44. Which renewable energy source uses the heat from within the Earth?
    a) Solar energy
    b) Wind energy
    c) Hydroelectric energy
    d) Geothermal energy

45. What is the term for the long-term average of weather patterns in a particular area?
    a) Weather
    b) Climate
    c) Atmosphere

Answer Key

1. c) Carbon dioxide
2. d) Greenhouse gases
3. a) Methane
4. c) Earth's reflection of sunlight
5. c) Melting of permafrost
6. a) Warmer-than-average sea surface temperatures in the Pacific Ocean
7. c) Tidal power
8. a) Photovoltaic cells
9. d) Nitrogen
10. b) Solar energy
11. b) Stratosphere
12. c) Weakened shells of marine organisms
13. c) World Meteorological Organization (WMO)
14. b) Long-term average weather conditions
15. b) Nuclear energy
16. c) Sedimentation
17. a) Reduce greenhouse gas emissions
18. c) Soil erosion
19. a) Agricultural activities
20. b) Sulfur dioxide and nitrogen oxides
21. a) Limit global warming to well below 2 degrees Celsius
22. b) Transpiration
23. a) Volcanic eruptions
24. c) Antarctica
25. b) Total amount of carbon dioxide emitted by human activities.
26. b) The reflectivity of a surface
27. b) Chlorofluorocarbons (CFCs)
28. b) Carbon monoxide
29. a) United Nations Environment Programme (UNEP)
30. c) Decrease in solar radiation reaching the Earth's surface
31. d) Human activities
32. b) Concentration of carbon dioxide in the atmosphere
33. d) Earth's orbital parameters
34. b) Melting of sea ice decreasing albedo
35. b) Conversion of liquid water into water vapor by plants
36. b) Concrete and asphalt surfaces absorbing heat
37. c) Ozone
38. c) Radiation
39. b) Decreased shellfish populations
40. c) Ozone-depleting substances
41. c) Carbon dioxide (CO_2)
42. b) Stratosphere
43. c) Increased levels of greenhouse gases from human activities

44. d) Geothermal energy
45. b) Climate
46. d) Nitrogen fixation
47. b) Barometer
48. b) Infrared (IR) radiation
49. d) It is a clean and renewable energy source
50. c) Increase in soil erosion

Answerkey

Shri Shivaji Education Society, Amravati's

SCIENCE COLLEGE

Congress Nagar, Nagpur-12 (M.S.), India

Accredited with CGPA of 3.51 at 'A+' grade by NAAC, Bangalore
A "College with Potential for Excellence" identified by UGC New Delhi.
Institutional Member of APQN
Recognized Centre for Higher Learning and Research
Mentor College under 'PARAMARSH Scheme', UGC, New Delhi

Add-on Course

Course Exam Name: Environmental Physics: Understanding Climate Change, Atmospheric Dynamics, and Renewable Energy

Name of Student: .....

Roll No.: | **Session: 2022-23**

Test Date: 29/10/2022 | **Max. Marks: 100**

Invigilator Signature | **Obtained Marks:**

INSTRUCTIONS FOR FILLING THE SHEET
1. This sheet should not be folded or crushed.
2. Use only blue/ black ball point pen to fill the circles.
3. Use of pencil is strictly prohibited.
4. Circles should be darkened completely and properly.
5. Cutting and erasing on this sheet is not allowed.
6. Do not use any stray marks on the sheet.
7. Do not use marker or white fluid to hide the mark.

WRONG METHODS ⊗ ◉ ▨ ✓ CORRECT METHOD ○ ○ ○ ●

	A	B	C	D
1	○	○	●	○
2	○	○	○	●
3	●	○	○	○
4	○	○	●	○
5	○	○	●	○
6	●	○	○	○
7	○	○	●	○
8	●	○	○	○
9	○	○	○	●
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49	○	○	○	●
50	○	○	●	○

Shri Shivaji Education Society Amravati's

Science College

Congress Nagar, Nagpur

Department of Physics

Add-on Certificate Course

(2022-2023)

Certificate Course: Environmental Physics: Understanding Climate Change, Atmospheric Dynamics, and Renewable Energy

NOTICE

Date: 22/10/2022

All the registered students of add-on Course on **Environmental Physics: Understanding Climate Change, Atmospheric Dynamics, and Renewable Energy** under Department of Physics for the session 2022-23 are hereby informed that the theory examination is to be scheduled **on 29/10/2022** (Saturday) at **10:30 am to 12:30 am** in Physics Laboratory at our college center. All Students should be present in the laboratory before 10 mins. of scheduled time of examination.

Dr. G. L. Jadhav
Course Coordinator
Department of Physics

Shri Shivaji Education Society Amaravati's

Science College Congress Nagar, Nagpur

(2022-2023)

Certificate Course on Environmental Physics: Understanding Climate Change, Atmospheric Dynamics, and Renewable Energy (10 Week)

MARKSHEET

Sr. No.	Full Name of Student	Total Marks (100)	Grade obtained
1	BAGDE SAKSHI SATISH	68	B
2	BHALAVI SIDDHESH RAMESHWAR	52	C
3	CHOUDHARY DHANSHREE NARENDRA	42	C
4	DHOLE ISHA ANIL	58	C
5	GEDAM ROHIT DIPAK	68	B
6	GEDAM DIKSHA RAVINDRA	50	C
7	GHUTKE SHWETA CHARAN	52	C
8	JANGADE SANJANA SADANAND	58	C
9	JOSHI SANCHIT MADHUSUDAN	62	B
10	MESHRAM AYUSH BHARAT	62	B
11	BALAPURE PARI GAJANAN	66	B
12	BANSOD NIKHIL MILIND	44	C
13	BEDEKAR TUSHAR VAIBHAV	72	B
14	BHIWGADE SHRINAY YOGESH	62	B
15	DHADSE VAISHNAVI VIJAY	50	C
16	DHAKATE SAKSHI PRAMOD	92	A+
17	JADHAV AASTHA SANJU	60	B
18	JOSHI ARTI SUBHASH	62	B
19	KHAPRE MUSKAN PRAKASH	68	B
20	KUKDE ABHINAV BHUPENDRA	64	B
21	MEENA RUCHI MAHENDRA	84	A
22	MESHRAM NIKHITA RAVIKANT	80	A
23	MOHOD SAKSHI SADASHIVRAO	80	A
24	MOTWANI VARUN DOLAT	74	B
25	MOUNDEKAR VINKU MANIK	56	C
26	NARWADE SARTHAK ARUNRAO	62	B
27	PATLE SONALI SURESH	64	B
28	PAROCHE PALAK SATISH	66	B
29	PAUNIKAR YASHWANT RAJU	68	B
30	PIMPLE MANYA GANESH	70	B

31	PITALE SHRIVATSA PRASHANT	96	A+
32	POPERE GARGI VINAYAK	60	B
33	RAMAPURE ANUSHKA GANESH	52	C
34	RAUT DISHA VIJAY	70	B
35	SAMARTH SHRIHARI AJAY	72	B
36	AGARKAR PRANJAL VIJAY	70	B
37	AMBEKAR ATHARV RAMBHAU	71	B
38	BAGDE SHRADDHA BABAN	60	B
39	BALODIYA RITIKA VISHNU	76	A
40	BHAGAT KRUNAL GAJANAN	56	C
41	BHAGAT SANJIVANI SAGAR	60	B
42	BILKAR AMISHA SITARAM	74	B
43	CHANDANKHEDE RACHANA VINESH	68	B
44	CHAUDHARY MUNESH RAVINDRASINGH	94	A+
45	DAF PRADNYA CHANDRAKANT	90	A+
46	BHOYAR SHRUTIKA ANRENDRA	62	B
47	BOKARE ADITI ANAND	70	B
48	DHOMANE TWINKLE RAJESH	72	B
49	DONGRE SAKSHI SUNIL	88	A
50	JOSHI RENUKA PRAVIN	64	B
51	KADU KHUSHI KAMALAKAR	80	A
52	KAMBLE PARITOSH SARNATH	66	B
53	KOHAD DEVANSHU FIROJ	84	A
54	KURVE ATHARVA RAJESH	62	B
55	MANDAOKAR MRUNMAYEE DILIP	84	A
56	ALONE YASH ANIL	72	B
57	BANGDE ANSH PURUSHOTTAM	76	A
58	BASOPURKAR SARAS PRAKASH	80	A
59	BODKHE PRATIKSHA DILIP	78	A
60	BOMLE TANMAY VIJAY	74	B
61	BOTHLIKAR MUNISH SADASHIV	82	A
62	CHATAP DIPTI NILKANTH	66	B
63	DATAR MITALI SUNIL	64	B
64	DINESHWAR PUNAM BHOLRAM	66	B
65	DESHMUKH SOHAM PRASHANT	76	A
66	DESHPANDE MIUKTA RAVINDRA	74	B
67	DURGE RUPALI RAJU	82	A
68	GADGE ANIKET PARSHURAM	78	A
69	GEETEY PRATHA RAJESH	68	B
70	KALE NISHANT UMRAO	50	C
71	MADAVI GAURAV FANDULAL	48	C
72	MAHEVASH ZAMANI ATAUR	56	C
73	MANIKWAR PRATIKSHA KAILAS	76	A
74	MARAVI YOGESH RAMNATH	44	C
75	MEHETRE SANKET VISHNU	76	A
76	MESHRAM LIPAKSHI RAJANAND	74	B

77	NAGPURE SIDDHSHWAR MOHAN	76	A
78	NAGRALE MOUSAM MAHENDRA	68	B
79	NAMIRA KAUSAR WASEEM	74	B
80	NAVGHARE DIKSHA RAJENDRRA	84	A
81	TAJNE VAIBHAVI DEVENDRA	96	A+
82	THAKRE MRUNMAYI SUBHASH	76	A

A+ Grade => Marks=90 and above,
A Grade =>Marks=75 and <90
B Grade =>Marks=60 and <75,
C Grade =>Marks=40 and <60,
Fail Grade =>Marks<40

Dr. G. L. Jadhav
Course Coordinator

Shri Shivaji Education Society Amaravati's

Science College, Congress Nagar Nagpur

Department of Physics

2022-2023

Certificate Course on Environmental Physics: Understanding Climate Change, Atmospheric Dynamics, and Renewable Energy (10 Week)

Attendance Sheet

Theory/Practical

Sr. No.	Name of Student	Signature
1	BAGDE SAKSHI SATISH	
2	BHALAVI SIDDHESH RAMESHWAR	
3	CHOUDHARY DHANSHREE NARENDRA	
4	DHOLE ISHA ANIL	
5	GEDAM ROHIT DIPAK	
6	GEDAM DIKSHA RAVINDRA	
7	GHUTKE SHWETA CHARAN	
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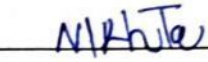
23	MOHOD SAKSHI SADASHIVRAO	
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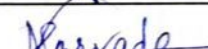
27	PATLE SONALI SURESH	
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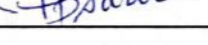
30	PIMPLE MANYA GANESH	
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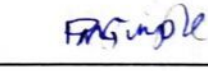
32	POPERE GARGI VINAYAK	
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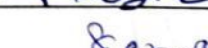
37	AMBEKAR ATHARV RAMBHAU	
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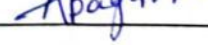
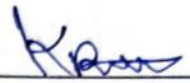
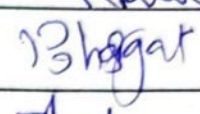
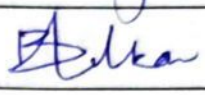
39	BALODIYA RITIKA VISHNU	

40	BHAGAT KRUNAL GAJANAN	
41	BHAGAT SANJIVANI SAGAR	
42	BILKAR AMISHA SITARAM	
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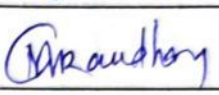
44	CHAUDHARY MUNESH RAVINDRASINGH	
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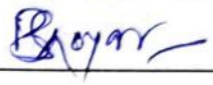
46	BHOYAR SHRUTIKA ANRENDRA	
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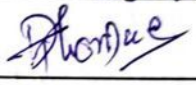
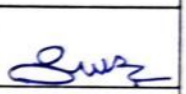
48	DHOMANE TWINKLE RAJESH	
49	DONGRE SAKSHI SUNIL	
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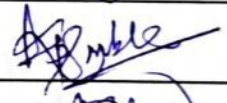
52	KAMBLE PARITOSH SARNATH	
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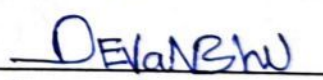
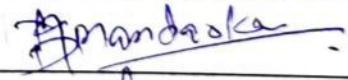
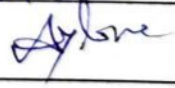
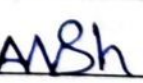
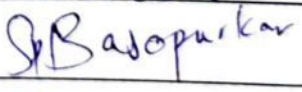
54	KURVE ATHARVA RAJESH	
55	MANDAOKAR MRUNMAYEE DILIP	
56	ALONE YASH ANIL	
57	BANGDE ANSH PURUSHOTTAM	
58	BASOPURKAR SARAS PRAKASH	
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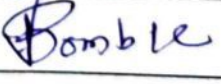
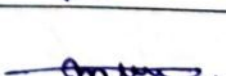
60	BOMLE TANMAY VIJAY	
61	BOTHLIKAR MUNISH SADASHIV	
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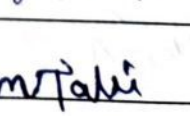
63	DATAR MITALI SUNIL	

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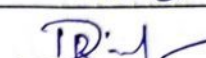
67	DURGE RUPALI RAJU	
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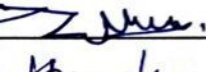
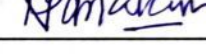
74	MARAVI YOGESH RAMNATH	
75	MEHETRE SANKET VISHNU	
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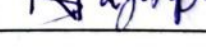
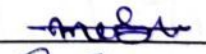
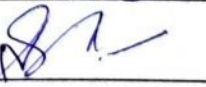
77	NAGPURE SIDDHSHWAR MOHAN	
78	NAGRALE MOUSAM MAHENDRA	
79	NAMIRA KAUSAR WASEEM	
80	NAVGHARE DIKSHA RAJENDRRA	
81	TAJNE VAIBHAVI DEVENDRA	
82	THAKRE MRUNMAYI SUBHASH	

Shir Shivaji EducationSociety Amaravati's

Science College,Congress Nagar, Nagpur

Environmental Physics: Understanding Climate Change, Atmospheric Dynamics, and Renewable Energy (10 Week)

Certificate Course

2022-2023

Registration Sheet

Sr. No.	Full Name of Student
1	BAGDE SAKSHI SATISH
2	BHALAVI SIDDHESH RAMESHWAR
3	CHOUDHARY DHANSHREE NARENDRA
4	DHOLE ISHA ANIL
5	GEDAM ROHIT DIPAK
6	GEDAM DIKSHA RAVINDRA
7	GHUTKE SHWETA CHARAN
8	JANGADE SANJANA SADANAND
9	JOSHI SANCHIT MADHUSUDAN
10	MESHRAM AYUSH BHARAT
11	BALAPURE PARI GAJANAN
12	BANSOD NIKHIL MILIND
13	BEDEKAR TUSHAR VAIBHAV
14	BHIWGADE SHRINAY YOGESH
15	DHADSE VAISHNAVI VIJAY
16	DHAKATE SAKSHI PRAMOD
17	JADHAV AASTHA SANJU
18	JOSHI ARTI SUBHASH
19	KHAPRE MUSKAN PRAKASH
20	KUKDE ABHINAV BHUPENDRA
21	MEENA RUCHI MAHENDRA
22	MESHRAM NIKHITA RAVIKANT
23	MOHOD SAKSHI SADASHIVRAO
24	MOTWANI VARUN DOLAT
25	MOUNDEKAR VINKU MANIK
26	NARWADE SARTHAK ARUNRAO
27	PATLE SONALI SURESH
28	PAROCHE PALAK SATISH
29	PAUNIKAR YASHWANT RAJU
30	PIMPLE MANYA GANESH
31	PITALE SHRIVATSA PRASHANT
32	POPERE GARGI VINAYAK
33	RAMAPURE ANUSHKA GANESH
34	RAUT DISHA VIJAY
35	SAMARTH SHRIHARI AJAY
36	AGARKAR PRANJAL VIJAY
37	AMBEKAR ATHARV RAMBHAU
38	BAGDE SHRADDHA BABAN

39	BALODIYA RITIKA VISHNU
40	BHAGAT KRUNAL GAJANAN
41	BHAGAT SANJIVANI SAGAR
42	BILKAR AMISHA SITARAM
43	CHANDANKHEDE RACHANA VINESH
44	CHAUDHARY MUNESH RAVINDRASINGH
45	DAF PRADNYA CHANDRAKANT
46	BHOYAR SHRUTIKA ANRENDRA
47	BOKARE ADITI ANAND
48	DHOMANE TWINKLE RAJESH
49	DONGRE SAKSHI SUNIL
50	JOSHI RENUKA PRAVIN
51	KADU KHUSHI KAMALAKAR
52	KAMBLE PARITOSH SARNATH
53	KOHAD DEVANSHU FIROJ
54	KURVE ATHARVA RAJESH
55	MANDAOKAR MRUNMAYEE DILIP
56	ALONE YASH ANIL
57	BANGDE ANSH PURUSHOTTAM
58	BASOPURKAR SARAS PRAKASH
59	BODKHE PRATIKSHA DILIP
60	BOMLE TANMAY VIJAY
61	BOTHLIKAR MUNISH SADASHIV
62	CHATAP DIPTI NILKANTH
63	DATAR MITALI SUNIL
64	DINESHWAR PUNAM BHOLRAM
65	DESHMUKH SOHAM PRASHANT
66	DESHPANDE MIUKTA RAVINDRA
67	DURGE RUPALI RAJU
68	GADGE ANIKET PARSHURAM
69	GEETEY PRATHA RAJESH
70	KALE NISHANT UMRAO
71	MADAVI GAURAV FANDULAL
72	MAHEVASH ZAMANI ATAUR
73	MANIKWAR PRATIKSHA KAILAS
74	MARAVI YOGESH RAMNATH
75	MEHETRE SANKET VISHNU
76	MESHRAM LIPAKSHI RAJANAND
77	NAGPURE SIDDHSHWAR MOHAN
78	NAGRALE MOUSAM MAHENDRA
79	NAMIRA KAUSAR WASEEM
80	NAVGHARE DIKSHA RAJENDRRA
81	TAJNE VAIBHAVI DEVENDRA
82	THAKRE MRUNMAYI SUBHASH

Shri Shivaji Education Society Amaravati's

Science College Congress Nagar, Nagpur

Department of Physics

Undergraduate Course for Physics Students

REPORT

"Environmental Physics: Understanding Climate Change, Atmospheric Dynamics, and Renewable Energy"

Duration: [10 Week] 30 Hour: (16 August 2022 to 22 October 2022)

Total Students: 82

This 10-week add-on course provided B.Sc. Physics students with a comprehensive understanding of the "Environmental Physics: Understanding Climate Change, Atmospheric Dynamics, and Renewable Energy." The course was conducted by Dr. G. L. Jadhav, Assistant Professor, Department of Physics SSES Amt's Science College Congress Nagar, Nagpur. Total 82 Students of B.Sc. I, II and III, year Physics were enrolled for the course.

The course covered theoretical principles and real-world applications. The students were evaluated through MCQ based final exam of 100 marks. All 82 students successfully completed the course.

The 10-week of "Environmental Physics: Understanding Climate Change, Atmospheric Dynamics, and Renewable Energy." course was a valuable addition to the undergraduate physics curriculum, equipping students with essential knowledge in environmental physics. The course successfully combined theoretical foundations with, preparing the students for further studies and careers in Environmental Physics and related fields.

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Feedback Report

1. How would you rate the overall quality of the course?

a) Excellent

b) Good

c) Average

d) Poor

2. How effective were the instructors in delivering the course content?

a) Excellent

b) Good

c) Average

d) Poor

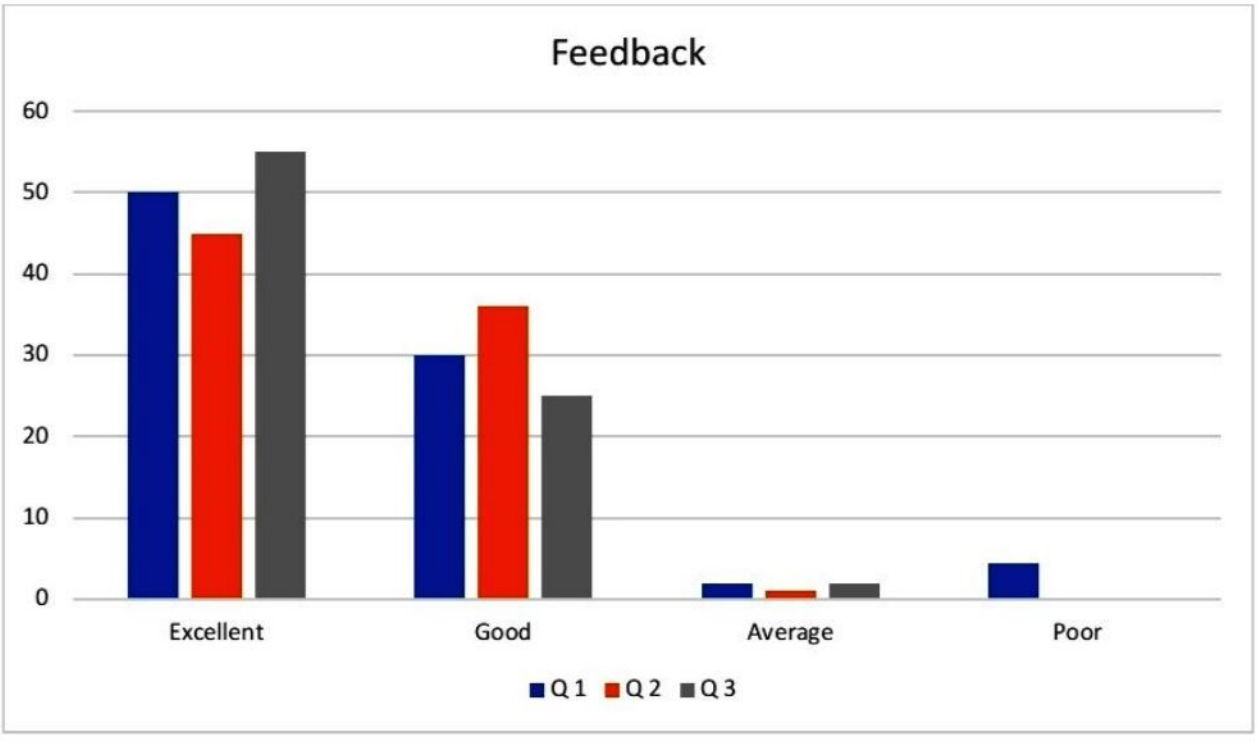
3. How would you rate the course's ability to meet your expectations?

a) Excellent

b) Good

c) Average

d) Poor



Shri Shivaji Education Society Amravati's

SCIENCE COLLEGE, CONGRESS NAGAR, NAGPUR

Accredited with CGPA of 3.51 at 'A+' Grade
A College with Potential for Excellence

CERTIFICATE

Mr./Ku. Dhakate Sakshi Pramod is awarded with certificate on successful completion of the course entitled, Certificate course in "Environmental Physics: Understanding Climate change, Atmospheric Dynamics and Renewable Energy".

Session 2022-23 under Add-on course conducted for 30 hours from 16/08/2022 to 22/10/2022 by Department of Physics, SSESA's, Science College, congress Nagar, Nagpur 440012.

He/She has passed the Examination with 'A+' Grade.

Dr. G. L. Jadhav
Coordinator, Department of Physics

Prof. M. P. Dhore
Principal, Science College, Nag