

**KRANTIGURU SHYAMJI KRISHNA VERMA  
KACHCHH UNIVERSITY, BHUJ**

**Academic Year: 2025-2026**



**Syllabus (NEP – 2020)  
B.Sc. (Honours) ENVIRONMENT SCIENCE  
(with Research /without Research)**

**Semesters: V and VI  
(with Multiple exit-entry options)**

**FACULTY OF SCIENCE**

**A Curriculum of Environment Science  
Faculty of Science framed as per UGC Guidelines and norms of  
National Education Policy (NEP) – 2020.**

**With effect from June – 2025**



# **B.Sc. (Honours) Environment Science Program**

**(With Research/without Research)**

**As per NEP-2020**

**With effect from June – 2025**

**FACULTY OF SCIENCE**

**Subject: Environment Science**

**B.Sc. Semesters: V&VI**



## AIM OF THE COURSE:

### **Aims of the B.Sc. (Honours) Course in Environment Science:**

- Foster a hands-on learning approach that encourages students to explore and discover the wonders of Environment science.
- Embrace modern educational trends like e-learning, flipped classrooms, and hybrid learning to create an engaging and interactive learning environment.
- Cultivate environmentally responsible citizens who play a pivotal role in shaping the future of Environment science subject and contribute their knowledge to sustainable development.
- Provide comprehensive theoretical and practical knowledge in Environment Science, equipping graduates with the necessary skills for further studies or exciting careers in Environment-related fields.
- Prepare students for national and international competitive examinations, empowering them to pursue advanced research opportunities or secure prestigious positions in Environment science and related fields.



## COURSE INTRODUCTION

The new curriculum of B.Sc. in Science (Environment Science) offers the essential knowledge and technical skills to study Environment science in a holistic manner. Students would be trained in all areas of Environment science using a unique combination of Major, Minor, MDC, AEC, SEC and VAC papers with significant inter-disciplinary components. Students would be exposed to cutting-edge technologies that are currently being used in the study of Environment life forms, their evolution, and interactions with other organisms within the ecosystem. Students would also become aware of the social and environmental significance of Environment life and its relevance to the national economy. B.Sc. Environment Science Programme covers academic activities within the classroom sessions along with practical concepts at laboratory sessions. Infield, outstation activities, and projects would also be organized for real-life experience and learning. Candidates who have curiosity in the field of Environment, Nature, Ecosystems and eager to exploring various exotic places, and wish to work as researchers or professionals like Environment Scientists, conservationists, Ecologists, etc. can choose the B.Sc. Environment Science course.



## Programme outcomes (POs)

This curriculum in B.Sc. Environment Science is to cultivate well-rounded individuals who are not only equipped with knowledge in the field of Environment science but are also driven to contribute to their nation's progress and shape the future. By studying Environment science, students will develop a deep understanding of the oceanic world and its potential for transformative impact on various sectors.



## EVALUATION METHODS:

Evaluation Methods for Environment Science: To assess the achievement of students in the Environment Science subject and ensure their desired learning outcomes, a variety of assessment methods will be adopted. These methods will provide a comprehensive evaluation of the student's academic performance. Here are the innovative assessment methods for Environment Science:

1. **Engaging Examinations:** Both oral and written examinations, including scheduled and surprise tests, will be conducted. These exams will test students' theoretical knowledge, critical thinking, and problem-solving skills related to Environment science concepts.
2. **Diverse Testing Approaches:** Closed-book and open-book tests will be administered to assess students' understanding and application of Environment science principles. These tests will challenge their ability to think critically and apply concepts to real-world scenarios.
3. **Practical Assignments and Reports:** Students will be assigned practical assignments and laboratory reports to evaluate their hands-on skills and understanding of Environment science experiments and techniques. These assignments will provide insight into their ability to collect, analyze, and interpret data in the context of Environment Environments.
4. **Observation of Practical Skills:** Practical skills, such as field sampling techniques or data collection methods, will be directly observed and evaluated. This assessment method allows instructors to assess students' competency in executing practical tasks related to Environment science.



5. **Collaborative Projects:** Both individual and group project reports will be assigned to encourage collaborative learning and foster teamwork. These projects will assess students' ability to conduct research, analyze data, and present findings on various ENVIRONMENT science topics.

6. **Innovative Seminar Presentations:** Students will deliver seminar presentations on specific Environment science subjects. This method will not only test their understanding and communication skills but also encourage them to explore cutting-edge research and advancements in the field.

7. **Viva Voce Interviews:** Viva voce interviews will be conducted to assess students' comprehensive understanding of Environment science concepts and their ability to articulate their knowledge effectively. This interactive assessment method will provide insights into their depth of understanding and critical thinking skills.

8. **Computerized Adaptive Testing:** Utilizing computerized adaptive testing methods will enable personalized assessment and help identify individual learning needs. These tests can adapt the difficulty level based on the student's responses, ensuring a tailored evaluation.

9. **Literature Surveys and Evaluations:** Students will be required to conduct literature surveys and evaluations on Environment science topics. This assessment approach will develop their research skills, and ability to critically analyze scientific literature, and synthesize information from various sources.

10. **Comprehensive Continuous Assessment (CCA):** Students will undergo continuous assessment throughout the course, including internal evaluations. The weightage of CCA will be 30% of the overall evaluation, ensuring a holistic evaluation of their progress.



**11. End of Semester Examination:** The semester-end examination, comprising 70% of the evaluation, will assess students based on their knowledge, understanding, skills, application, and higher-order thinking skills related to Environment science concepts. The assessment will be conducted by the university.

Additionally, to enhance their learning experience, students will be required to participate in at least one Environment Science Excursion, where they will study Environment ecosystems and biodiversity in their natural state. Laboratory work must be recorded in certified journals, which will be presented during practical examinations to showcase the students' hands-on expertise.

These innovative and varied assessment methods will enable a comprehensive evaluation of student's knowledge, skills, and understanding of Environment Science, fostering their growth and development in this field.



## Paper and Credit Scheme for Environment Science

### For Environment Science Semester - V

Year	Semester	Type of Paper	Paper Code	Paper Name	Credits	Marks		Total		
						CA	UA			
Third Year	V	Major - 1 Theory	MJES - 501 (Theory)	Computer, Remote Sensing and Environmental auditing	3	35	40	75		
		Major - 1 Practical	MJES - 502 (Practical)	Computer, Remote Sensing and Environmental auditing	1	10	15	25		
		Major - 2 Theory	MJES - 503 (Theory)	Environmental Hazards and Disaster Management	3	35	40	75		
		Major - 2 Practical	MJES - 504 (Practical)	Environmental Hazards and Disaster Management	1	10	15	25		
		Major - 3 Theory	MJES - 505 (Theory)	Environmental Pollution - 2	3	35	40	75		
		Major - 3 Practical	MJES - 506 (Practical)	Environmental Pollution - 2	1	10	15	25		
		Minor - 1 Theory	MNES - 507 (Theory)	Computer, Remote Sensing and Environmental auditing	3	35	40	75		
		Minor - 1 Practical	MNES - 508 (Practical)	Computer, Remote Sensing and Environmental auditing	1	10	15	25		
		Minor - 2 Theory	MNES - 509 (Theory)	Environmental Hazards and Disaster Management	3	35	40	75		
		Minor - 2 Practical	MNES - 510 (Practical)	Environmental Hazards and Disaster Management	1	10	15	25		
		TOTAL					20	225	275	500



### For ENVIRONMENT Science Semester - VI

Year	Semester	Type of Paper	Paper Code	Paper Name	Credits	Marks		Total
						CA	UA	
Third Year	VI	Major - 1 Theory	MJES - 601 (Theory)	Environmental Laws and Legislation	3	35	40	75
		Major - 1 Practical	MJES - 602 (Practical)	Environmental Laws and Legislation	1	10	15	25
		Major - 2 Theory	MJES - 603 (Theory)	Industrial Safety and Management - 1	3	35	40	75
		Major - 2 Practical	MJES - 604 (Practical)	Industrial Safety and Management - 1	1	10	15	25
		Major - 3 Theory	MJES - 605 (Theory)	Environmental Pollution - 3	3	35	40	75
		Major - 3 Practical	MJES - 606 (Practical)	Environmental Pollution - 3	1	10	15	25
		Minor - 1 Theory	MNES - 607 (Theory)	Environmental Laws and Legislation	3	35	40	75
		Minor - 1 Practical	MNES - 608 (Practical)	Environmental Laws and Legislation	1	10	15	25
			TOTAL		16	180	220	400



DETAILED SYLLABUS OF B.Sc. 3<sup>rd</sup> YEAR

SEMESTER - 5

CODE: MJES 501

PAPER NAME: COMPUTER, REMOTE SENSING AND ENVIRONMENTAL AUDITING  
KSKV Kachchh University, Bhuj – Kachchh

UNIT	SEMESTER 5 ENVIRONMENT SCIENCE MAJOR 1	NO. OF LECTURES
1	<p><b>Basics of computer:</b> Need for PC, parts of PC, computer programs. Basic Introduction of Hardware, software, Use of control panel, mouse and notepad Basic Introduction of formation of table and chart. Introduction of Operating systems: Basic Introduction of DOS, Windows and Linux.</p> <p><b>Computer application:</b> Introduction of Internet, Email, HTTP and IP address. Basic Introduction of Word, Excel and Power point, Applications of Computer in Science</p>	15
2	<p><b>Remote sensing:</b> Introduction, Concepts, foundations and applications of remote sensing. Remote Sensing application to study marine ecosystems like mangroves, corals and coastal water quality. Application of computers in remote sensing, Basic Introduction of ILWIS and ERDAS software.</p> <p><b>GPS and GIS:</b> Basic Introduction, principle and working application of GPS and GIS. Introduction to digital image processing and geographic information system, special data models and data structures. Basic Introduction and application of GIS- INCOIS Program.</p>	15
3	<p><b>Environmental Auditing:</b> Definition, Scope, Need and Importance Environmental Auditing. Types of Environmental Audits (Compliance Audits, Performance Audits, and Management System Audits), Internal and External Audits and their components. Pollution Control Boards, Penalties and Implementation. Role of Auditing in Sustainable Development.</p> <p><b>Environmental Economics:</b> Economics of natural (renewable/non-renewable) resources, methods for valuing Environmental costs and benefits. Pollution taxes, tradable permits (CO<sub>2</sub>, SO<sub>2</sub> and other pollutants), economic incentives for Environmental protection.</p>	15



**DETAILED SYLLABUS OF B.Sc. 3<sup>rd</sup> YEAR  
ENVIRONMENT SCIENCE  
(PRACTICAL PAPER)**

**SEMESTER - 5  
CODE: MJES 502**

**PAPER NAME: COMPUTER, REMOTE SENSING AND ENVIRONMENTAL AUDITING  
KSKV Kachchh University, Bhuj - Kachchh**

PRACTICAL	AIM OF PRACTICAL
1	Prepare a word document by using various formatting options. (Use: Home, Insert and Page layout menu buttons).
2	Prepare an excel document by using various formatting options. (Use: Home, Insert and Page layout menu buttons).
3	Prepare a PowerPoint document by using various formatting options. (Use: Home, Insert and Page layout menu buttons).
4	Prepare email ID and send mail with attachment. (attachment must be photo, text and pdf file).
5	Basic Introduction and demonstration of ILWIS software.
6	Basic Introduction and demonstration of ERDAS software.
7	Basic Introduction and application of GIS- INCOIS Program.
8	Case study of given EIA report.
9	Case study of given EIA report.
10	Case study of given EIA report.



### **Suggested Readings:**

1. Computer Fundamentals and Internet Basics by Rohit Khurana
2. Computer Fundamentals by RS Salaria
3. Handbook of Computer Fundamentals by Nasib Singh Gill
4. Introduction to Remote Sensing by James B. Campbell, Randolph H. Wynne,
5. Remote Sensing of Vegetation: Principles, Techniques, and Applications by Hamlyn G Jones, Robin A Vaughan
6. GIS Fundamentals: A First Text on Geographic Information Systems by Paul Bolstad.
7. Geographical information systems by Mehtani S. Commonwealth.
8. Fundamental of remote sensing by Joseph.
9. Basic laws of Environment by Prabhakar Anmol Pub.
10. Environmental pollution by Katyal Anmol Pub.
11. Marine pollution and prevention by Tyagi Anmol Pub.
12. Management of pollution control by Trivedi Akashdeet Pub.
13. Environmental waste and soil analysis by Trivedi Akashdeet Pub.
14. Handbook of methods in Environmental studies by S.k.mali Oxford Pub.



**DETAILED SYLLABUS OF B.Sc. 3<sup>rd</sup> YEAR**

**SEMESTER - 5**

**CODE: MJES 503**

**PAPER NAME: ENVIRONMENTAL HAZARDS AND DISASTER MANAGEMENT**

**KSKV Kachchh University, Bhuj - Kachchh**

UNIT	SEMESTER 5 ENVIRONMENT SCIENCE MAJOR 2	NO. OF LECTURES
1	<p><b>Environmental Hazard:</b> Definition of Hazard, Disaster, Eco – Disaster, Disaster Management. Definition and Types of Environmental Hazards (Natural vs. Man-made).</p> <p><b>Natural Hazards:</b> Basic Introduction, Causes, impacts, Occurrences and Mitigation of Earthquake, Volcano, Floods, Droughts, Landslides, Cyclone, Tsunami, Forest fires, Avalanches. Importance of Disaster Management in Environmental Science</p>	15
2	<p><b>Manmade Hazards:</b> Basic Introduction of Oil Spills, Urban Flooding, Deforestation and Desertification, Overall Environmental Degradation.</p> <p><b>Industrial accidents:</b> Definition, Causes, Types (Physical, Chemical, Biological, Electrical). Industrial Accidents (Chemical Spills, Nuclear Accidents), Nature of accident – explosion, fire, toxic release and dispersion.</p> <p><b>Occupational health hazard:</b> Basic Introduction, Causes and Prevention.</p> <p><b>Technical Hazard:</b> Basic Introduction, Causes and Prevention.</p> <p><b>Ergonomics:</b> Introduction to ergonomics, concept and methodology</p>	15
3	<p><b>Disaster Management:</b> Definition, Basic Introduction, Components, Overview Phases (Preparedness, Mitigation, Response, Recovery) of Disaster Management, Need of Disaster management Plan, On site &amp; Off-site emergency plans. Environmental Engineering Solutions for Disaster Mitigation (Flood Barriers, Earthquake-resistant Buildings), Preparedness for Specific Disasters (Floods, Droughts, Hurricanes),</p> <p><b>Basic concepts of hazards control system</b> – Incident reduction, Incident management techniques of assessing technical hazards – PHA, HAZOP, HAZAN, MCAA.</p>	15



**DETAILED SYLLABUS OF B.Sc. 3<sup>rd</sup> YEAR  
ENVIRONMENT SCIENCE  
(PRACTICAL PAPER)**

**SEMESTER - 5**

**CODE: MJES 504**

**PAPER NAME: ENVIRONMENTAL HAZARDS AND DISASTER MANAGEMENT  
KSKV Kachchh University, Bhuj - Kachchh**

<b>PRACTICAL</b>	<b>AIM OF PRACTICAL</b>
1	Case Study 01: The Chernobyl Nuclear Disaster.
2	Case Study 02: Minamata Disease (Japan, 1956).
3	Case Study 03: Aral Sea Shrinkage (Central Asia).
4	Case Study 04: London Smog (UK, 1952).
5	Case Study 05: The 2004 Indian Ocean Tsunami.
6	Case Study 06: The 2010 Haiti Earthquake.
7	Case Study 07: Uttarakhand Floods (India, 2013).
8	Case Study 08: The 2015 Nepal Earthquake.
9	Case Study 09: Amazon Rainforest Fires (Brazil, 2019).
10	Case Study 10: Visakhapatnam Gas Leak (India, 2020).



**Suggested Readings:**

1. Standard methods for the examination of water and wastewater 22 ed by Rice, APHA pub.
2. Textbook of Environmental studies by Bharucha, OBS pub.
3. Handbook of Environmental 2 volumes by Trivedi, BSP pub.
4. Environmental science vol 1& 2 by Trivedi, Atlantic pub.
5. Environmental waste and soil analysis by P.R.Trivedi Akashdeet pub.



**DETAILED SYLLABUS OF B.Sc. 3<sup>rd</sup> YEAR**  
**SEMESTER - 5**  
**CODE: MJES 505**  
**PAPER NAME: ENVIRONMENTAL POLLUTION - 2**  
**KSKV Kachchh University, Bhuj - Kachchh**

UNIT	SEMESTER 5 ENVIRONMENT SCIENCE MAJOR 3	NO. OF LECTURES
1	<p><b>Air Pollution:</b> Composition and Chemistry of Earth Atmosphere, Basic Introduction, Definition and Overview of Air Pollution. Brief History of Air Pollution and Major Events (e.g., London Smog, Beijing Air Pollution). Types of Air Pollutants: Primary vs. Secondary Pollutants.</p> <p><b>Sources of Air Pollution:</b> Natural Sources and Manmade Sources. Stationary vs. Mobile Sources, Point, and Non-Point Sources</p> <p><b>Major Air Pollutants:</b> Gaseous Pollutants: CO, NO<sub>x</sub>, SO<sub>2</sub>, O<sub>3</sub>, VOCs; Particulate Matter (PM): PM<sub>2.5</sub>, PM<sub>10</sub>, Aerosols; Heavy Metals: Lead, Mercury, Arsenic, Cadmium; Greenhouse Gases: CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O</p>	15
2	<p><b>Meteorology and Air Pollution:</b> Wind speed, Wind direction, wind roses; Atmospheric stability and inversions, stack height, stack emissions, dispersion theories and models.</p> <p><b>Monitoring of Air Pollution:</b> Stack sampling and analysis – Instrumental analysis and wet chemical methods, Ambient air quality monitoring – High volume sampler, instrumental monitoring. Stationery and Mobile Methods for Monitoring Air Pollutants. Air Quality Index (AQI).</p>	15
3	<p><b>Air pollution control:</b> Control of air pollution by process change; control of air pollution by equipment: control of particle emission – setting chambers, inertial separators, cyclones, filters, electrostatic precipitators, scrubbers and wet collectors; control of smokes; control of gaseous emission – combustion, adsorption, absorption.</p> <p><b>Effects of Air Pollution:</b> Human Health Effects: Respiratory Diseases (e.g., Asthma), Environmental Effects: Acid Rain</p>	15



**DETAILED SYLLABUS OF B.Sc. 3<sup>rd</sup> YEAR  
ENVIRONMENT SCIENCE  
(PRACTICAL PAPER)  
SEMESTER - 5  
CODE: MJES 506  
PAPER NAME: ENVIRONMENTAL POLLUTION – 2  
KSKV Kachchh University, Bhuj - Kachchh**

PRACTICAL	AIM OF PRACTICAL
1	To study principal and working procedure of High-Volume Air Sampler and Low Volume Air Sampler.
2	To study principal and working procedure of Respirable Dust Sampler (RDS).
3	To study principal and working procedure of Continuous Ambient Air Quality Monitoring Station.
4	To study principal and working procedure of Gas Analyzers.
5	To study principal and working procedure of Stack Emission Monitoring Equipment.
6	Prepare report on given topic.
7	Prepare report on given topic.
8	Prepare report on given topic.
9	Prepare report on given topic.
10	Prepare report on given topic.



**Suggested Readings:**

1. **Air Pollution** by M.N. Rao & H.V.N. Rao
2. **Air Pollution and Control** by K.V.S.G. Murali Krishna
3. **Principles and Practices of Air Pollution Control and Analysis** by J.R. Mudakavi
4. **Air Pollution and Control** by Dr. Keshav Kant & Rajni Kant
5. **Air Pollution | Measurement, Modelling and Mitigation (4th Edition)** by Abhishek Tiwary & Ian Williams



DETAILED SYLLABUS OF B.Sc. 3<sup>rd</sup> YEAR

SEMESTER - 5

CODE: MNES 507 (MINOR)

PAPER NAME: COMPUTER, REMOTE SENSING AND ENVIRONMENTAL AUDITING  
KSKV Kachchh University, Bhuj – Kachchh

UNIT	SEMESTER 5 ENVIRONMENT SCIENCE MINOR 1	NO. OF LECTURES
1	<p><b>Basics of computer:</b> Need for PC, parts of PC, computer programs. Basic Introduction of Hardware, software, Use of control panel, mouse and notepad Basic Introduction of formation of table and chart. Introduction of Operating systems: Basic Introduction of DOS, Windows and Linux.</p> <p><b>Computer application:</b> Introduction of Internet, Email, HTTP and IP address. Basic Introduction of Word, Excel and Power point, Applications of Computer in Science</p>	15
2	<p><b>Remote sensing:</b> Introduction, Concepts, foundations and applications of remote sensing. Remote Sensing application to study marine ecosystems like mangroves, corals and coastal water quality. Application of computers in remote sensing, Basic Introduction of ILWIS and ERDAS software.</p> <p><b>GPS and GIS:</b> Basic Introduction, principle and working application of GPS and GIS. Introduction to digital image processing and geographic information system, special data models and data structures. Basic Introduction and application of GIS- INCOIS Program.</p>	15
3	<p><b>Environmental Auditing:</b> Definition, Scope, Need and Importance Environmental Auditing. Types of Environmental Audits (Compliance Audits, Performance Audits, and Management System Audits), Internal and External Audits and their components. Pollution Control Boards, Penalties and Implementation. Role of Auditing in Sustainable Development.</p> <p><b>Environmental Economics:</b> Economics of natural (renewable/non-renewable) resources, methods for valuing Environmental costs and benefits. Pollution taxes, tradable permits (CO<sub>2</sub>, SO<sub>2</sub> and other pollutants), economic incentives for Environmental protection.</p>	15



**DETAILED SYLLABUS OF B.Sc. 3<sup>rd</sup> YEAR  
ENVIRONMENT SCIENCE  
(PRACTICAL PAPER)  
SEMESTER - 5**

**CODE: MNES 508 (MINOR)**

**PAPER NAME: COMPUTER, REMOTE SENSING AND ENVIRONMENTAL AUDITING  
KSKV Kachchh University, Bhuj - Kachchh**

<b>PRACTICAL</b>	<b>AIM OF PRACTICAL</b>
<b>1</b>	Prepare a word document by using various formatting options. (Use: Home, Insert and Page layout menu buttons).
<b>2</b>	Prepare an excel document by using various formatting options. (Use: Home, Insert and Page layout menu buttons).
<b>3</b>	Prepare a PowerPoint document by using various formatting options. (Use: Home, Insert and Page layout menu buttons).
<b>4</b>	Prepare email ID and send mail with attachment. (attachment must be photo, text and pdf file).
<b>5</b>	Basic Introduction and demonstration of ILWIS software.
<b>6</b>	Basic Introduction and demonstration of ERDAS software.
<b>7</b>	Basic Introduction and application of GIS- INCOIS Program.
<b>8</b>	Case study of given EIA report.
<b>9</b>	Case study of given EIA report.
<b>10</b>	Case study of given EIA report.



### **Suggested Readings:**

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2. Computer Fundamentals by RS Salaria
3. Handbook of Computer Fundamentals by Nasib Singh Gill
4. Introduction to Remote Sensing by James B. Campbell, Randolph H. Wynne,
5. Remote Sensing of Vegetation: Principles, Techniques, and Applications by Hamlyn G Jones, Robin A Vaughan
6. GIS Fundamentals: A First Text on Geographic Information Systems by Paul Bolstad.
7. Geographical information systems by Mehtani S. Commonwealth.
8. Fundamental of remote sensing by Joseph.
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11. Marine pollution and prevention by Tyagi Anmol Pub.
12. Management of pollution control by Trivedi Akashdeet Pub.
13. Environmental waste and soil analysis by Trivedi Akashdeet Pub.
14. Handbook of methods in Environmental studies by S.k.mali Oxford Pub.



DETAILED SYLLABUS OF B.Sc. 3<sup>rd</sup> YEAR

SEMESTER - 5

CODE: MNES 509 (MINOR)

PAPER NAME: ENVIRONMENTAL HAZARDS AND DISASTER MANAGEMENT

KSKV Kachchh University, Bhuj - Kachchh

UNIT	SEMESTER 5 ENVIRONMENT SCIENCE MINOR 2	NO. OF LECTURES
1	<p><b>Environmental Hazard:</b> Definition of Hazard, Disaster, Eco – Disaster, Disaster Management. Definition and Types of Environmental Hazards (Natural vs. Man-made).</p> <p><b>Natural Hazards:</b> Basic Introduction, Causes, impacts, Occurrences and Mitigation of Earthquake, Volcano, Floods, Droughts, Landslides, Cyclone, Tsunami, Forest fires, Avalanches. Importance of Disaster Management in Environmental Science</p>	15
2	<p><b>Manmade Hazards:</b> Basic Introduction of Oil Spills, Urban Flooding, Deforestation and Desertification, Overall Environmental Degradation.</p> <p><b>Industrial accidents:</b> Definition, Causes, Types (Physical, Chemical, Biological, Electrical). Industrial Accidents (Chemical Spills, Nuclear Accidents), Nature of accident – explosion, fire, toxic release and dispersion.</p> <p><b>Occupational health hazard:</b> Basic Introduction, Causes and Prevention.</p> <p><b>Technical Hazard:</b> Basic Introduction, Causes and Prevention.</p> <p><b>Ergonomics:</b> Introduction to ergonomics, concept and methodology</p>	15
3	<p><b>Disaster Management:</b> Definition, Basic Introduction, Components, Overview Phases (Preparedness, Mitigation, Response, Recovery) of Disaster Management, Need of Disaster management Plan, On site &amp; Off-site emergency plans. Environmental Engineering Solutions for Disaster Mitigation (Flood Barriers, Earthquake-resistant Buildings), Preparedness for Specific Disasters (Floods, Droughts, Hurricanes),</p> <p><b>Basic concepts of hazards control system</b> – Incident reduction, Incident management techniques of assessing technical hazards – PHA, HAZOP, HAZAN, MCAA.</p>	15



**DETAILED SYLLABUS OF B.Sc. 3<sup>rd</sup> YEAR  
ENVIRONMENT SCIENCE  
(PRACTICAL PAPER)  
SEMESTER - 5  
CODE: MNES 510 (MINOR)  
PAPER NAME: ENVIRONMENTAL HAZARDS AND DISASTER MANAGEMENT  
KSKV Kachchh University, Bhuj - Kachchh**

<b>PRACTICAL</b>	<b>AIM OF PRACTICAL</b>
1	Case Study 01: The Chernobyl Nuclear Disaster.
2	Case Study 02: Minamata Disease (Japan, 1956).
3	Case Study 03: Aral Sea Shrinkage (Central Asia).
4	Case Study 04: London Smog (UK, 1952).
5	Case Study 05: The 2004 Indian Ocean Tsunami.
6	Case Study 06: The 2010 Haiti Earthquake.
7	Case Study 07: Uttarakhand Floods (India, 2013).
8	Case Study 08: The 2015 Nepal Earthquake.
9	Case Study 09: Amazon Rainforest Fires (Brazil, 2019).
10	Case Study 10: Visakhapatnam Gas Leak (India, 2020).



**Suggested Readings:**

1. Standard methods for the examination of water and wastewater 22 ed by Rice, APHA pub.
2. Textbook of Environmental studies by Bharucha, OBS pub.
3. Handbook of Environmental 2 volumes by Trivedi, BSP pub.
4. Environmental science vol 1& 2 by Trivedi, Atlantic pub.
5. Environmental waste and soil analysis by P.R.Trivedi Akashdeet pub.



**DETAILED SYLLABUS OF B.Sc. 3<sup>rd</sup> YEAR**  
**SEMESTER - 6**  
**CODE: MJES 601**  
**PAPER NAME: ENVIRONMENTAL LAWS AND LEGISLATION**  
**KSKV Kachchh University, Bhuj - Kachchh**

UNIT	SEMESTER 6 ENVIRONMENT SCIENCE MAJOR 1	NO. OF LECTURES
1	<b>National Agencies:</b> Introduction, Role, Objectives and Functions of Animal Welfare Board of India (AWBI), National Biodiversity Authority (NBA), Wildlife Crime Control Bureau (WCCB), National Mission for Clean Ganga (NMCG), Compensatory Afforestation Fund Management and Planning Authority (CAMPA), Ministry of Environment, Forest and Climate Change (MoEFCC), Forest Survey of India (FSI), National Biodiversity Authority (NBA), National Tiger Conservation Authority (NTCA), Wildlife Institute of India (WII), Botanical Survey of India (BSI), Zoological Survey of India (ZSI), Indian Institute of Tropical Meteorology, Indian Meteorological Department	15
2	<b>Environmental Acts:</b> Basic Introduction of The Environment (Protection) Act, 1986, Wildlife Protection Act, 1972, Forest Conservation Act, 1980, Biological Diversity Act, 2002, The Ozone Depleting Substances (Regulation and Control) Rules 2000, The Energy Conservation Act, 2001, Public Liability Insurance Act, 1991, The National Green Tribunal Act, 2010, Coastal Regulation Zone, E-waste (Management) Rules, 2016, Compensatory Afforestation Fund Act, 2016, <b>Wetland (Conservation and Management) Rules 2010 &amp; 2017.</b>	15
3	Ramsar Convention 1971, Stockholm Convention 2001, CITES 1973, Convention on Biological Diversity 1992, Vienna Convention 1985, Montreal Protocol 1987, Kyoto Protocol 1997, United Nations Framework Convention on Climate Change (UNFCCC) 1992, Rio Summit 1992, UNCCD 1994, United Nations Environment Programme (UNEP), Aichi Biodiversity Targets – 2010, The Earth Summit (1992), Paris Agreement – 2015, World Wide Fund for nature (WWF), Bruntland commission (WCEB), Rio conference 1992, Environmental Impact Assessment notification.	15



**DETAILED SYLLABUS OF B.Sc. 3<sup>rd</sup> YEAR  
ENVIRONMENT SCIENCE  
(PRACTICAL PAPER)  
SEMESTER - 6  
CODE: MJES 602  
PAPER NAME: ENVIRONMENTAL LAWS AND LEGISLATION  
KSKV Kachchh University, Bhuj - Kachchh**

<b>PRACTICAL</b>	<b>AIM OF PRACTICAL</b>
1	Role and objectives of Wildlife Institute of India (WII).
2	Role and objectives of Botanical Survey of India (BSI).
3	Role and objectives of Zoological Survey of India (ZSI).
4	Role and objectives of The Environment (Protection) Act, 1986.
5	Role and objectives of Biological Diversity Act, 2002.
6	Role and objectives of The Ozone Depleting Substances (Regulation and Control) Rules 2000.
7	Role and objectives of Ramsar Convention 1971.
8	Role and objectives of Montreal Protocol 1987
9	Role and objectives of United Nations Environment Programme (UNEP).
10	Role and objectives of Environmental Impact Assessment.



**Suggested Readings:**

1. Environmental Laws and Policies in India by N.V. Paranjape
2. Environmental Institutions in India by V. S. Prakash
3. Environmental Governance in India by K. K. Sharma
4. Environmental Law and Sustainable Development by Dr. S. C. Sharma
5. International Environmental Law by Prue Taylor



DETAILED SYLLABUS OF B.Sc. 3<sup>rd</sup> YEAR

SEMESTER - 6

CODE: MJES 603

PAPER NAME: INDUSTRIAL SAFETY AND MANAGEMENT – 1

KSKV Kachchh University, Bhuj - Kachchh

UNIT	SEMESTER 5 ENVIRONMENT SCIENCE MINOR 1	NO. OF LECTURES
1	<b>Introduction to Industrial Safety:</b> Basic introduction of industrial safety, Types of workplace hazards (fire, electric, chemicals, noise), Importance of Safety. <b>Basic Safety Rules and Equipment:</b> Common safety signs and symbols, Fire extinguishers and emergency exits. <b>Safety Management System:</b> Basic information of safety policy, Role of safety officer and safety committee, Safety training and awareness programs.	15
2	<b>Safety Regulations and Standards: National Regulations:</b> Overview of the Factories Act, 1948; Environment Protection Act, 1986; Water (Prevention and Control of Pollution) Act, 1974; Air (Prevention and Control of Pollution) Act, 1981. <b>International Standards:</b> Introduction to ISO 14001 (Environmental Management Systems) and ISO 45001 (Occupational Health and Safety Management Systems). <b>Role of Regulatory Bodies:</b> Functions of the Central Pollution Control Board (CPCB), State Pollution Control Boards (SPCBs), and the National Green Tribunal (NGT).	15
3	<b>Techniques for Hazard Control:</b> Hierarchy of Controls - Elimination, Substitution, Engineering Controls, Administrative Controls, Personal Protective Equipment (PPE). <b>Safety Management Systems (SMS) -</b> Components of SMS (Policies, Organizational Structure, Procedures, Records, and Audits). Implementation of Safety Management Systems, Continuous Improvement in Safety - The Plan-Do-Check-Act (PDCA) Cycle. <b>Personal Protective Equipment (PPE) -</b> Types of PPE: Head Protection, Eye and Face Protection, Hearing Protection, Respirators, Gloves, Protective Clothing, Proper Selection and Use of PPE, Maintenance and Storage of PPE.	15



**DETAILED SYLLABUS OF B.Sc. 3<sup>rd</sup> YEAR  
ENVIRONMENT SCIENCE  
(PRACTICAL PAPER)  
SEMESTER - 6  
CODE: MJES 604  
PAPER NAME: INDUSTRIAL SAFETY AND MANAGEMENT – 1  
KSKV Kachchh University, Bhuj - Kachchh**

<b>PRACTICAL</b>	<b>AIM OF PRACTICAL</b>
1	To study common safety signs and symbols.
2	To demonstrate types and functioning of Fire extinguishers.
3	Case study of industrial safety and management.
4	Case study of industrial safety and management.
5	Case study of industrial safety and management.
6	Role of Central Pollution Control Board in industrial safety.
7	Role of State Pollution Control Boards in industrial safety.
8	Role of National Green Tribunal in industrial safety.
9	Proper Selection and Use of Personal Protective Equipment (PPE).
10	Maintenance and Storage of Personal Protective Equipment (PPE).



**Suggested Readings:**

1. Industrial Safety, Health and Environment Management Systems by Prof. Sunil S. Rao & R.K. Jain
2. Providing Safe & Healthy Workplace with ISO 45001:2018 by Ramesh C. Grover & Sachin Grover
3. Occupational Safety, Health and Working Conditions Code, 2020
4. Industrial Safety and Health by Dr. S.K. Bhattacharya
5. Safety Management Systems: A Practical Approach by Dr. S.K. Saha



**DETAILED SYLLABUS OF B.Sc. 3<sup>rd</sup> YEAR**  
**SEMESTER - 6**  
**CODE: MJES 605**  
**PAPER NAME: ENVIRONMENTAL POLLUTION – 3**  
**KSKV Kachchh University, Bhuj – Kachchh**

UNIT	SEMESTER 6 ENVIRONMENT SCIENCE MAJOR 3	NO. OF LECTURES
1	<p><b>Solid Waste Management (SWM):</b> Introduction, Definition and Types of Solid Waste (Municipal, Industrial, Hazardous, Biomedical, Agricultural, etc.), <b>Sources of Solid Waste:</b> Residential, Commercial, Industrial, Institutional etc. Characteristics of Solid Waste: Physical, Chemical, and Biological.</p> <p><b>The Waste Hierarchy:</b> Reduce, Reuse, Recycle, and Dispose, Importance of Waste Management in Environmental Protection and Public Health.</p> <p><b>Solid waste Generation:</b> Basic Introduction, Factors Influencing Waste Generation: Population Growth, Urbanization, Economic</p>	15
2	<p><b>Collection and Segregation of Solid Waste:</b> Methods of Collection: Curbside Collection, Door-to-Door Collection, Communal Collection Points. Waste Segregation at Source: Importance and Methods. Types of Waste Containers: Bins, Bags, and Other Collection Devices.</p> <p><b>Solid waste transport:</b> Definition and Importance. Types of Transport Vehicles: On-Road Vehicles (Collection Trucks, Dump Trucks). Off-Road Vehicles (Conveyors, Trolleys) Containerization and Packaging for Transport (Bins, Dumpsters, and Special Containers for Different Types of Waste) Challenges in Handling Hazardous and Biomedical Waste, Automated Waste Collection Systems (AWCS)</p>	15
3	<p><b>Waste Treatment Technologies:</b> Mechanical Biological Treatment (MBT) - Composting, Anaerobic Digestion, Thermal Treatment: Incineration, Pyrolysis, and Gasification, Biological Treatment: Composting, Vermiculture, and Biodegradation, Chemical Treatment: Neutralization and Stabilization of Hazardous Waste,</p> <p><b>Technologies for Waste to Energy (WTE):</b> Landfill Gas Recovery, Incineration, Biomass Energy Production</p> <p><b>Recycling:</b> Principles, Types of Recyclable Materials (Paper, Plastics, Glass, Metals, Organic Waste), Methods of Recycling: Manual, Mechanical, Chemical, and Thermal Recycling, Resource Recovery from Waste: Metals, Paper, Plastics, Organic Waste, E-Waste, etc.</p>	15



**DETAILED SYLLABUS OF B.Sc. 3<sup>rd</sup> YEAR  
ENVIRONMENT SCIENCE  
(PRACTICAL PAPER)  
SEMESTER - 6  
CODE: MJES 606  
PAPER NAME: ENVIRONMENTAL POLLUTION – 3  
KSKV Kachchh University, Bhuj - Kachchh**

<b>PRACTICAL</b>	<b>AIM OF PRACTICAL</b>
1	Prepare report on given topic from unit-1.
2	Prepare report on given topic from unit-1.
3	Prepare report on given topic from unit-2.
4	Prepare report on given topic from unit-2.
5	Prepare report on given topic from unit-3.
6	Prepare report on given topic from unit-3.
7	Collection and segregation of solid waste.
8	Visit of municipal solid waste management in nearby municipality.
9	Case study of solid waste management.
10	Case study of solid waste management.



**Suggested Readings:**

1. Solid Waste Management: Principles and Practice" by S. C. Bhatia
2. Environmental Management: Solid Waste Management" by R. K. Trivedi
3. Solid Waste Management: A Roadmap for India" by K. K. Ghosh
4. Waste Management and Resource Recovery" by S. N. Ghosh
5. Environmental Pollution Control Engineering" by C. S. Rao



**DETAILED SYLLABUS OF B.Sc. 3<sup>rd</sup> YEAR**  
**SEMESTER - 6**  
**CODE: MNES 607 (MINOR)**  
**PAPER NAME: ENVIRONMENTAL LAWS AND LEGISLATION**  
**KSKV Kachchh University, Bhuj - Kachchh**

UNIT	SEMESTER 6 ENVIRONMENT SCIENCE MINOR 1	NO. OF LECTURES
1	<b>National Agencies:</b> Introduction, Role, Objectives and Functions of Animal Welfare Board of India (AWBI), National Biodiversity Authority (NBA), Wildlife Crime Control Bureau (WCCB), National Mission for Clean Ganga (NMCG), Compensatory Afforestation Fund Management and Planning Authority (CAMPA), Ministry of Environment, Forest and Climate Change (MoEFCC), Forest Survey of India (FSI), National Biodiversity Authority (NBA), National Tiger Conservation Authority (NTCA), Wildlife Institute of India (WII), Botanical Survey of India (BSI), Zoological Survey of India (ZSI), Indian Institute of Tropical Meteorology, Indian Meteorological Department	15
2	<b>Environmental Acts:</b> Basic Introduction of The Environment (Protection) Act, 1986, Wildlife Protection Act, 1972, Forest Conservation Act, 1980, Biological Diversity Act, 2002, The Ozone Depleting Substances (Regulation and Control) Rules 2000, The Energy Conservation Act, 2001, Public Liability Insurance Act, 1991, The National Green Tribunal Act, 2010, Coastal Regulation Zone, E-waste (Management) Rules, 2016, Compensatory Afforestation Fund Act, 2016, <b>Wetland (Conservation and Management) Rules 2010 &amp; 2017.</b>	15
3	Ramsar Convention 1971, Stockholm Convention 2001, CITES 1973, Convention on Biological Diversity 1992, Vienna Convention 1985, Montreal Protocol 1987, Kyoto Protocol 1997, United Nations Framework Convention on Climate Change (UNFCCC) 1992, Rio Summit 1992, UNCCD 1994, United Nations Environment Programme (UNEP), Aichi Biodiversity Targets – 2010, The Earth Summit (1992), Paris Agreement – 2015, World Wide Fund for nature (WWF), Bruntland commission (WCEB), Rio conference 1992, Environmental Impact Assessment notification.	15



**DETAILED SYLLABUS OF B.Sc. 3<sup>rd</sup> YEAR**  
**ENVIRONMENT SCIENCE**  
**(PRACTICAL PAPER)**  
**SEMESTER - 6**  
**CODE: MNES 608 (MINOR)**  
**PAPER NAME: ENVIRONMENTAL LAWS AND LEGISLATION**  
**KSKV Kachchh University, Bhuj - Kachchh**

<b>PRACTICAL</b>	<b>AIM OF PRACTICAL</b>
<b>1</b>	Role and objectives of Wildlife Institute of India (WII).
<b>2</b>	Role and objectives of Botanical Survey of India (BSI).
<b>3</b>	Role and objectives of Zoological Survey of India (ZSI).
<b>4</b>	Role and objectives of The Environment (Protection) Act, 1986.
<b>5</b>	Role and objectives of Biological Diversity Act, 2002.
<b>6</b>	Role and objectives of The Ozone Depleting Substances (Regulation and Control) Rules 2000.
<b>7</b>	Role and objectives of Ramsar Convention 1971.
<b>8</b>	Role and objectives of Montreal Protocol 1987
<b>9</b>	Role and objectives of United Nations Environment Programme (UNEP).
<b>10</b>	Role and objectives of Environmental Impact Assessment.



**Suggested Readings:**

1. Environmental Laws and Policies in India by N.V. Paranjape
2. Environmental Institutions in India by V. S. Prakash
3. Environmental Governance in India by K. K. Sharma
4. Environmental Law and Sustainable Development by Dr. S. C. Sharma
5. International Environmental Law by Prue Taylor



**Dissertation/Project Work/Internship (Other than self-institute)/Review work/other relevant  
– 04 Credit**

The main goal of this exercise is to help students understand the basics of research methods, develop computer and information literacy, and improve their presentation skills. It also encourages students to explore and analyze an environmental issue from different perspectives—such as environmental, economic, legal, social angles and other relevant topics. All of these viewpoints must be included in the outline and final project.

Students are free to choose any topic related to environmental science. They may also carry out their research in collaboration with their department, a research institute, or an industry partner—after getting proper permission from both sides in case of internship.

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**Guidance for Writing a Thesis (UG Level):**

1. Choosing a Topic:

- Pick a topic that interests you and is relevant to current environmental issues.
- Discuss with your guide/mentor to narrow down a focused research question.

2. Structure of the Thesis:

- Title Page – Include title, your name, institute, and date.
- Abstract – A brief summary of the study (150–250 words).
- Introduction and Literature Review – Background of the problem, why it's important, summary of previous work on the topic.
- Objectives – What you aim to study or solve.
- Methodology – Describe how you plan to collect and analyze data.
- Results and Discussion – Present your findings using tables, charts, etc., interpret your results, link with objectives and give proper citation.
- Conclusion and Recommendations – Wrap up findings and suggest future work.
- References – Cite all sources using a consistent format (APA, MLA, etc.).
- Appendices – Include questionnaires, raw data, etc. if needed.

**Guidance for Making the Presentation:**

1. Structure Your Slides:

- Slide 1: Title slide (topic, your name, institution, date)
- Slide 2: Introduction to the problem
- Slide 3–4: Objectives and significance
- Slide 5–6: Methodology (flowcharts, diagrams help)



- Slide 7–8: Results (graphs, tables, images)
- Slide 9: Discussion/interpretation
- Slide 10: Conclusion and recommendations
- Slide 11: References (brief)
- Slide 12: Acknowledgments (if applicable)



**KRANTIGURU SHYAMJI KRISHNA VERMA KACHCHH UNIVERSITY**

**Theory assessment**

**Pattern for Semester end Examination**

<b>Question</b>	<b>Question Type</b>	<b>Total Marks</b>	<b>Remarks</b>
<b>1 (From Unit – 1)</b>	Descriptive Questions with Internal Option.	<b>10 Marks</b>	<b>Question may be of 10 marks/ 5 + 5 marks</b>
<b>2 (From Unit – 2)</b>	Descriptive Questions with Internal Option.	<b>10 Marks</b>	<b>Question may be of 10 marks/ 5 + 5 marks</b>
<b>3 (From Unit – 3)</b>	Descriptive Questions with Internal Option.	<b>10 Marks</b>	<b>Question may be of 10 marks/ 5 + 5 marks</b>
<b>4 (From Unit – 1, 2, 3, 4)</b>	Short Questions, Fill in the Blanks, MCQ, etc. 12 questions (4 questions x 3 units) will be asked with option (10 out of 12)	<b>10 Marks</b>	<b>Total 12 questions from all units will be ask ; students have to attempt any 10</b>

**Note:**

1. The descriptive questions i.e. Question 1, 2, 3 will be like *Explain, describe, discuss* etc. type which may be of 10 marks or 05 + 05 marks.
2. Examiner can ask two questions of 10 marks, of which one must be attempt or examiner can ask three questions of 05 marks, of which two must be attempt.
3. The fourth question can ask from all three units. Total 12 questions (4 questions x 3 units) will be asked, of which 10 must be attempt. Each question carry 01 mark.

**For Internal / College theory assessment**



Continuous evolution method will be applied for college assessment. Internal theory examination/ Unit test, Seminar, Assignments, Group discussions etc. will be the key part for the internal/ college assessment. The internal assessment will be of 35 marks.

The passing criteria for Internal/ college assessment is 40% i.e. students have to secure 14 marks out of 35 marks.

**KRANTIGURU SHYAMJI KRISHNA VERMA KACHCHH UNIVERSITY**

**Practical assessment**

**Pattern for Semester end Examination**

For university assessment of practical, 4 to 5 exercises will be arranged for students according to the prescribed syllabus.

The University Practical assessment is of 10 marks.

The passing criteria for practical assessment is 40% i.e. students have to secure 04 marks out of 10 marks.

**For Internal / College assessment**

For Internal/ college assessment of practical, 4 to 5 exercises will be arranged for students according to the prescribed syllabus.

The Internal/ college Practical assessment is of 15 marks.

The passing criteria for practical assessment is 40% i.e. students have to secure 06 marks out of 15 marks.



**Mrugesh Trivedi**

