



M. C. E. Society's

Abeda Inamdar Senior College

Of Arts, Science and Commerce, Camp, Pune-1

(Autonomous) Affiliated to Savitribai Phule Pune University

NAAC accredited 'A' Grade

Syllabus for Fundamentals of Environmental Chemistry and Biology

F.Y.B.Sc. 2023-24 (CBCS – Autonomy 21 Pattern)

Course Title	Fundamental of Environmental Chemistry and Biology	
Course Code: 23SBEV11MM		No. of Credits: 02
Course Type: Major (MM)		Total Teaching Hours: 30

Course Objectives	
1.	To ensure 'well variedness' with the basic, scientific concepts of Environmental Biology
2.	To encourage incitation of a thought process related to Evolution of life
3.	To enlighten the students with the basic concepts of Environmental Chemistry.
4.	To learn the basics of environmental analysis techniques.

Course Outcome	
1.	To ensure 'well variedness' with the basic, scientific concepts of Environmental Biology
2.	To encourage incitation of a thought process related to Evolution of life
3.	Students will understand the importance of Chemistry in day todays life

Syllabus

Unit I	Environmental Biology and Biogeography <ul style="list-style-type: none">● Introduction to Biology, Branches, Scope and Importance in today's context from environmental point of view.● Charles Darwin's Voyage of HMS Beagle His theory of 'Survival of the Fittest'.● Biological diversity of Biogeography – The meaning; Biographical profile of the world; The physical, microbial, floral and faunal characteristics of each Bio-geographical zone	06 hours
Unit II	Origin of Life and Taxonomy <ul style="list-style-type: none">● The origin of Life; Evolution of Life through the geological time i.e. – Eras, Periods, Epochs● The current 'Mass Extinction' with reference to rate of extinction, factors responsible and possible remedies● Taxonomic Principles - aim, objectives, hierarchy, kingdoms, History; Linnaeus system of classification; Bentham & Hooker system of classification.	06 hours
Unit III	Ecology and Bio-resources <ul style="list-style-type: none">● Ecological Adaptations under various environmental conditions –● In plants - Hydrophytes, Mesophytes, Epiphytes, Xerophytes & Halophytes● In animals - mimicry, vestigiality etc.● Bio-resources● Forests- major types of the World & India● Agricultural crops - major food plants of the world & India● Livestock – major varieties of the World & India	06 hours

	<ul style="list-style-type: none"> • Fisheries resources - saline & fresh water • Significances / use of the Bio resources; Harnessing / Optimum use of Bio resources by traditional & modern methods; Threat to local bio resources - overexploitation, habitat loss, invasive species etc. 	
Unit IV	Introduction <ul style="list-style-type: none"> • Definition and Concept, Scope and Applications of Environmental Chemistry • Segments of Environment and various interactive reactions occurring between these segments. • Concept of Bio-geo-chemical cycles 	06 hours
Unit V	Chemistry of Atmosphere , Water and Soil <ul style="list-style-type: none"> • Characteristic of the Chemical Reactions involved in atmosphere , Classification of Air Pollutants, Climate Change, Global Warming, Acid Rain and Photochemical Smog and Control measures • Properties of Water, Hydrogen Bonding, Treatment of Waste Water, Surfactants and their types, Water Pollution types and Control measures • Soil Pollution, Toxicology of Soil Pollutants, Soil degradation causes and impacts, Control Measures 	06 hours

Suggested Readings	
1.	A Textbook of Plant Ecology' Ambashta R.S. & Ambashta N.K (1999) CBS Publ. & Distributers, New Delhi
2.	'Ecology: Principles and Applications' Chapman J.L. & Reiss M.J. (1995) Cambridge University Press
3.	'Elements of Ecology' Sharma P.D. Rastogi Publication
4.	Environmental Studies' Benny Joseph (2005) Tata McGraw Hill Publ. Co. Ltd.

5.	An Advanced textbook on Biodiversity – Principles & Practice, K. V. Krishnamurthy, Oxford & IBH Publishing Co. Pvt. Ltd., Special Indian Edtn
6.	Environmental Chemistry, A. K. De, New Age International Publishers, 7thEdtn.
7.	Elements of Environmental Chemistry, H. V. Jadhav, Stosius Incorporated/Advent Books Division, 1992
8.	Environmental Chemistry, H. Kaur, A Pragati Edtn., 2ndEdtn. (2007)
9.	Environmental Chemistry, S. K. Banerjee, PHI Learning Pvt. Ltd., 2nd Edtn.
10.	Holmes' Principles of Physical Geology, Edt. By P. McL. D. Duff, ELBS with Chapman & Hall, 4thEdtn.
11.	Forinash K.2010.Foundation of Environmental Physics, Island Press
12.	'Paleobotany and the Evolution of Plants' Wilson N. Stewart (1983) Cambridge University Press



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Syllabus for Traditional and Modern Water Management Systems in India

F.Y.B.Sc. 2023-24 (CBCS – Autonomy 21 Pattern)

Course Title	Traditional and Modern Water Management Systems in India	
Course Code: 23SBEV12MM		No. of Credits: 02
Course Type: Major (MM)		Total Teaching Hours: 30

Course Objectives	
1.	To study the Ancient techniques of Water conservation in in India and causes of their extinction
2.	To understand various Management techniques used for Conservation of precious Water resources
3.	To understand the negative impacts of Dam construction on the Environment and Tribal community
4.	To understand with suitable case studies various Water Management Techniques
5.	To understand water quality standards , testing of Water quality , treatment of waste water

Course Outcome	
1.	To understand various Ancient Water Conservation Techniques that have prevailed in India
2.	To understand difference between Traditional and Modern Water

	Techniques with respect to changing populations and changing times
3.	To understand various Modern Water Conservation techniques used in Domestic, Agricultural and Industrial sectors
4.	To understand Water quality Standards, testing of Water Quality for treatment of Water and preservation of Water quality

Syllabus		
Unit I	Water and its importance <ul style="list-style-type: none"> • Scenario of Water quality in World and in India, • Distribution of Water resources, Uses of Water Resources Hydrological cycle, Surface and Groundwater • Effects of different pollutants on the water quality • Organisms and Human health, Water borne diseases , Water stress 	06 hours
Unit II	Traditional Methods of Water Conservation in India: <ul style="list-style-type: none"> • Need for Water conservation Structures in Ancient times • Types of Traditional Water Conservation Structures -Zing, Naula, Gul, Dhara, Dhan, Simar, Khal, Kul, Khatri, Johad, Bawaris, Taanka, Zabo, Kunds, Ahar Pynes, Bhandara Phad, Ramtek, Katas / Mundas / Bandhas, Eri, Ooranis, Dongs, Baolis, Dighis, Bamboo Drip irrigation, Apatani, Virdas, Surangam, Korambus, Jackwells, Madakas, Neeruganti method, Dungs, Jampols, Cheruvu • Causes for extinction of Traditional Water Conservation Structures 	06 hours
Unit III	Dam Construction for Water Conservation <ul style="list-style-type: none"> • Advantages of Dam construction • Impact of Dam construction on the Environment and Tribal Community displacement, damage to 	06 hours

	<p>Biodiversity</p> <ul style="list-style-type: none"> • Water conflict in India 	
Unit IV	<p>Importance of Water Conservation</p> <ul style="list-style-type: none"> • Water Harvesting -Need, Principle and methods – Rain water harvesting, roof top harvesting in Urban areas, Subsurface barrier/dykes, Farm ponding in Rural areas • Groundwater recharge , Revival of Traditional Water harvesting techniques • Water Footprints, Water quality standards, • Different methods to conserve water in Industries- Treatment of waste water, use of recycled water, STP and ETP, Different methods to conserve water in Agriculture sector 	06 hours
Unit V	<p>Act, Policies and schemes related to Water Management in India</p> <ul style="list-style-type: none"> • Community based involvement in Water Management • Role of Government and NGO in Water conservation and Management • Elementary idea of Water analysis and instruments used, Chemical analysis with the help of potable instruments • Case studies related to Water Conservation and Management 	06 hours

Suggested Readings

1.	Water Resources Systems - Subhas Chander and Rajesh Prasad, Jain Brothers.
2.	Water Resources System Planning and Management- S.K.Jain and V.P.Singh, Elsevier.
3.	Water Resources Systems- S. Vedula and P.P.Majumdar, Tata McGraw Hill Education.
4.	Water Resources System Planning and Analysis- D.P.Loucks, J.R.Stedinger, D.A.Haith. Englewood Cliffs, Prentice Hall.
5.	Water Treatment - Principles and Design by J.M.Montgomery, Wiley, 1985.
6.	Stuetz R and T Stephenson. 2009. Principles of Water and Waste Water Treatment Processes. IWA Publishing, Alliance House, UK. 214p.
7.	Harrison R.M. 2001. Pollution; Causes, Effects and Control. 3rd Ed., Royal Society of Chemistry, London,. doi =" 10.1039 / 9781847551719. 3. Bolin B., (Ed.), (1981)
8.	Water Supply Engineering S. K. Garg , Khanna Publishers 2007.
9.	Water Supply and Sanitary Engineering – G.S.Birdie and J.S.Birdie.
10.	Water Supply Engineering – Dr. P.N.Modi.
11.	Water Supply and Wastewater Engineering – Dr. B.S.N.Raju.



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Syllabus for Practicals in Environmental Science-I

F.Y.B. Sc. 2023-24 (CBCS – Autonomy 21 Pattern)

Course Title	Practicals in Environmental Science-I	
Course Code: 23SBEV13MM		No. of Credits: 02
Course Type: Major (MM)		Total Teaching Hours: 30

Syllabus		
Sr. No.	Title with Contents	Practical Sessions
1	Laboratory safety rules and introduction to laboratory equipment's	01
2	Collection and preservation of water and soil samples (Field Practical).	02
3	Determination of pH and Electrical Conductivity of Water and Soil samples	01
4	Introduction to Use of software's to calculate Air and Water Carbon Footprint	01
5	Determination of Alkalinity from water sample	01
6	Determination of Total Hardness (Ca & Mg) from water.	01
7	Determination of Chlorides from water.	01
8	Determination of TDS, TSS & TS from water	01
9	Identification of Food adulterants in various food samples	01

10	Identifying native plants for plantation with respect to Geography and Climate	01
11	Study of the working of PUC machine-Gas Analyser (Demonstration).	01
12	Study of Plant / Animal Fossil Forms from different geological periods/visit to Palaeo-botanical museum	01
13	Study of Plant Adaptations under various environmental conditions (Hydrophytes, Mesophytes, Epiphytes, Halophytes & Xerophytes).	01
14	Study of Animal Adaptations under various ecological conditions	01
15	Visit to study different Fishery resources in the local market	01
16	Visit to study and Inventarise the various Agricultural/ Horticultural resources in the local market	01

Any other relevant practical's related

Suggested Readings	
1.	S.K. Maiti, Handbook of methods in Environmental Studies Vol—I & II, ABD Publishers, Jaipur, India
2.	Manivaskam, N, Physico-Chemical Examination of water, sewage and industrial effluents, Pragti Prakashan, Meerut, 1984
3.	Trivedi, R.K. and Goel, P.K, Chemical and biological method for water pollution studies. Environment Publications, Karad, 1986
4.	Willard, Instrumental methods of analysis, cbspd; 7thEdtn



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Syllabus for Health and Nutrition

F.Y.B.Sc. 2023-24 (CBCS – Autonomy 21 Pattern)

Course Title	Health and Nutrition	
Course Code: 23SBEV11CC		No. of Credits: 02
Course Type: Co-curricular (CC)		Total Teaching Hours: 30

Course Objectives	
1.	To learn the concept of Health and Nutrition in day today life for healthy being
2.	To create awareness about healthy lifestyle and balanced diet.
3.	To gain knowledge about different food groups and their nutritive value, role of micro-organisms in health, mode of infection and diseases.
4.	To aware students about therapeutic role of food and physical fitness and exercise.

Course Outcome	
1.	Understand the importance and need of balanced diet, healthy lifestyle and its role
2.	Better analyse the types of diseases caused by unhealthy diet and junk foods
3.	Aware and Acquire knowledge about therapeutic role of food and physical fitness and exercise.

Syllabus		
Unit I	Health and Diseases	06 hours
	<ul style="list-style-type: none"> • Concept of Health & Diseases • Definition of health 	

	<ul style="list-style-type: none"> • Determinants of Health • Health graph <p>Diseases</p> <ul style="list-style-type: none"> • Concept of disease • Types of Diseases- Epidemic, Pandemic, Sporadic <p>Infection, Intoxication, Disorders</p>	
Unit II	<p>Sources of Infection and Mode of Transmission of Diseases</p> <p>Sources of Infection</p> <ul style="list-style-type: none"> • Air • Food/ Water • Animals • Soil <p>Mode of Transmission of Diseases</p> <ul style="list-style-type: none"> • Contact • Inhalation • Inoculation • Vertical Transmission • Vector • Fomites 	06 hours
Unit III	<p>Disease Control and Prevention Methods</p> <p>Vaccination</p> <ul style="list-style-type: none"> • History of vaccination • Types and of Vaccines • Significance of Vaccination • National Immunization Schedule <p>Exercise & Health</p> <ul style="list-style-type: none"> • Types of Exercises • Benefits of Exercise • Exercise as therapy 	06 hours
Unit IV	<p>Nutrition and Role of Nutrients</p> <p>Nutrition</p> <ul style="list-style-type: none"> • Definition & Concept • Nutrition Pyramid • Understanding relationship between food, nutrition and health • Functions of food- Physiological, psychological and social 	06 hours

	<p>Role of the following Nutrients</p> <ul style="list-style-type: none"> • Carbohydrates, lipids and proteins • Fat soluble vitamins- A, D, E and K • Water soluble vitamins- Thiamin, Riboflavin, Niacin, Pyridoxine, Folate, Vitamin B12 and Vitamin C • Minerals- Calcium, Iron and Iodine, Micronutrients 	
Unit V	<p>Food Groups and Food Therapy</p> <p>Food Groups</p> <ul style="list-style-type: none"> • Cereals • Pulses • Fruits and vegetables • Milk and milk products • Meat, poultry and Fish 1. Fats and Oils <p>Food As Therapy</p> <ul style="list-style-type: none"> • Foods with medicinal properties • Treating deficiency related disease • Healthy food choices 	06 hours

Suggested Readings	
1.	Mudambi, SR and Rajagopal, MV. Fundamentals of Foods, Nutrition and Diet Therapy; Fifth Ed; 2012; New Age International Publishers
2.	Mudambi, SR, Rao SM and Rajagopal, MV. Food Science; Second Ed; 2006; New Age International Publishers
3.	Srilakshmi B. Nutrition Science; 2012; New Age International (P) Ltd.
4.	Swaminathan M. Handbook of Foods and Nutrition; Fifth Ed; 1986; BAPPCO
5.	Bamji MS, Rao NP, and Reddy V. Text Book of Human Nutrition; 2009; Oxford & IBH Publishing Co. Pvt Ltd.
6.	Wardlaw GM, Hampl JS. Perspectives in Nutrition; Seventh Ed; 2007; McGraw Hill.
7.	Lakra P, Singh MD. Textbook of Nutrition and Health; First Ed; 2008; Academic Excellence.
8.	Jain P et al. Poshan va swasthya ke mool siddhant (Hindi); First Ed; 2007; Academic Pratibha.
9.	Khanna K et al. Textbook of nutrition and dietetics; 2013; Phoenix Publisher.

10.	Sharma S, Wadhwa A. Nutrition in the community- A textbook; 2003; Elite Publishing House Pvt. Ltd.
11	Edelstein S, Sharlin J (ed). Life Cycle Nutrition- An Evidence Based Approach; 2009; Jones and Barlett Publishers.
12	Manay MS, Shadaksharaswamy. Food-Facts and Principles; 2004; New Age International (P) Ltd



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Syllabus for Green Technologies for Sustainable Future

Under Skill Enhancement Course

F.Y.B.Sc. 2023-24 (CBCS – Autonomy 21 Pattern)

Course Title	Green Technologies for Sustainable Future	
Course Code: 23SBEV11SE		No. of Credits: 02
Course Type: Skill Enhancement Course (SEC)- Minor		Total Teaching Hours: 30

Course Objectives	
1.	To learn the concept and advantages of green technology for better future
2.	To develop the ability towards environmental and sustainable development
3.	To gain knowledge about innovations in various sectors of development
4.	To aware about the circular economy and its importance in environmental protection

Course Outcome	
1.	To understand the importance and need of green technology for sustainable future
2.	To better analyze the types of green technologies and the future scope
3.	To Aware and Acquire knowledge about new innovations in various fields for the betterment of Environment

Syllabus		
Unit I	Introduction to Green Technology <ul style="list-style-type: none"> • Concept of Green technology • Need of Green technology with reference to Sustainable Future • Role of Green technology in sustainable development • Goals of Green technology • Advantages and Characteristics of Green technology 	08 hours
Unit II	Types of Green technologies <ul style="list-style-type: none"> • Green Technology in Automobile sector--Electric vehicles, Hydrogen- fueled cars, Solar energy • Green architecture in Construction sector • Solid Waste Management and 3R's Principle • Biodegradable plastic • Biofuels • Vertical and Terrace Gardening • Importance of Green Spaces in Urban and Rural areas • Rain water Harvesting and Watershed Management 	12 hours
Unit III	Types of Agricultural Activities <ul style="list-style-type: none"> • Organic Farming and its advantages • Biological Fertilizers and Pest Management • Use of Agricultural and Livestock Waste • Sustainable Agricultural methods • Introduction to Hydroponics and Micro propagation 	10 hours

Suggested Readings

1.	Green Technology: An A-to-Z Guide, SAGE publications, Dustin Mulvaney
2.	https://sustainability-success.com/green-technology-examples/
3.	https://ied.eu/blog/7-green-technologies-for-a-sustainable-future/
4.	https://sustainabilitymag.com/top10/top-10-green-technology-innovations
5.	https://www.ripublication.com/ijaes17/ijaesv12n5_18.pdf
6.	Green Building Fundamentals: Practical Guide to Understanding and Applying Fundamental Sustainable Construction Practices and the Leed System Paperback – Illustrated, 10 February 2010, by Mike Montoya (Author



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**Syllabus for Environmental Ethics and Values
F.Y.B.Sc. 2023-24 (CBCS –Autonomy 21 Pattern)**

Course Title	Environmental Ethics and Values	
Course Code: 23SBEV11VE		No. of Credits: 02
Course Type: Minor (MN)		Total Teaching Hours: 30

Course Objectives	
1.	To ensure 'well variedness' with the basic, scientific concepts of many of the current environmental issues & happenings
2.	To encourage incitation of a thought process & hence, development of a practical perspective amongst the students
3.	To bring sensitization towards the environment but also increase student competency & employability.
4.	To define the concepts central to Environmental ethics

Course Outcome	
1.	To understand the multidisciplinary nature of the subject and thus, the Scope of study
2.	To analyze the importance of the subject in day today's life, thus understanding the basics of sustainability
3.	To explain and define one's own ethical stand point according to these Ethical concept
4.	Students of each faculty will be empowered with the knowledge of environment and sustainability, which they can implement in their daily life to achieve sustainable lifestyle

Syllabus		
Unit I	Introduction to Environmental Studies <ul style="list-style-type: none"> • Multidisciplinary nature of Environmental Studies • Scope & Importance • Concept of Sustainability and sustainable development 	03 hours
Unit II	Classification of Natural Resources <ul style="list-style-type: none"> • Forest Resources • Water Resources • Mineral Resources • Food Resources • Energy Resources • Land Resources 	04 hours
Unit III	Biodiversity & its Conservation <ul style="list-style-type: none"> • Definition of Biodiversity • Biogeographical Classification in India • Values and Threats to biodiversity (Habitat loss, poaching of wildlife, man-wildlife conflicts) • In-situ & Ex-situ Conservation <ol style="list-style-type: none"> 1. National Parks 2. Wildlife Sanctuaries 3. Biodiversity Hotspots 4. Botanical Gardens 5. Seed Banks 6. Zoos 	06 hours
Unit IV	Environmental Ethics and Values <ul style="list-style-type: none"> • Concept of Environmental Ethics • Equitable use of Resources • Introduction to Animal Rights • Role of Individual in Conservation of Resources 	06 hours

	<p>for Future Generation</p> <ul style="list-style-type: none"> • Manipulation of Plants and Animals – Advantages and Disadvantages • GMO and Cross Hybrid 	
Unit V	<p>Environmental issues and Solutions</p> <ul style="list-style-type: none"> • Deforestation and Afforestation • Rainwater harvesting and Watershed Management • Mining and Construction impacts on Ecosystem • Consumerism and Waste Products • Solid waste and its Management • Modern Agricultural vs Traditional Agricultural Techniques 	06 hours
Unit VI	<p>Human Communities and the Environment</p> <ul style="list-style-type: none"> • Human population growth: Impacts on environment, human health and welfare. • Concept of Disaster management: floods, earthquake, cyclones and landslides. 	05 hours

Suggested Readings	
1.	Barrow, C.J., Environmental Management, 1999. Routledge, N.Y.
2.	Boubel, R.W., Fundamentals of Air Pollution, 1991. Academic Press, N.Y
3.	Botbin, D., and Keller, E., Environmental Science, 1995. John Wiley and Sons, USA.
4.	Chadha, K.L. and Swaminathan, M.S., Environment and Agriculture. Malhotra Publishing House, 2006, New Delhi
5.	Carson, R., Silent Spring, 2002, , Houghton Mifflin Hartcourt
6.	Odum, E.P., Odum, H.T. & Andrews, J. Fundamentals of Ecology, 1971. Philadelphia: Saunders

7.	Sharma, P.D. Ecology and Environment 1994. Ashish Publications,
8.	Wagner, K.D Environment Management 1998. W.B. Saunders Co, Philadelphia, USA
9.	Singh, G.B. and Sharma Fifty Years of Natural Resource Management Research B.R. 1998, Indian Council of Agriculture Research, New Delhi
10.	Singh, N. and Sontakke, N.A. On Climatic fluctuations and Environment changes on Indo-Gangetic Plains, India. Springer, Feb, 2002
11.	Thapar, V. Land of the Tiger: A Natural History of the Indian Subcontinent 1998
12.	World Commission on Environment and Development 1987, Our Common Future. Oxford University Press.



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Syllabus for Environmental Conservation during Ancient times

F.Y.B.Sc. 2023-24 (CBCS – Autonomy 21 Pattern)

Course Title	Environmental Conservation during Ancient times	
Course Code: 23SBEV11IK		No. of Credits: 02
Course Type: MN(Minor-IKS)		Total Teaching Hours: 30

Course Objectives	
1.	To know about the importance of Environmental Conservation.
2.	To discuss about various Ancient methods to conserve and protect the Environmental quality.
3.	To understand significance of Environment in various Religions.

Course Outcome	
1.	To understand the various methods of Environmental Conservation that were used to follow during ancient times.
2.	To relate to different religious teachings on Environmental Conservation.
3.	To encourage of students for Environmental conservation through different ancient teachings.

Syllabus		
Unit I	Ancient Tradition of Environmental Conservation. <ul style="list-style-type: none"> ➤ Sacred Mangroves. ➤ Religious Community Rituals. ➤ Totemism. 	05 hours
Unit II	Environmental Conservation in Buddhism. <ul style="list-style-type: none"> ➤ Concept of Eco-Buddhism ➤ Environmental Ethics by Lord Buddha. ➤ Buddhist teaching on preservation of Nature. 	06 hours
Unit III	Environmental Conservation in Hinduism <ul style="list-style-type: none"> ➤ Bhagwat Geeta teachings on Environmental Protection. ➤ Ashoka teachings on Wildlife and Environment. ➤ Teachings of Brahmans – Concept of Ahimsa. ➤ Vishnu – Protecting India’s Sacred Forests 	08 hours
Unit IV	Environmental Conservation in Islam <ul style="list-style-type: none"> ➤ Islam and Environmental Ethics. ➤ Protection of Natural Resources. ➤ Environmental models provided by Islam. ➤ Islam and Climate Change. 	06 hours
Unit V	Environmental Conservation in Christianity. <ul style="list-style-type: none"> ➤ Christian teachings on Environmental stewardship. ➤ Christian teachings on Global warming. 	05 hours

Suggested Readings	
1.	Robson, James. Power of Place: The Religious Landscape of the Southern Sacred Peak (Nanyue)
2.	Swearer, Donald K. "An Assessment of Buddhist Eco-Philosophy." Harvard Theological Review
3.	WIJESEKERA, O.H. de A.Rgvedic river-goddesses and an Indus Valley sealIn: Dr.C.Kunhan Raja presentation volume: a volume of Indological studies. Edited byG.S.Murti and others (Madras: The Adyar Library, 1946
4.	APFFEL-MARGLIN, F.The sacred groves: menstruation rituals in rural OrissaManushi (Delhi) 1994;no.82:22-32
5.	Khalid, F.M. (2002). Islam and the environment. Social and Economic Dimensions of Global Environmental Change, 5, 332-339
6.	Manzour, S.P. (1984). Environment and Values: the Islamic Perspective dalam Ziauddin Sardar (ed). The Touch of Midas: Science. Values and Environment in Islam and the West, Manchester. Manchester University Press
7.	Boff, L. 1989. Faith on the Edge: Religion and Marginalized Existence. San Francisco: Harper and Row



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Syllabus for Practicals in Water Analysis

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Course Title	Practicals in Water Analysis	
Course Code: 23SBEV11VS		No. of Credits: 02
Course Type: Major (MJ)		Total Teaching Hours: 30

Course Objectives

1.	To understand the various techniques for Water sampling and Collection
2.	To understand various techniques used for analysis of Water in laboratory
3.	To understand the working of STP/ ETP for treatment of Water and Waste water
4.	To identify various Phytoplankton's and Zooplanktons as indicators of Water quality

Course Outcome

1.	To understand various Water collection and sampling techniques along with analysis
2.	To understand techniques employed for analysis of Waste water in Environmental Laboratory
3.	To help students develop career in ETP and STP
4.	To acquire a broad knowledge of Water and Water quality analysis

Syllabus

Sr. No.	Title with Content	
1	Collection and preservation of water samples	Field Practical
2	Determination of pH and Electrical Conductivity of Water	Laboratory

	samples	
3	Determination of Alkalinity from water	Laboratory
4	Determination of Total Hardness (Ca & Mg) from water	Laboratory
5	Determination of Chlorides from water.	Laboratory
6	Determination of TDS, TSS and TS from given water	Laboratory
7	Determination of Dissolved Oxygen (DO) in water	Laboratory
8	Determination of CO ₂ from water	Laboratory
9	Determination of Residual Chlorine from water	Laboratory
10	Study visit to Water Body restoration site	Field
11	Determination of Temperature from water	Laboratory
12	Study of Eutrophic Water Body	Field
13	Determination of Turbidity in water by <u>Secchi disc</u> (Field practical—Traditional method) and by Nephalo turbidometer	Laboratory
14	Identification of Planktons and Zooplanktons as bio-indicators from Eutrophic Lake	Field
15	Study Visit to Environmental Laboratory	Field

Any other relevant practical's related

Suggested Readings	
1.	S.K. Maiti, Handbook of methods in Environmental Studies Vol—I & II, ABD Publishers, Jaipur, India
2.	Manivaskam, N, Physico-Chemical Examination of water, sewage and industrial effluents, Pragti Prakashan, Meerut, 1984
3.	Trivedi, R.K. and Goel, P.K, Chemical and biological method for water pollution studies. Environment Publications, Karad, 1986

4.	Willard, Instrumental methods of analysis, cbspd; 7thEdtn
5.	Laboratory Manual of Water and Waste water Analysis, D .R. Khanna , R.. Bhutiani, Daya Publishing House , Delhi, 2008
6.	Chemical and Biological Methods for Water Pollution Studies, R. K. Trivedy, P.K.Goel, Oriental Printing Press, Aligarh, 1986



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Syllabus for Fundamental of Environmental Geoscience

F.Y.B. Sc. 2023-24 (CBCS – Autonomy 21 Pattern)

Course Title	Fundamental of Environmental Geoscience	
Course Code: 23SBEV21MM		No. of Credits: 02
Course Type: Major (MM)		Total Teaching Hours: 30

Course Objectives	
1.	To ensure 'well variedness' with the basic, scientific concepts of many of the current environmental issues & happenings
2.	To encourage incitation of a thought process & hence, development of a practical perspective amongst the students
3.	To bring sensitization towards the environment but also increase student competency & employability.
4.	To inculcate sense of Scientific Temperament
5.	To inculcate the laws of Nature and to maintain the harmonious relationship with it.

Course Outcome	
1.	To understand the multidisciplinary nature of the subject and the basics of Geosciences

2.	To know the importance of the subject in day today's life, thus understanding the basics of sustainability
3.	To enumerate the intricate relationship between all type's life and the present trend of man – environment relationship
4.	To understand about how the subject knowledge helps in solving various social, economic and environment related problems

Syllabus		
Unit I	Earth & it's Structural Components <ul style="list-style-type: none"> • Solar system formation and planetary differentiation • Internal Structure of Earth • Theories of geological evolution – Wagener's Continental Drift Theory, Plate Tectonic Theory • Major changes on the Earth's surface Geological time scale • Introduction—Indian Mountain system, Indo- Gangetic plains, Geology of Himalayan ecosystem and Western Ghats • Types of Rocks – Igneous, Sedimentary, Metamorphic, Rock cycle 	06 hours

Unit II	Soil <ul style="list-style-type: none"> • Formation – weathering processes (types) • Physical & chemical properties • Macro & Micro plant nutrients, their role • Soil Profile, types • Soil classification • Soils of India – with respect to their agriculture significances. • Importance and Significance of Soil • Soil erosion, Types, Causes and Effects 	06 hours
Unit III	<ul style="list-style-type: none"> • Earth’s Atmosphere and Atmospheric temperature • Introduction, Evolution of atmosphere • General properties • Vertical structure • Chemical composition – in each of the vertical <ul style="list-style-type: none"> ○ layers; past & present Significance • Atmospheric temperature measurement – <ul style="list-style-type: none"> ○ Instruments, Methods (maximum, minimum, mean temperature, temperature range); • Factors regulating atmospheric temperature • Lapse rate; Types – ELR, DALR & WALR • Concept of Temperature Inversion • Urban Heat Island Effect • Land - Sea breeze effect 	06 hours

Unit IV	<ul style="list-style-type: none"> • Hydrological cycle & Atmospheric pressure • Hydrological cycle – <ul style="list-style-type: none"> ○ Introduction & significance ○ Evaporation; Factors affecting the rate of Evaporation ○ Condensation; Factors affecting, forms of condensation – dew, frost, fog & cloud. ○ Precipitation; Factors affecting and Forms of precipitation – rain, drizzle, snow, hail, sleet • Atmospheric pressure –Introduction; Measurement; Factors affecting the atmospheric pressure, Isobars • Atmospheric pressure & Generation of winds; Factors affecting winds 	06 hours
Unit V	<p>Natural Calamities</p> <ul style="list-style-type: none"> • Natural Calamities – Volcanoes, Earthquakes, Landslides, Cyclones, Floods, Droughts, Wild <ul style="list-style-type: none"> • Forest fires ---their origin, Causes, Effects • Human Interference in triggering disasters • Planning & Management to prevent/mitigate their effects; • Case studies for each. • Government Departments / Agencies to manage Natural Disasters 	06 hours

Suggested Readings	
1.	Environmental Geology; Valdiya K.S.; Indian Context. Tata McGraw Hill
2.	Essentials of Climatology; D. S. Lal; Chaitanya Publishing House, Allahabad, 1989.
3.	Holmes’ – Principles of Physical Geology; Edt. by P. McL. D. Duff;

	ELBS Chapman & Hall Low Priced Edtn; 4thEdtn.
4.	A Textbook of soil Science; T.D. Biswas& S.K. Mukharjee; TataMcGraw-Hill Education
5.	Introductory Soil Science; Dilip Kumar Das; Kalyani Publishers; 2ndEdtn.
6.	Environmental Geology; Kellar E.A. (2011); Prentice Hall, 624 p; 9thEdtn.



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Abeda Inamdar Senior College

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Syllabus for Fundamental of Environmental Pollution

F.Y.B. Sc. 2023-24 (CBCS – Autonomy 21 Pattern)

Course Title	Fundamental of Environmental Pollution	
Course Code: 23SBEV22MM		No. of Credits: 02
Course Type: Major (MM)		Total Teaching Hours: 30

Course Objectives	
1.	To bring awareness about major types of pollution and the control measures of each
2.	To inculcate a sense of responsibility among students about various principles of environment
3.	To make them understand about recent pollution related case studies
4.	To find new sustainable ways to protect the mother Earth
5.	To encourage students about applicability of knowledge in day today's life.

Course Outcome	
1.	To understand the impact of human activities on various resources of environment through case studies
2.	To learn about various types of pollution, its impact and

	control measures.
3.	To correlate about how the subject knowledge helps in solving various social, economic and environment related problems
4.	To empower the students with recent technologies that are ecofriendly and can help them to be the entrepreneurs

Syllabus		
Unit I	<p>Introduction</p> <ul style="list-style-type: none"> • Pollution – Definitions • Types –Air, Water Soil, Noise, Thermal, Radioactive and Solid waste • Natural and Anthropogenic sources • Introduction to Solid waste and Plastic pollution- A case study • Introduction to Plastic Toxicity—micro plastic in food chain 	04 hours
Unit II	<p>Air Pollution</p> <ul style="list-style-type: none"> • Definition; Major air pollutants and their sources; • Effects –on Biological systems– Animals, Humans & Plants and on Non-Biological systems – material; physical environment • Green House Effect, Ozone layer depletion, Smog, Acid Rain, Global warming • Case studies – London smog; Los Angeles smog; Taj-Mahal • Current Air pollution scenario of Indian cities 	08 hours
Unit III	Water and Thermal pollution	06 hours

	<ul style="list-style-type: none"> • Definition, Types (Ground, Surface and Marine) Sources, Effects & control measures • Detergent – Eutrophication • Pesticide – Bioaccumulation, Biomagnification • Case studies – Itai- Itai & Minamata (Japan); Arsenic poisoning (West Bengal) etc. • Definition, Sources, Effects and Control measures of Thermal pollution 	
Unit IV	<ul style="list-style-type: none"> • Soil pollution • Definition; Sources/ routes of contamination • Effects –On soil quality/ productivity. • On Biological system – on soil microorganisms, on Plants, Animals • Control measures/ Alternatives – ✓ Bio fertilizers & biological pest management; ✓ Organic farming & other agricultural interventions; ✓ Appropriate irrigation & drainage techniques; ✓ Lime& gypsum application. Case studies – Declining soil productivity in the Punjab &Haryana; ✓ Desertification in India, Western Maharashtra 	08 hours
Unit V	<ul style="list-style-type: none"> • Noise Pollution • Definition, Introduction • Sources, Measurement, Instrument, Permissible limits, Categories/ Zones in context to noise level • Effects—Auditory and Non- Auditory—on Living and non –living things • Control measures—at Individual level, Institute 	04 hours

	level, Commercial level, industrial level	
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Suggested Readings	
1.	Air Pollution- M. N. Rao & H. V.N. Rao; Tata McGraw Hill, New Delhi, 1989.
2.	"Environment Pollution Control and Environmental Engg." C. S. Rao, Tata McGraw Hill, New Delhi, 1994.
3.	Soil pollution & Soil Organism - P.V. Mishra
4.	Water Pollution—A.K. Tripathy& S.N. Pandey; A. P. H. Publishing Corporation
5.	Environmental Air pollution & it's control—G.R. Chatwal; Anmol Publications, New Delhi, 1989
6.	Environmental Chemistry; A. K. De; New Age International Publishers; 6thEdtn.
7.	Understanding Environment; Edt by Kiran B. Chhokar, Mamata Pandya, Meena Raghunathan;
8.	Centre for Environment Education; Sage Publication.
9.	Perspective in Environmental Studies; Kaushik &Kaushik; New Age International Pvt. Ltd Publishers
10.	Environmental Science; S.C. Santra; New Central Book Agency (P) Ltd.; 2ndEdtn.
11.	Water Pollution, P.K. Goel, New Age International, 2006 Revised Edtn



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Syllabus for Practicals in Environmental Science- II

F.Y.B.Sc. 2023-24 (CBCS – Autonomy 21 Pattern)

Course Title	Practicals in Environmental Science-II	
Course Code: 23SBEV23MM		No. of Credits: 02
Course Type: Major (MM)		Total Teaching Hours: 30

Course Objectives	
1.	To study the concept of Wind rose and Lapse rate
2.	To understand various Soil analysis techniques
3.	To estimate the Noise Level in Residential and Commercial areas through Survey methods
4.	To learn the identification of rocks and mineral specimens

Course Objectives	
1.	To understand the types of conservation techniques
2.	To acquaint with use of social media for e-networking and dissemination of ideas on environmental issues
3.	To learn Solid Waste management by visiting the site
4.	To check the importance of bio indicators in water quality

Syllabus

Sr. No.	Title with Contents	Practical Sessions
1.	Measurement of Noise using Sound Level Meter (Field Practical). — (Degree of Annoyance measurement)	01
2.	Collection and characterization of planktons as bio-indicators from Eutrophic Lake (Field Practical).	01
3.	Identification of different Rock specimens from their physical properties.	01
4.	Identification of different Mineral specimens from their physical properties	01
5.	Visit to a Natural Area/ Wildlife Sanctuary/ National Park	01
6.	Visit to Weather Station.	01
7.	Determination of Turbidity in water by Secchi disc (Field practical— Traditional method) and by Nephalo turbido meter(Digital Instrument)	01
8.	Reading Topographic Maps and Symbols	01
9.	Visit to Water Bodies	01
10.	Visit to Garbage Disposal site / Solid Waste management Site	01
11.	Determination of Water Holding Capacity of soil	01
12.	Study of soil properties – Temperature, texture and particle size	01
13.	Introduction to Study of Wind Rose	01
14.	Estimation of the Moisture Content of soil	01
15.	Use of social media for e-networking and dissemination of ideas on environmental issues	01
16.	Estimation of Lapse Rate from given data	01

Any other relevant practical's related

Suggested Readings

1.	S.K. Maiti, Handbook of methods in Environmental Studies Vol—I & II, ABD Publishers, Jaipur, India
2.	Manivaskam, N, Physico-Chemical Examination of water, sewage and industrial effluents, Pragti Prakashan, Meerut, 1984
3.	Trivedi, R.K. and Goel, P.K, Chemical and biological method for water pollution studies. Environment Publications, Karad, 1986
4.	Willard, Instrumental methods of analysis, cbspd; 7thEdtn



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Syllabus for Introduction to Environmental Science

F.Y.B.Sc. 2023-24 (CBCS- Autonomy 21 Pattern)

Course Title	Introduction to Environmental Science	
Course Code: 23SBEV21MN		No. of Credits: 02
Course Type: Minor (MN)		Total Teaching Hours: 30

Course Objectives	
1.	To learn fundamental concept of Environmental science and its scope and applications in all aspects of Life
2.	To be able to understand the relationship between man and environment.
3.	To develop understanding about ecosystem dynamics and its Functioning, types of Ecosystems
4.	To understand various types of Pollution and their control measures, threats to Biodiversity and their Conservation techniques

Course Outcome	
1.	Demonstrate a foundational interdisciplinary knowledge of the environment and global environmental issues
2.	Articulate a theological and ethical approach to environmental issues
3.	Communicate clearly about environmental issues while demonstrating respect, humility, and empathy toward the natural world, including human beings

4.	Craft creative solutions to Environmental problem
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Syllabus		
Unit I	Importance of Environmental Science <ul style="list-style-type: none"> • Definition, Scope, Elements and Importance of Environmental Science • Need for Public awareness • Types and Structure of Environment 	06 hours
Unit II	Natural Resources <ul style="list-style-type: none"> • Importance and Scope of Natural Resources • Classification of Natural Resources • Forest Resources and Wildlife Resources • Water Resources • Mineral Resources • Land Resources 	06 hours
Unit III	Ecosystems <ul style="list-style-type: none"> • Concept of Ecosystems • Structure and Functions of Ecosystems • Food chain and Food Web • Terrestrial Ecosystems- Forest, Grassland, Desert etc • Aquatic Ecosystems- Marine, Freshwater etc 	06 hours
Unit IV	Biodiversity <ul style="list-style-type: none"> • Types of Biodiversity • Causes of Loss and Threats to Biodiversity • Biodiversity in World and India • India as Biodiversity Country • Hotspots of Biodiversity in India • Methods and Techniques Conservation of Biodiversity 	06 hours
Unit V	Pollution <ul style="list-style-type: none"> • Water Pollution and Control Measures • Air Pollution and Control Measures • Soil Pollution and Control Measures • Radiation Pollution and Control Measures 	06 hours

	<ul style="list-style-type: none"> • Noise Pollution and Control Measures • Case studies related to Water, Air, Soil, Noise , Radiation Pollution 	
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Suggested Readings	
1.	Textbook on Environmental Science-Dr Y.K .Singh-New Age International Publishers
2.	Ecology and Environment: P.D. Sharma., Rastogi Publication
3.	Fundamental of Ecology: E. P. Odum,W. B. Sauders Company, USA
4.	Textbook for Environmental Studies, Erach Bharucha
5.	Environmental Science, CEC EduSat, National Digital Library of India.
6.	Ecology and Environment: P.D. Sharma., Rastogi Publication.
7.	Environmental Science: S. C. Santra, New Central Book Agency.



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Syllabus for Basics of Geosciences and Environmental Biology

F.Y.B.Sc. 2023-24 (CBCS- Autonomy 21 Pattern)

Course Title	Basics of Environmental Geoscience and Biology	
Course Code: 23SBEV22MN		No. of Credits: 02
Course Type: Minor (MN)		Total Teaching Hours: 30

Course Objectives	
1.	To ensure 'well variedness' with the basic, scientific concepts of many of the current environmental issues, environmental Biology & happenings
2.	To encourage incitation of a thought process related to Evolution of Life and the adaptations to changing environment during the course of evolution
3.	To enumerate the significance of Bioresources, threats and exploitation
4.	To get knowledge about Earths structural components and significance of Soil from agriculture point of view.

Course Outcome	
1.	Understand the importance of the subject in day today's life, thus understanding the basics of sustainability
2.	Better enumerate the intricate relationship between all type's life and the present trend of man – environment relationship

3.	Analyze about how the subject knowledge helps in solving various social, economic and environment related problems
4.	Interpret how evolution has played important role in shaping and making Life possible on Earth
5.	Learn about Taxonomy, Ecological Adaptations, Significances / use of the Bio resources and role of micro-organisms in environment.

Syllabus		
Unit I	<p>Earth's structural components and Soil</p> <ul style="list-style-type: none"> • Internal Structure of Earth • Theories of geological evolution – Wagener's Continental Drift Theory, Plate Tectonic Theory • Types of Rocks – Igneous, Sedimentary, Metamorphic, Rock cycle • Soil :Introduction , Formation – weathering processes (types) • Physical & Chemical properties • Macro & Micro plant nutrients, their role • Soil Profile, types • Soil classification • Soils of India – with respect to their agriculture significances. • Importance and Significance of Soil 	06 hours
Unit II	<p>Earth's Atmosphere and Atmospheric temperature</p> <ul style="list-style-type: none"> • Introduction, Evolution of atmosphere • General properties • Vertical structure • Chemical composition – in each of the vertical 	06 hours

	<ul style="list-style-type: none"> ○ layers; past & present Significance ● Atmospheric temperature measurement – <ul style="list-style-type: none"> ○ Instruments, Methods (maximum, minimum, mean temperature, temperature range); ● Factors regulating atmospheric temperature ● Lapse rate; Types – ELR, DALR & WALR ● Concept of Temperature Inversion ● Urban Heat Island Effect ● Land - Sea breeze effect 	
Unit III	Origin of Life <ul style="list-style-type: none"> ● The origin of Life; Evolution of Life through the geological time i.e. – Eras, Periods, Epochs ● Events of (Evolutionary) ‘Explosions’ and ‘Mass Extinctions’ & Paleontological Evidences for these. ● The current 'Mass Extinction' with reference to rate of extinction, factors responsible and possible remedies 	06 hours
Unit IV	Taxonomy <ul style="list-style-type: none"> ● Taxonomic Principles - aim, objectives, hierarchy, kingdoms. ● History; Linnaeus system of classification; Bentham & ● Hooker system of classification. ● Components of systematic - Characterization, Classification, identification & nomenclature. ● The concept of species- morphological, biological, phylogenetic, ecological etc. 	06 hours
Unit V	Ecology and Bio-resources <ul style="list-style-type: none"> ● Ecological Adaptations under various environmental conditions –In plants - Hydrophytes, Mesophytes, Epiphytes, Xerophytes & Halophytes, In animals - mimicry, vestigiality etc. 	06 hours

	<ul style="list-style-type: none"> • Bio-resources--- • Forests- major types of the world & India • Agricultural crops - major food plants of the world & India • Livestock – major varieties of the world & India • Fisheries resources - saline & fresh water • Significances / use of the Bio resources; Harnessing / Optimum use of Bio resources by traditional & modern methods; Threat to local bio resources - overexploitation, habitat loss, invasive species etc. 	
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Suggested Readings	
1.	‘A Textbook of Plant Ecology’ Ambashta R.S. & Ambashta N.K (1999) CBS Publ. & Distributers, New Delhi
2.	Environmental Science: A Global Concern’ Cunningham W.P. & Saigo S.W. (1997) WCB, McGraw Hill
3.	‘Elements of Ecology’ Sharma P.D. Rastogi Publication
4.	‘Environmental Science’ Tyler M.G. Jr. (1997) Wadsworth Publ. Co.
5.	‘Environmental Studies’ Benny Joseph (2005) Tata McGraw Hill Publ. Co. Ltd.
6.	‘Patterns in the Living World’ – Biology-an Environmental approach, John Murray, London
7.	Diversity Among Living Things’ Biology-an Environmental approach, John Murray, London
8.	Environmental Geology; Valdiya K.S.; Indian Context. Tata McGraw Hill
9.	Essentials of Climatology; D. S. Lal; Chaitanya Publishing House, Allahabad, 1989.
10.	Holmes’ – Principles of Physical Geology; Edt. by P. McL. D. Duff; ELBS Chapman & Hall Low Priced Edtn; 4thEdtn.
11.	A Textbook of soil Science; T.D. Biswas& S.K. Mukharjee; Tata McGraw-Hill Education
12.	Introductory Soil Science; Dilip Kumar Das; Kalyani Publishers; 2ndEdtn.
13.	Environmental Geology; Kellar E.A. (2011); Prentice Hall, 624 p; 9thEdtn.
14.	‘Ecology: Principles and Applications’ Chapman J.L. & Reiss M.J. (1995) Cambridge



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Syllabus for Practical course on Fundamental of Environmental Biology and Geoscience

F.Y.B.Sc. 2023-24 (CBCS – Autonomy 21 Pattern)

Course Title	Practical course on Fundamental of Environmental Biology and Geoscience		
Course Code: 23SBEV21VS		No. of Credits: 02	
Course Type: MN(Minor)		Total Teaching Hours: 30	

Aims & Objectives of the Course

Course Objectives	
1.	To learn the properties of rock and mineral samples
2.	To estimate the various parameters of soil samples
3.	To illustrate the different ways for the safe disposal of solid waste
4.	To identify native plants for plantation with respect to Geography and Climate and their significance in providing ecological services
5.	To study the Plant / Animal Fossil Forms from different geological periods

Course Outcome	
1.	Understand the types of plant and animal adaptations under various environmental conditions
2.	Estimate the parameters like Soil temperature, Texture, Moisture content and water holding capacity of soil
3.	Identify the food adulterants from food samples

4.	Find out the % Carbon and Organic Content from soil.
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Syllabus		
Sr. No.	Title with Contents	Practical Sessions
1.	Study of Plant / Animal Fossil Forms from different geological periods/visit to Palaeo-botanical museum	01
2.	Study of Plant Adaptations under various environmental conditions (Hydrophytes, Mesophytes, Epiphytes, Halophytes & Xerophytes).	01
3.	Study of Animal Adaptations under various ecological conditions	01
4.	Visit to study different Fishery resources in the local market	01
5.	Visit to study and Inventarise the various Agricultural/ Horticultural resources in the local market	01
6.	Identification of Food adulterants in various food samples	01
7.	Identifying native plants for plantation with respect to Geography and Climate	01
8.	Identification of different Rock specimens from their physical properties.	01
9.	Identification of different Mineral specimens from their physical properties.	01
10.	Visit to Garbage Disposal site / Solid Waste management Site	01
11.	Study of soil properties – Temperature, Texture and Particle size	01
12.	Collection and preservation of water samples (Field Practical).	01
13.	Collection and preservation of soil samples (Field Practical).	01
14.	Determination of pH & Electrical Conductivity from soil samples.	01
15.	Estimation of the Moisture Content of soil.	01
16.	Estimation of the Water Holding Capacity of given soil sample.	01

17.	Determination of % Carbon and Organic Content from soil.	01
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Suggested Readings	
1.	S.K. Maiti Handbook of methods in Environmental Studies Vol—I & II, ABD Publishers, Jaipur, India
2.	Manivaskam, N, Physico-Chemical Examination of water, sewage and industrial effluents, Pragti Prakashan, Meerut, 1984
3.	Trivedi, R.K. and Goel,P.K Chemical and biological method for water pollution studies, Environment Publications, Karad, 1986
4.	Willard Instrumental methods of analysis cbspd; 7thEdtn

