

 

 SHIVAJI UNIVERSITY, KOLHAPUR 416 004, MAHARASHTRA

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दिनांकः – १२/०२/२०२५

प्रति,

मा. संचालक / प्राचार्य, सर्व संलग्न महाविद्यालय, शिवाजी विद्यापीठ, कोल्हापूर

> विषय:— B.Sc. Part- I Environment Science (Entire) अभ्यासकमाबाबत. संदर्भ — या कार्यालयाचे जा.क.SU/BOS/Scie&Tech/877 दिनांक:— २६ /१२/२०२४

#### महोदय,

उपरोक्त संदर्भिय विषयास अनुसररुन आपणास आदेशान्वये कळविण्यात येते की, राष्ट्रीय शैक्षणिक धोरण २०२० नुसार शैक्षणिक वर्ष २०२४—२५ पासून लागू करण्यात आलेल्या B.Sc. Part-I Environment Science (Entire) या अभ्यासकमामध्ये किरकोळ दुरुस्ती करण्यात आलेली आहे. सोबत सदर अभ्यासकमाची प्रत जोडली आहे. तसेच विद्यापीठाच्या <u>https://www.unishivaji.ac.in (NEP-2020@suk/ Online syllabus)</u> या संकेस्थळावर ठेवण्यात आला आहे. सदर अभ्यासकम सर्व संबधित विद्यार्थी व शिक्षकांच्या निदर्शनास आणून द्यावेत ही विनंती. कळावे.

आपला विश्वास एस. एम. कुबल उपकेलसचिव अभ्यास मंडळ विभाग

सोबत – अभ्यासकमाचीर प्रत,

प्रत :- माहितीसाठी व पुढील योग्यत्या कार्यवाहीसाठी

मा. संचालक, परीक्षा व मुल्यमापन मंडळ	प्र. अधिष्ठाता, विज्ञान व तंत्रज्ञान विद्याशाखा
अध्यक्ष, एन्व्हायरॉनमेंट सायन्स ॲण्ड इंजिनिअरोग ॲण्ड टेक्नॉलाजी मंडळ	बी.एस्सी / एम. एस्सी विभागास.
परीक्षक नियुक्ती ए व बी विभागास.	संलग्नता टी. १ व टी. २ विभागास
पीजी प्रवेश विभागास	पीजी सेमिनार विभागास
संगणक केंद्र / आयटी सेल	पात्रता विभागास

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To.

## SHIVAJI UNIVERSITY, KOLHAPUR - 416004, MAHARASHTRA

PHONE:EPABX-2609000, www.unishivaji.ac.in, bos@unishivaji.ac.in शिवाजी विद्यापीठ, कोल्हापूर -४९६००४, महाराष्ट्र दुर्ध्वनी-इंपीएबीएकस -२६०९०००, अभ्यासमंडळे विभाग दुर्ध्यनी ०२३१-२६०९०९४



#### SU/BOS/Science/349

Date: 24/06/2024

The Principal, All Concerned Affiliated Colleges/Institutions Shivaji University, Kolhapur

Subject: Regarding Minor Change syllabi of B.Sc. Part-I (Sem.I & II) as per NEP-2020 (2.0) degree programme under the Faculty of Science and Technology.

Ref: SU/BOS/Science/877/ Date: 26/12/2023 Letter.

#### Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the university authorities have accepted and granted approval to the Minor Change syllabi, nature of question paper B.Sc. Part-I (Sem. 1 & II) as per NEP-2020 (2.0) degree programme under the Faculty of Science and Technology.

	B.Sc.Part-I (Sem. I & II) a	NEP-2020 (2.0)	
1.	Food Science and Technology (Entire)	6.	Biochemistry
2.	Food Science	7.	Biotechnology (Optional/Vocational)
3.	Food Science and Quality Control	8.	Biotechnology (Entire)
4	Food Technology & Management (Entire)	9.	Pollution
5.	Computer Science (Opt)	10.	Environmental Science (Entire)

This syllabus, nature of question and equivalence shall be implemented from the academic year 2024-2025 onwards. A soft copy containing the syllabus is attached herewith and it is also available on university website <u>www.unishivaji.ac.in NEP-2020@suk(Online Syllabus)</u>

The question papers on the pre-revised syllabi of above-mentioned course will be set for the examinations to be held in October /November 2024 & March/April 2025, These chances are available for repeater students, if any.

You are, therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Dy Registrar Dr. S. M. Kubal

#### Copy to:

1	The Dean, Faculty of Science & Technology	4	B.Sc. Exam/ Appointment Section
2	Director, Board of Examinations and Evaluation	5	Computer Centre/ Eligibility Section
3	The Chairman, Respective Board of Studies	6	Affiliation Section (U.G.) (P.G.)

# SHIVAJI UNIVERSITY, KOLHAPUR.



Established: 1962

A<sup>++</sup> Accredited By NAAC (2021) with CGPA 3.52

New Syllabus For

**Bachelor of Science** 

**B.Sc. Environment Science (Entire)** 

SEMESTER I AND II

STRUCTURE AND SYLLABUS IN ACCORDANCE WITH NATIONAL EDUCATION POLICY-2020

WITH MULTIPLE ENTRY AND MULTIPLE EXIT OPTIONS

(TO BE IMPLEMENTED FROM ACADEMIC YEAR 2024-25 ONWARDS)

## Syllabus of B.Sc. Part - I Environment Science (Entire) SEMESTER I AND II (NEP 2020)

## Syllabus to be implemented from academic year 2024-2025 onwards

- ✤ Guidelines shall be as per B. Sc. Regular Programme
- Rules and Regulations shall be as per B.Sc. Regular
   Programme
- **\*** Preamble:

This syllabus is framed to give sound knowledge with understanding of Environment science to undergraduate students of B.Sc. Environment Science (Entire) Programme. Students will learn Environment Science as a separate course (subject) from B. Sc. I. The goal of the syllabus is to make the study of EnvironmentScience popular, interesting and encouraging students for higherstudies including research.

#### **Programme Outcome:**

- 1. This programme will lay strong foundation of environmental concepts for postsgraduate education and research.
- 2. Helps students in capacity building, developing environmental programmes /projects based on sound technical, environmental and policy matters of Government of India.
- 3. Develop ability to carry out experiments and provide efficient conclusions.
- 4. Develop an approach to work for needs of society regarding environment, health, safety considerations.

#### **Programme Specific Outcome:**

- 1. This programme will make students to understand the concept of sustainable development.
- 2. This programme will provide in-depth knowledge to the students in

respect of current environmental and safety problems faced by human society and to develop amongst students' scientific attitude based on interdisciplinary approach to enable them to take holistic view in decision taking.

Structure B.Sc. (Environment Science) I Entire To be implemented from academic year 2024-25 onwards

					<b>3-OE</b>	4-	5-	6-	OJT,FP,CE	P,CC,RP	
Leve I	S e m e st				IDC/ MD C/ OE/ GE	SE C	AEC,VEC , IKS	C C	Summer Internship / Field Project/	Research Project/ Dissertatio n	Total Credi t s
	e r	Subject-1	Subject-1I	Subject- 1II	OE				<b>OJT</b>		
		DSC-I Introduction to environmenta l science and natural resources-I (2)	<b>DSC-I</b> Ecology-I ( <b>2</b> )	DSC-I Biodiversity and Wild life management -I (2)						-	
	Ι	<b>DSC-II</b> Environmenta l Pollution-I ( <b>2</b> )	DSC-II Sustainable Development and Environmenta l Issues-I (2)	<b>DSC-II</b> Waste Management -I (2)	OE-I Food Preservat i on (2)		IKS-I(2) Introductio n to IKS				
		<b>DSC-PractI</b> Lab course I (2)	<b>DSC-PractI</b> Lab Course II(2)	<b>DSC-Pract</b> I Lab course III (2)							
4.5	Cr e dit s	4+2=6	4+2=6	4+2=6	2+0=2	-	2	-	-	-	22

п	DSC-III Introduction to environmenta l science and natural resources-II (2) DSC-IV (2) Environmenta l Pollution-II (2)	DSC-III Ecology-I (2) DSC-IV Sustainable Development and Environmenta l Issues-II (2)	DSC-III Biodiversity and Wild life management -II (2) DSC-IV Waste Management - II (2)	<b>OE-II</b> Insuranc e Skill I ( <b>2</b> )		<b>VEC-I(2)</b> Democracy, Election and Constitution			-	
	DSC-Pract II Lab course IV (2)	DSC-Pract II Lab course V (2)	DSC-Pract II Lab course VI (2)							
Cr e dit s	4+2=6	4+2=6	4+2=6	0+2=2	-	2	-	-	-	22
<sup>t</sup> Year Cum Credi ts	12	12	12	4	-	4				44
it opt urse/l	tion: Award ( Internship O	of UG Certifi R Continue v	cate with 44 with Major a	credits a and Mino	and an	n additional	4 ci	edits core N	ISQF	

## Semester I Introduction to Environmental Science and Natural Resources-I (DSC-I) Credits-2

## **Course Outcomes:**

- 1. Get acquainted with interaction between man and environment.
  - 2. Introduction to the concept of natural resources and its classification.

Unit	Lecture Hours
Unit I	15
A: Concept of Environmental Science	
Definition, Principles & Scope of environmental science.	
Structure and composition of atmosphere- troposphere,	7
stratosphere, mesosphere and thermosphere; Hydrosphere,	
lithosphere, biosphere	
B: Meteorological Parameters	
Meteorological Parameters i.e. pressure, temperature, precipitation,	
humidity and its types, wind velocity and their units, instruments used	8
for measurement	
Energy budget of earth, Albedo, Heat island Lapse rate,	
Types-ELR, DALR & WALR	
Temperature inversion; Types-radiation, advection, frontal, subsidence,	
turbulence	
Unit II	15
A: Introduction to Natural Resource:	
Definition, Concept of natural resources and classification of resources-	8
Renewable and non-renewable resources,	
Advantages and disadvantages of Renewable and non-renewable resources.	
Conventional Energy Sources: Coal, petroleum, natural gas Non-	
conventional resources; solar, water, wind, tidal, geothermal resources,	
biomass energy, nuclear energy,	
B: Mineral and land resources	
Mineral Resources: Utilization of metallic minerals and non-metallic	
minerals overuse, conservation measures, alternative technologies Land	7
resources, Uses, land degradation, soil erosion, soil conservation,	
changing in agriculture pattern, advantages and disadvantages of	
modern agriculture	

- 1. Principles of Environmental Science by Watt, K.E.F. (1973), McGraw-Hill Book Company
- 2. Environmental Science by Nobel, B.J. and Kormandy, E.J. (1981), The Way the World Works, Prentice-Hall Inc., N.J.
- 3. Environmental Science by Turk A., Turk, J. Wittes J.T. and Wittes, R.E. (1978)
- 4. Ecology & Environment by P.D.Sharma

- 5. Environmental Science : An Introduction by G. T. Miller-1991
- 6. Environmental Resources by Mathur
- 7. Singh MP, Singh BS and Soma S. Dey (2004) Conservation of Biodiversity and Natural Resources. Daya Publishing House, New Delhi.
- 8. Singh, B. K. 2004: Biodiversity Conservation and Management, Mangaldeep Publications, Jaipur
- Mital, K. M. 1997: Non-conventional Energy System, Wheeler Publishers, New Delhi Singh, A. K. 1987: Forest Resources, Ecology and Environment, Concept Publishing Co., New Delhi
- 10. Sarma, P. K.: Forest Resources and their Utilization in India, Mittal Publishers, New Delhi
- 11. Agrawal, V. P.: Forests in India, Oxford & IBH, New Delhi
- 12. Tyner, W.E.: Energy Resources and Economic Development in India, Allied Pub. Pvt. Ltd.

#### Semester I Environmental Pollution-I (DSC-II) Credits 2

#### **Course Outcome:**

- 1. Understand sources, types and impacts of environmental pollution.
- 2. Understand role of various agencies to mitigate pollution.

Unit	Lecture Hours
Unit I	15
A: Introduction Definition of pollution, Concept of pollution, pollutant, types of pollutants-Water pollution, air pollution, noise pollution, plastic pollution, space pollution, soil pollution, thermal pollution Natural sources- flood, volcanic eruption, landslide, forest fires etc. Man- made sources- industrialization, urbanization, domestic waste, modern agriculture practices, transportation etc.	7
<ul> <li>B: Water Pollution, Classification and Impacts</li> <li>Definition, classification of water pollution, sources of water pollution Impacts of water pollution on human, plants &amp; animals</li> <li>Introduction to various water quality parameters and their measurement i.e. pH, EC, Turbidity, TDS, hardness, chloride, Salinity, DO, BOD, COD and contaminants, WQI.</li> <li>Sampling methods: Purpose of sampling, different types of samples, collection methods.</li> </ul>	8
Unit II	15
A: Air Pollution and Sources Air Pollution, Definition, terminology, Sources of air pollution, Classification of air pollutants, National Ambient Air Quality Monitoring Standards Aerosols: Sources, classification, size, adverse effects, cloud seeding	8
<b>B: Mitigation measures</b> Mitigation measures for pollution, individual practices, awareness programs, role NGOs and government, case studies of pollution in India	7

- 1. Environmental Pollution of Cadmium by Rohatgi
- 2. Chemical and Biological Methods for Water Pollution Studies by Trivedy and Goel
- 3. Water Pollution and Management by C.K. Vershney
- 4. Air Pollution By: Arthur C Stern. 3rd Edn. Vol. I, II, VI, VII, Academic Press (1986)
- 5. Air Quality By: Thad Godish, 3rd Edition, Lewis Publishers, New York (1997)

- 6. Understanding Environmental Pollution By: Marquita K Hill. Cambridge University Press (1997)
- 7. Land Pollution, Causes and Control by Harrusson and Laxon
- 8. Soil and Water Conservation Engineering by Schwab, SD, Frevert, RK, Edminster, TW and Barns, KK, John Wiley and Sons
- 9. Manual of Soil & water Conservation Practices by Carmel singh, C. Venkataramamnan, G. sastry, B.p. Joshi

## Semester I Laboratory Course-I (DSC Practical I) Credits-2

DSC-	Lab Course I
Pract 1	
Sr. No.	Name of Experiment
1	Study of rocks and minerals
2	Demonstration of instruments used to measure meteorological parameters.
3	Water Sampling and Preservation
4	Determination of pH of water sample
5	Determination of Electrical Conductivity of water sample
6	Determination of Dissolved Oxygen in water sample
7	Determination of Biochemical Oxygen Demand of water sample
8	Determination of Chemical Oxygen Demand of water sample
9	Determination of Total Dissolved Solids and Total Suspended Solids
10	Determination of colour and turbidity of water sample
11	Preparation of wind rose diagram

## Semester I Ecology-I (DSC-I) Credits-2

#### **Course Outcomes:**

1.Understand the basic concepts regarding ecology and ecosystem.

2.Get acquainted with major biomes and relationship among organisms.

Unit	Lecture Hours
Unit I	15
A: Ecology Definition, Scope and basic principles of ecology and environment, history of ecology, subdivision of ecology, Biological levels of organization, population, community, ecosystem and biosphere.	7
B. Biomes	
Major biomes of the world.	
Characteristics of terrestrial, fresh water and marine ecosystems with reference of plant and animal diversity, Forests, grasslands, lake, river and marine ecosystems of India.	8
Unit II	15
A. Autecology of Species Introduction, biological clock, seed output, seed dispersal, viability of seed, seed dormancy, seed germination and reproductive capacity	7
<b>B: biotic factor</b> Relationship among organisms, symbiosis, mutualism, commensalism, protocooperation, Positive and negative interactions among populations – competition, predation, parasitism,	8

- 1. Muller-Dombols D and Ellenberg H (1974), Aims and Methods of Vegetation Ecology, Wiley, New York
- 2. Odum, E.P. (1983), Basic Ecology, Sanders, Philadelphia
- 3. Robert Ricklefs (2001). The Ecology of Nature. Fifth Edition. W.H. Freeman and Company
- 4. Singh K.P. and J.S. Singh (1992). Tropical Ecosystems: Ecology and Management Wiley Eastern Limited, Lucknow
- 5. Singh, J.S. (ed.) 1993. Restoration of Degraded Land: Concepts and Strategies. Rastogi Publications, Meerut
- 6. Smith, R.L. (1996). Ecology and Field Biology, Harper Collins, New York
- 7. Ecology & Environment by P.D.Sharma

## Semester I Sustainable Development and Environmental Issues (DSC-II) Credit -2

#### **Course Outcomes:**

- 1. Study the causes and effects of global environmental issues in relation to global warming and ozone depletion.
- 2. Inculcate the concept of sustainable development and practices.

Unit	Lecture Hours
Unit I	15
A: Sustainable Development Definition, Concept and strategies of sustainable development, United Nation Conference on Environment and Development with special reference to agenda 21, CSR and sustainability, Clean development mechanism, Commission on sustainable development, The world summit on sustainable development, threats to sustainable development, principles of sustainable development	8
<b>B:</b> Sustainable Development Practices in India: Major issues in sustaining growth and development in India, Interlinking of rivers, desertification and its control, Environmental priorities in India, Role of India in environmental treaties, urban and rural planning	7
Unit II	15
A: State of India's Environment Sustainable Development Goals and characteristics, Environmental Challenges in India and other countries, Sustainable Development in India, International efforts on Sustainable Development, renewable resources and sustainability	8
<b>B: Major Environmental Issues</b> Global Warming, Ozone Depletion,Desertification, pollution, soil erosion, waste lands, chemical pesticide and fertilizers, modern life style practices	7

- 1. Ecology & Environment by P.D.Sharma
- 2. Environmental Science by S. C. Santra
- 3. Atmosphere, Weather and Climate by Barry R. G.
- 4. Climate Change: Causes, Effects and Solutions by Hardy J. T.
- 5. Climate and Global Climate Change by Harvey D
- 6. Climate Change: The Science of Global Warming and Our Energy Future by Mathez E. A.
- 7. Climate Change and India by Mitra A. P., Sharma S., Bhattacharya S., Garg A., Devotta S. and Sen K.

Semester I
Laboratory Course-II (DSC Practical I)
Credits-2

DSC-	Lab Course I	
Pract-1		
Sr. No.	Name of Experiment	
1	Identification of various plant species in campus area	
2	Measurement of girth and diameter of trees in campus	
3	Determination of chlorophyll content of given plant material	
4	Determination of frequency of species in ecosystem	
5	Determination of species density in nearby ecosystem	
6	Estimation of GPP, NPP and RR	
7	Estimation of biomass of trees	
8	Study of Phytoplankton's and Zooplanktons	
9	Preparation of compost	
10	Preparation of life table	

## Semester I Biodiversity and Wildlife Management (DSC-I) Credits-2

### **Course Outcome:**

- 1. Understand various reasons responsible for loss of wildlife degradation
- 2. To study various wildlife management measures.

Unit	Lecture Hours
Unit I	15
A: Biodiversity Concept and Disciplines	8
Biodiversity concept, definition, need for assessment, scope Value	
of biodiversity – food, timber, medicinal & ornamental.	
Threats to wild life: Natural and anthropogenic reasons,	
Habitat destruction and fragmentation, urbanization, industrialization,	
agricultural expansion, effects of climate change,	
Human wildlife conflict, exploitation of wildlife by hunting and	
poaching	
B: Biodiversity management	7
Centers of diversity, concept of endemism, types & endemic species	
With example.	
Loss of biodiversity, Founder Effects, Demographic bottlenecks,	
Genetic Drift, Inbreeding Depression,	
Effects and examples of exploitation of plants and animals	
Unit II	15
A: Introduction to wildlife and habitats	8
Wildlife: concept and need for conservation,	
Types of habitats: Aquatic habitats- freshwater, marine and brackish	
Terrestrial habitats-forest, arid zones, grassland, agricultural lands,	
deserts	
B: Conservation projects for wildlife:	7
IUCN Threatened species Categories	
Project tiger, project elephant, crocodile conservation project, UNDP	
sea turtle project, project hangul, Project snow leopard, Tiger task	
force	

- Chaudhuri AB and Sarkar DD (2003) Megadiversity Conservation, Flora, Fauna and Medicinal Plants of India's Hotspots. Daya Publishing House, New Delhi.
- 2. Singh, B. K. 2004: Biodiversity Conservation and Management, Mangaldeep Publications, Jaipur
- 3. Krishnamurthy, K.V. 2003. An Advanced Textbook on Biodiversity Principles and Practice, Oxford and IBH Publishing, New Delhi

- 4. Kotwal, P.C. and S. Banerjee. Biodiversity Conservation In Managed forest and Protected areas, (2002). Agrobios, India
- 5. Animal Ecology and Environmental Biology by H. R. Singh
- 6. Plant Diversity Hotspots in India An Overview by Hajra P.K. and V. Mudgal
- 7. Plant Ecology by John E. Weaver and F.E. Clement
- 8. Restoration of Endangered Species by Bowles M.L. and Whelan C.J.
- 9. Understanding Biodiversity- Life, sustainability and Equity by Ashish Kothari

## Semester I Waste management-I (DSC-II) Credits 2

#### **Course Outcome:**

1. Study the fundamentals of solid and hazardous waste management.

2. Understanding methods and scenario of solid waste management.

Unit	<b>Lecture Hours</b>
Unit I	15
A: Introduction to Solid Waste	
Solid waste: Introduction and definition, classification of solid	
waste, sources of solid waste generation, components in solid	7
waste, Collection and volume reduction prior to disposal,	
Physio-chemical properties of solid waste	
B: Solid Waste Management Systems	
Solid Waste Management, advantages	
Factors affecting solid waste management system	
Indian Scenario of Solid Waste Management	8
Case studies for solid waste management	
Traditional methods, eco-friendly methods-conversion of solid	
waste to energy/manure, other techniques for solid waste	
management	
Constraints in solid waste management	
Unit II	15
A: Introduction to Hazardous Waste	
Hazardous waste definition, characteristics, types-biomedical,	
radioactive and other wastes, source of hazardous waste,	7
handling and storage of hazardous waste,	
Health risks associated with hazardous waste,	
B: Waste Management Methods	
Waste minimization, Waste treatment methods: Incineration,	
Stabilization, Secure Landfill, Disinfection, Irradiation,	8
Pyrolysis	
Disposal of radioactive waste	

- Integrated Solid Waste Management Engineering Principles & Management By: Issues by George Tchobanoglous, Hilary Theisen& Samuel A Vigil. McGraw-Hill International Editions, New York (1993)
- 2. Solid Waste Management in Developing Countries By: AD Bhide& BB Sunderesan. Indian National Scientific Documentation Centre, New Delhi (1983)
- 3. Solid Waste Engineering By: PA Vesilind, William Worrell & R. Thomas Brooks/Cole, Australia (2002)
- 4. Basics of Solid and Hazardous Waste Management Technology By: K.L Shah. Prentice Hall, Ohio (2000)

- 5. Industrial and Hazardous Wastes Health Impacts & Management Plans By: Rajiv K Sinha& Sunil Heart. Pointer Publishers, Jaipur (2004)
- 6. Prospects and Perspectives of Solid Waste Management Hazardous Waste management by M. LaGrega and others, McGraw-Hill Publication
- 7. Biomedical (handling and management) rules, 2008

## Semester I Laboratory Course-III (DSC Practical I) Credits-2

DSC-	Lab Course I
Pract-1	
Sr. No.	Name of Experiment
1	Study of pugmark
2	Estimation of MLSS, MLVSS and SVI
3	Wood Pyrolysis
4	Study of human wildlife conflict in local area through field visit
5	Study of population census by transect and camera trapping
6	Visit to botanical garden
7	Visit to wetland area
8	Study of bio-indicators in local area
9	Determination of crown density of trees

#### Semester I Food Preservation-I (OE-I) Credits-2

**Course Outcomes:** Upon successful completion of this course, the student will be able to

1. To understand the basic principles of food preservation.

2. To know basic principles of several food processing and preservation methods.

#### Unit I

#### **15 Lectures**

- Principles of Food Preservation
- Introduction and Definition of Food Preservation
- Importance and Need of Food Preservation
- Principles of Food Preservation
- Food Spoilage
- Introduction
- Undesirable Changes in Food due to Spoilage
- Factors Affecting food Spoilage
- Types of Spoilage
- Effect of Spoilage on Nutritional Quality of food
- Traditional Methods of Food Preservation
- Smoking
- Sun drying
- Pickling/ Salting
- Fermentation

#### Unit II

#### **15 Lectures**

- Preservation using Fermentation
- Theory and Equipment
- Benefits and mechanisms of fermentation
- Fermented food products e.g. Beer, Wine, Soya sauce, Cheese, Soya bean products Microbial vs Industrial Fermentation
- Effect of fermentation on Foods.
- Preservation using High temperature
- Moist and Dry heat methods
- Thermal death time (D-value, Z-value, F-value

- Boiling
- Blanching
- Dehydration and Concentration
- Canning
- Pasteurization
- Extrusion

## **SUGGESTED BOOKS:**

- 1. Potter (1996) Food Science, CBS publication & distribution, New York, 235, 432
- 2. B. Shrilakshmi (2001) Food Science, New Age International (P) Limited Publication
- 3. N. Shakuntala Manay, M. Shadaksharswamy (2008) Food Facts& Principles, New Age International (P) Limited Publication

4. G. Subbulakshmi, Shobha A Udipi (2001) Food Processing and Preservation, New Age International (P) Limited Publication

- 5. P.J. Fellow (2005) Food Processing Technology, Woodhead Publication Pvt Ltd.
- 6. Virag Gupta Food Safety & Standards Act 2006, Rules 2011, Regulations (2021), Commercial Law Publication (India) Pvt Ltd.
- 7. Norman Desrosier Technology of Food processing (1987), CBS publication & distribution

#### Semester II

## Introduction to Environmental Science and Natural Resources-II (DSC-III) Credits-2

#### **Course Outcomes:**

- 1. To study various theories related to origin of earth and geochemical differentiation.
- 2. Understanding natural resources of India.

Unit	<b>Lecture Hours</b>
Unit I	15
A: Biogeochemical cycles: Introduction to biogeochemical cycles, Endogenic and Exogenic Cycles, Carbon cycle, Nitrogen cycle, Sulphur cycle, Oxygen cycle, Phosphorus cycle and Water cycle	7
<b>B: Fundamentals of Geoscience</b> Origin of Earth-Theories of origin of earth Structure and composition of earth, Primary geochemical differentiation, Theories of Evolution- Wagener's Continental drift Theory, Plate tectonic Theory	8
Unit II	15
A: Forest and Wildlife Resources Forest and wildlife resources: Forest vegetation, status and distribution of forest and wildlife resources, contribution as resource. forest cover and types, Major and minor forest products Natural resources of India with Reference to occurrence, distribution and utilization Major and minor resources in India	7
<b>B: Conservation of Energy Resources:</b> Environmental impacts of large-scale exploitation of renewable and non-renewable energy resources. Growing energy needs. Energy scenario at national level, global level and its impacts on environment. Conservation measures of natural resources – individual practices and social practices, latest technologies	8

- 1. Principles of Environmental Science by Watt, K.E.F. (1973), McGraw-Hill Book Company
- 2. Environmental Science by Nobel, B.J. and Kormandy, E.J. (1981), The Way the World Works, Prentice-Hall Inc., N.J
- 3. Ecology & Environment by P.D.Sharma
- 4. Environmental Science: An Introduction by G. T. Miller, 1991
- 5. Perspectives in Environmental studies by Kaushik, Anubhav
- 6. Introduction to Environmental Management by Bal, Anand S.

- 7. Singh MP, Singh BS and Soma S. Dey (2004) Conservation of Biodiversity and Natural Resources. Daya Publishing House, New Delhi
- 8. Mital, K. M. 1997: Non-conventional Energy System, Wheeler Publishers, New Delhi 9. Sarma, P. K.: Forest Resources and their Utilization in India, Mittal Publishers, New Delhi
- 10. Tyner, W.E.: Energy Resources and Economic Development in India, Allied Pub. Pvt. Ltd.
- 11. Pachauri, R. K.: Energy, Environment and Development, Vol. I & II, HarAnand Pub. Pvt. Ltd.

## Semester-II Environmental pollution –II (DSC-IV) Credits 2

## **Course Outcome:**

- 1. Explain the sources and effects of air and noise pollution.
- 2. Study about various pollution controlling devices and institutions.

Unit	Lecture Hours
Unit I	15
A: Properties of Atmosphere	
Physical and chemical properties off atmosphere,	
Solar radiation – Solar spectrum Insolation, Factors affecting	
insolation	8
Atmospheric stability: concept and types, Pasqual stability	
classification	
Mixing heights, plume behavior, Dispersion of pollutants in	
atmosphere	
<b>B: Air Pollution and Sources</b> Air	
Pollution, Definition,	
terminology, Sources of air pollution,	_
Classification of air pollutants, National Ambient Air Quality	7
Monitoring Standards	
Aerosols: Sources, classification, size, adverse effects, cloud	
seeding	
Unit II	15
A: Pollution Controlling Devices and Institutions	
Air pollution control: stationary sources - settling chamber,	
cyclone, Wet collector,	
Fabric filter and Electro Static Precipitators	
Greenhouse's effect (Global Warming), Ozone layer depletion	8
Acid Rain, Effect of air pollution and acid rain on plants, animals	
and property	
IPCC (Intergovernmental Panel on Climate Change), UNFCCC	
(United Nations Framework Convention on Climate Change),	
Kyoto Protocol	
B: Soil and Noise Pollution	
Noise pollution, definition, sources	
Effects of noise pollution on human beings and animals	7
Noise control measures	
Characteristics of sound waves- Sound Level, Frequency,	
Wavelength, Sound pressure	
Soil pollution, types, sources & effects on plants and	
animals	

- 1. Pollution: Causes, Effects & Control Edited By: Roy M Harrison. 2nd Edn. The Royal Society of Chemistry Cambridge (1995)
- 2. Environmental Chemistry: A Global Perspective By: Gary W van Loon & Stephen J Duffy. Oxford University Press (2000)
- 3. Handbook of Pollution Control Processes By: Robert Noyes. Jaico Publisheing House, Mumbai (2001)
- 4. An Introduction to Air Pollution By: RK Trivedy& PK Goel. ABD Publishers Jaipur, India (2003)
- 5. Air Pollution By MN Rao& HVN Rao. Tata McGraw-Hill Publishing company Ltd., New Delhi (1994)
- 6. The Atmosphere by Tarbuch and Lutgen
- 7. Introduction to Atmospheric Chemistry by Hoobs, Peter V
- 8. Land Pollution, Causes and Control by Harrusson and Laxon
- 9. Soil and Water Conservation Engineering by Schwab, SD, Frevert, RK, Edminster, TW and Barns, KK, John Wiley and Sons.
- 10. Manual of Soil & water Conservation Practices by Carmel singh, C. Venkataramamnan, G. sastry, B.p. Joshi

Semester II
Laboratory Course-IV (DSC Practical II)
Credits-2

DSC-	Lab Course I
Pract- II	
Sr. No.	Name of Experiment
1	Study working of High-Volume Sampler
2	Estimation of Total Hardness of given water sample
3	Determination of Alkalinity in water sample
4	Determination of Acidity in water sample
5	Determination of Carbonates and Bicarbonates in Water
6	Determination of of PM10 in ambient air
7	Analysis of Sulphur Dioxide in ambient air
8	Analysis of Nitrogen Oxides in ambient air
9	Determination of free CO <sub>2</sub> in water
10	Measurement of noise levels at silence, residential and commercial zone

## Semester II Ecology-II (DSC-III) Credits 2

#### **Course Outcome:**

1.Understand structure and function of ecosystem.

2.Get acquainted with population ecology and succession.

Unit	Lecture Hours
Unit I	15
Ecosystems	
Ecosystem: Basic concepts, components of ecosystem.	
Trophic levels, food chains and food webs.	
Ecological pyramids, ecosystem functions.	7
Energy flow in ecological systems, energy efficiencies	1
B. Fragile Ecosystem	
Introduction, coral reef ecosystem, mangroves, wetlands,	
Antarctica, Artic ecosystem, mountain environment with reference of	0
plant and animal diversity	8
Unit II	15
A: Succession	
Succession: Concepts of	
succession, Types of Succession,	8
causes of succession, process of	
succession	
B: Ecology of population	
Population density, natality, mortality, age distribution, biotic potential	
of population, the growth form of population, metapopulational and	_
life table	7

- 1. Muller-Dombols, D. and Ellenberg, H. (1974). Aims and Methods of Vegetation Ecology, Wiley, New York.
- 2. Odum, E.P. (1983), Basic Ecology, Sanders, Philadelphia.
- 3. Robert Ricklefs (2001). The Ecology of Nature.Fifth Edition. W.H. Freeman and Company.
- 4. Singh K.P. and J.S. Singh (1992). Tropical Ecosystems: Ecology and Management. Wiley Eastern Limited, Lucknow, India.
- 5. Singh, J.S. (ed.) 1993. Restoration of Degraded Land: Concepts and Strategies. Rastogi Publications, Meerut.
- 6. Smith, R.L. (1996). Ecology and Field Biology, Harper Collins, New York

## Semester II Sustainable development and environmental issues-II (DSC-IV) Credits 2

#### **Course Outcome:**

- 1. Inculcate the values related to environmental education.
- 2. Inculcate the concept of sustainable development and practices.

Unit	Lecture Hours
Unit I	15
A: Global Environment Issues	
Environmental Education and awareness: Objectives, guiding principles,	
education programmed, environmental awareness	8
Global Environmental problems: sea level rise, Acid rain, Forest fire	U U
B: Climate Change and Policies	
International agreements regarding climate change, Montreal protocol,	7
Kyoto protocol, Carbon credit and carbon trading, Mitigation strategies	7
for climate change, Paris agreement, United Nations Framework on	
Climate Change, Vienna Convention	
Unit II	15
A: human and environment	
Impact of Human activities on environment, case studies in India, role	7
of environment in humans, economy and environment, environment and	1
human health, social and cultural importance of environment	
B: Awareness for environmental issue	
Government policies, rules and regulation for environment, campaigns,	8
training programs, environmental education, awareness through media,	0
agreement's for environmental conservations	

- 1. Ecology & Environment by P.D.Sharma
- 2. Environmental Science by S. C. Santra
- 3. Atmosphere, Weather and Climate by Barry R. G,
- 4. Climate Change: Causes, Effects and Solutions by Hardy J. T
- 5. Climate and Global Climate Change by Harvey D
- 6. Climate Change: The Science of Global Warming and Our Energy Future by Mathez E. A
- 7. Climate Change and India by Mitra A. P., Sharma S., Bhattacharya S., Garg A.Devotta S. and Sen K

## Semester II Laboratory Course-V (DSC Practical II) Credits-2

DSC-P1	Lab Course I
Sr. No.	Name of Experiment
1	Determination of Species Diversity Index
2	Determination of species density in nearby ecosystem
3	Estimation of biomass of plants
4	Study of Phytoplankton's and Zooplanktons
5	Preparation of vermicompost
6	Demonstration of rain water harvesting techniques
7	Study of eco-tourism activities in local area
8	Determination of fertility, natality and mortality rate of given population

## Semester II Biodiversity and Wildlife management II (DSC-III) Credits 2

### **Course Outcome:**

- 1. Understand various anthropogenic reasons responsible for biodiversity loss.
- 2. To get acquainted with various wildlife conservation measures.

Unit	Lecture Hours
Unit I	15
A: Conservation Measures Necessity of biodiversity conservation, Methods of biodiversity Conservation: In situ (Biosphere reserves and national parks) & ex Situ (Germplasm collection, botanical garden, seed banks, pollen Banks, DNA banks) conservation, Conservation of genetic diversity, Species diversity and ecosystem diversity	8
<b>B: hotspot in India</b> Concept of hotspot, major hotspot in world India as mega – biodiversity country, need & awareness, biogeographical regions of India Corridors for wildlife conservation State symbols (animals and plants)	7
Unit II	15
A: Wildlife management: Population census techniques: Transects, point counts, pug mark, camera trapping, Assessment of diversity: determination of sampling area, transects, quadrats, point center method, diversity indices and its application Habitat conservation	7
B: Organization involved in biodiversity conservation IUCN, UNEP, UNESCO, WWF, ICSU, FAO, WCMC, ISBI. Introduction, International Biodiversity Law. Convention on Biological Diversity, National Legislation: Environmental Protection Act 1986, Biodiversity Act, Wildlife protection act- merits and demerits MoEF CC,	8

- 1. Chaudhuri AB and Sarkar DD (2003) Megadiversity Conservation, Flora, Fauna and Medicinal Plants of India's Hotspots. Daya Publishing House, New Delhi
- 2. Singh, B. K. 2004: Biodiversity Conservation and Management, Mangaldeep Publications, Jaipur
- 3. Krishnamurthy, K.V. 2003. An Advanced Textbook on Biodiversity Principles and Practice, Oxford and IBH Publishing, New Delhi
- 4. Kotwal, P.C. and S. Banerjee. Biodiversity Conservation In Managed forest and Protected areas, (2002). Agrobios, India
- 5. Animal Ecology and Environmental Biology by H. R. Singh
- 6. Plant Diversity Hotspots in India An Overview by Hajra P.K. and V. Mudgal
- 7. Plant Ecology by John E. Weaver and F.E. Clement
- 8. Understanding Biodiversity- Life, sustainability and Equity by Ashish Kothari

## Semester II Waste management-II (DSC-IV) Credits 2

#### **Course Outcome:**

- 1. Study the fundamentals of E-waste management.
- 2. Learning the rules and regulations of solid and hazardous waste.

Unit	Lecture Hours
Unit I	15
A: E- Waste Management Introduction, Components of E-Waste, Hazards Associated with E- waste, Existing legislation, E-waste management Treatment and disposal methods, status of E-waste management in India	7
<b>B: landfill techniques and associated problems</b> Introduction, construction, decomposition of land fill, advantages and disadvantages, recovery and use of land fill gas, leachates, leachate control technique, Impact of landfill technique on health and environment	8
Unit II	15
A: waste management strategies in India Introduction, situation analysis, future scenario, private sector participation in waste management, important contractual issues, initiatives by government for waste management, case studies	7
<b>B: Laws and Regulation for Waste Management</b> Introduction, municipal solid waste (Management and Handling) Rules,2000 Biomedical waste (Management and Handling) Rules,2011 Electronic Waste (Management and Handling) Rules,2011 Hazardous waste (management, handling and transboundary movement) rules of 2008 Liquid waste management rules	8

- 1. Air Pollution By: Arthur C Stern. 3rd Edn. Vol. I, II, VI, VII, Academic Press (1986)
- 2. Air Quality By: Thad Godish, 3rd Edition, Lewis Publishers, New York (1997)
- 3. Understanding Environmental Pollution By: Marquita K Hill. Cambridge University Press (1997)

- Pollution: Causes, Effects & Control Edited By: Roy M Harrison. 2nd Edn. The Royal Society of Chemistry Cambridge (1995)
- Environmental Chemistry: A Global Perspective By: Gary W vanLoon& Stephen J Duffy. Oxford University Press (2000)
- Handbook of Air Pollution Control Engineering & Technology By: John C Mycock, John D McKenna & Louis Theodore. Lewis Publishers, CRC London (1995)
- 7. Handbook of Pollution Control Processes By: Robert Noyes. JaicoPublisheing House, Mumbai (2001)
- 8. An Introduction to Air Pollution By: RK Trivedy& PK Goel. ABD Publishers Jaipur, India (2003)
- Air Pollution By MN Rao& HVN Rao. Tata McGraw-Hill Publishing company Ltd., New Delhi (1994)
- 10. The Atmosphere by Tarbuch and Lutgen
- 11. Introduction to Atmospheric Chemistry by Hoobs, Peter V

## Semester II Laboratory Course-VI (DSC Practical II) Credits-2

DSC-P1	Lab Course I
Sr. No.	Name of Experiment
1	Study of physical and chemical characteristics of Municipal Solid Waste
2	Determination of moisture content of solid waste
3	Study of electricity generation from solid waste through field visit
4	Visit to NGO working for wildlife conservation
5	Visit to Sewage Treatment Plant and Effluent Treatment Plant
6	Determine biodiversity through bird watching
7	Study in-situ conservation measures through visit to wildlife sanctuary
8	Preparation of herbarium

## Semester II Insurance Skill I (OE-II) Credits-2

#### **COURSE OUTCOMES:**

After studying this course, students will be...

- 1. Know about concept of Insurance
- 2. Aware about importance of Insurance in society.
- 3. Able to understand Various types of insurance

Unit No.	Contents	No. of Hours
Ι	Introduction to Insurance:	
	+ Definition, characteristics of insurance.	15
	<ul> <li>Need of insurance and Principles of Insurance.</li> </ul>	13
	+ Economic and commercial significance of insurance.	
	✤ Insurance as a social security tool.	
II	Types of Insurance:	
	<ul> <li>Meaning and Nature of life insurance, Fire insurance and Marine Insurance.</li> </ul>	15
	<ul> <li>Products under Life Insurance policies.</li> </ul>	
	<ul> <li>Procedure of taking fire Insurance policy.</li> </ul>	
	<ul> <li>Procedure of taking marine insurance policy.</li> </ul>	

#### **References-**

- 1. G.S. Panda- Principles and Practices of Insurance' Kalyani Publishers, Ludhiana.
- 2. M. Arif khan Practice of Insurance, Educational Book House, Aligarh.
- 3. M.N. Mishra-'Insurance Principles and Practice' S. Chand & Company Ltd., New Delhi.