ECOLOGY AND ENVIRONMENTAL BIOTECHNOLOGY

Semester	Subject Code	Category	Lecture		Theory		P	C
IV	21CPBT4A	Core - X	5 hrs per week	75	5 hrs per week	75	0	5

COURSE OBJECTIVE: In this course, students will

- Understand the concepts of ecosystems and their functions, fundamentals of population ecology and community ecology, types of biodiversity and ecological succession, environmental issues and methods to treat the different types of wastes.

COURSE OUTCOMES: Up on successful completion of course, students will be able to

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL (K1-K6)
CO1.	Describe ecosystems, types and their function	K2
CO2.	Illustrate population growth curves and intra and inter specific interactions in a community	K3
CO3.	Categorize different types of biodiversity and ecological succession	K4
CO4.	Explain current environmental problems	K5
CO5.	Summarize the methods involved in treatment of various wastes	K6

Knowledge level: K1- Remember; K2- Understand; K3- Apply; K4- analyze; K5-Synthesize; K6-Evaluate

Mapping with Programme Outcomes

COS	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	S	M	M	M	M
CO2	S	M	M	M	M	M
CO3	M	M	S	S	M	M
CO4	M	S	M	M	S	M
CO5	M	M	M	M	M	S

S-strong; M- medium; L-low

UNIT I: ECOSYSTEMS AND THEIR FUNCTIONS **15 Hours**

Ecosystem components- biotic and abiotic, habitat, niche- width, overlap, fundamental niche, realized niche, partitioning, character displacement, Ecosystem types, ecosystem functions- productivity- primary, secondary, net community, energy flow, nutrient cycling- decomposition, food chains, food web.

UNIT II: POPULATION ECOLOGY AND COMMUNITY ECOLOGY **15 Hours**

Population density, characteristics of population, population growth curves-survivorship curves, population regulation, life history strategies (r and K selection), Concept of metapopulation-demes and dispersal, interdemic extinctions, age structured populations, Species Interactions, competiton- interspecific competition, intraspecific competition.

UNIT III: BIODIVERSITY AND ECOLOGICAL SUCCESSION **15 Hours**

Levels of Biodiversity, genetic, species, ecosystem, uses of biodiversity, threats to biodiversity, extinction of species, IUCN red list, Conservation of biodiversity, hotspots, project Tiger, Biosphere reserves, biogeographical classification of India.

UNIT IV: ENVIRONMENTAL ISSUES **15 Hours**

Ozone depletion, greenhouse effect, water, air, noise, nuclear, marine and soil pollution, bioindicators of pollution, Plankton community as indicators of water pollution; use of diversity index in evaluation of water quality, Determination of microbiological quality of recreational and potable waters, indicator organisms, coliforms and E.coli.

UNIT V: WASTE TREATMENT **15 Hours**

Wastes types, hazardous wastes, solid wastes, solid waste management, composting, vermicomposting, sewage waste water treatment, waste water treatment in different industries, Bioremediation- insitu, exsitu, phytoremediation of metals, Biodegradation of hydrocarbons, xenobiotics, GEMs used in biodegradation

Distribution of Marks: Theory 80% and Problems 20%

TEACHING METHODOLOGY

- Class room teaching
- Assignments
- Discussions
- Home work
- PPT presentations
- Seminars
- Models/Charts

TEXT BOOKS:

S.NO.	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	Eugene P. Odum and Gray W. Barett	Fundamentals of Ecology	Cengage Learning	2004

2.	Thomas M Smith, Robert Leo Smith	Elements of Ecology	Pearson	2015
3.	W.P Cunninghum and BW Saigo	Environmental Science	McGraw Hill	1999
4.	Hans-JoachinJordening and Josef Winter	Environmental Biotechnology, Concepts and Applications	Winter-VCH	2005

REFERENCE BOOKS:

S.NO.	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	Wiliam D Bowman, Sally D Hacker, Michael L Cain	Ecology	Oxford University press	2017
2.	P.NicholasCheremisinoff	Biotechnology for Wastewater Treatment	Prentice Hall Of India	2001
3	P.K. Mohapatra	Text book of environmental biotechnology	I.K. International Pvt. Ltd.	2010
4	Alan Scragg	Environmental biotechnology	Longman	1999
5	Daniel A. Vallero	Environmental Biotechnology	Academic Press	2010

WEB SOURCES

1. https://www.shomusbiology.com/ecology-and-env-biology.html
2. https://www.khanacademy.org/science/biology/ecology/population-growth-and-regulation/a/exponential-logistic-growth
3. https://www.khanacademy.org/science/biology/ecology/population-ecology/a/life-tables-survivorship-age-sex-structure
4. https://www.researchgate.net/publication/26789987_Biodegradation_of_aromatic_compoundsCurrent status_and_ _for_biomolecular_approaches.
5. https://books.google.com/books/about/Environmental_Biotechnology.html

Syllabus Designer:

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