

Sri Sathya Sai College for Women, Bhopal

(An Autonomous College affiliated to Barkatullah University, Bhopal)

(NAAC Accredited 'A' Grade)



SYLLABUS

UG

SESSION- 2023-24

CLASS: B.Sc. III YEAR

SUBJECT: Biotechnology

Sri Sathya Sai College for Women, Bhopal

(An Autonomous College Affiliated to Barkatullah University Bhopal)

Department of Higher Education, Govt. of M.P.

Under Graduate Syllabus (Annual Pattern)

As recommended by Central Board of Studies and approved by the Governor of M. P.

wef 2022-2023

(Session 2023-24)

(NEP-2020)

Class	: B.Sc. III year
Subject	Biotechnology जैव प्रौद्योगिकी
Title of paper	: Environmental Biotechnology (Theory)/ पर्यावरण जैव प्रौद्योगिकी (सैद्धांतिक)
Course type	: DSE (Group - B)
Paper	: I
Max. Marks	: 70 (Theory) + 30(CCE)/Regular students
Min. Marks	: 35
Credit value	: 04
Course Learning outcomes: On Successful completion of this course, the students will be able to :	
<ol style="list-style-type: none"> 1. Deep understanding of existing and emerging technologies that are important in the area of environment and the principles and techniques which underline the environmental issues including air and water pollution. 2. Empowers the students with the knowledge of Domestic waste water treatment, Classification of wastewater treatment (physical, chemical and biological) 3. Students learn about concepts of Biodegradation, Biodegradation of hydrocarbon, and Measurement of biodegradation. Bioremediation-Concept, Methods of Bioremediation (In-situ and Ex-situ Bioremediation) and Xenobiotic biodegradation. 4. Learners will understand the concept of biodiversity: conservation and management, rules and acts. 	

Part B – Content of the Course

No. of lectures - 60

Unit – I	Environmental Pollution: Definition, principles and scope of ecology types of pollution, Oil pollution, Methods for the measurement of pollution; Methodology of environmental management – the problem solving approach, its limitations.
इकाई – I	पर्यावरण प्रदूषणरू पारिस्थितिकी की परिभाषा, सिद्धांत और कार्यक्षेत्र प्रदूषण के प्रकार, तेल प्रदूषण, प्रदूषण के मापन के तरीके; पर्यावरण प्रबंधन की पद्धति समस्या समाधान दृष्टिकोण, इसकी सीमाएँ।
Unit – II	Solid and Water wastes: sources and management (composting, vermiculture and methane production). Treatment of waste water, primary, secondary and Assessment of water quality.
इकाई – II	ठोस एवं जल अपशिष्ट स्रोत और प्रबंधन खाद बनाना, वर्मीकल्चर और मीथेन उत्पादन। जल गुणवत्ता निर्धारण, अपशिष्ट जल का उपचार— प्राथमिक, द्वितीयक एवं तृतीयक
Unit – III	Global Environmental Problems: Ozone depletion, UV-B, green house effect and acid rain. Biogas H ₂ Production
इकाई – III	वैश्विक पर्यावरणीय समस्याएँ: ओजोन क्षरण, यू वी-बी, हरित कृषि प्रभाव और अम्लीय वर्षा, बायोगैस और हाइड्रोजन उत्पादन, उनका प्रभाव और प्रबंधन के लिए जैव प्रौद्योगिकी दृष्टिकोण।
Unit – IV	Degradation of Xenobiotics in Environment Ecological considerations, decay behavior and degradative plasmids; Hydrocarbons, substituted hydrocarbons, surfactants, pesticides, microbial leaching. Bioremediation of contaminated soils and waste land.
इकाई – IV	पर्यावरण में जिनोबायोटिक का अपघटन: पारिस्थितिक विचार, क्षय व्यवहार और अपक्षयी प्लास्मिड; हाइड्रोकार्बन, प्रतिस्थापित हाइड्रोकार्बन, सर्फैक्टेंट, कीटनाशक दूषित मिट्टी और बंजर भूमि का जैव उपचार, सूक्ष्म जैविक निष्कालन।

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Unit – V	Techniques and Applications: Methods of monitoring Pollution; Biological methods; Detection methods for DO, BOD, Pathogen monitoring by heterotrophic plate count; Multiple tube method; Membrane filtration methods; Strategies for controlling pathogen transfer; Chemical Methods- Detection methods for COD, pH, alkalinity, TSS, TDS, Total organic carbon, oil, grease etc.; Biosensors for pollution
इकाई- V	तकनीक और अनुप्रयोग: प्रदूषण की निगरानी के तरीके; हेटरोट्रॉफिक प्लेट काउंट द्वारा डीओ, बीओडी, पैथोजन मॉनिटरिंग के लिए जांच के तरीके; एकाधिक ट्यूब विधि; झिल्ली निस्पंदन विधियाँ; रोगजनक स्थानांतरण को नियंत्रित करने के लिए रणनीतियाँ; रासायनिक तरीके सीओडी, पीएच, क्षारीयता, टीएसएस, कुल कार्बनिक कार्बन, तेल, ग्रीस आदि के लिए पता लगाने के तरीके; प्रदूषण के लिए बायोसेंसर

Learning Resources

Suggested Readings:

1. Sodhi G. S., Environmental Chemistry, Narosa Publishing House.
2. Das Satya N., Essential of Biotech for student, PeePee Publication and Distributor Ltd.
3. Verma Dhananjay, Environmental Awareness, M.P. Hindi Granth Academy.

Suggestive digital platform/ web links:

https://www.biologyonline.com

Suggestive Equivalent Online Courses:

https://www.biologyonline.com – Coursera, NPTEL

Suggested Continuous Evaluation Methods:

(अनुशासितसतत मूल्यांकन विधियाँ)

Maximum Marks: 100 (अधिकतम अंक: 100)		
Continuous Comprehensive Evaluation (CCE): 30 marks Term End Exam (Theory) 70 marks (सतत व्यापक मूल्यांकन अंक: 30 विश्वविद्यालयीनपरीक्षा अंक : 70)		
Internal Assessment : (आंतरिक मूल्यांकन) Continuous Comprehensive Evaluation (CCE): 30 Marks (सतत व्यापक मूल्यांकन)	Class Test (क्लास टेस्ट) Assignment / Presentation (असाइनमेंट / प्रस्तुतीकरण प्रेजेंटेशन)	30
External Assessment: Term End Exam (आकलन) (Theory) 70 Time : 03:00 Hrs. (विश्वविद्यालयीन परीक्षा:)	Section (A) : Very Short Question (अनुभाग अ: अति लघु प्रश्न) Section (B) : Short Questions (अनुभाग ब: लघु प्रश्न) Section (C) : Long questions (अनुभाग स: दीघ उत्तरीय प्रश्न)	70
		Total 100

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(NEP-2020)

Class	: B.Sc. III year
Subject	Biotechnology (Practical) प्राणीशास्त्र (प्रायोगिक)
Title of paper	: Environmental Biotechnology (Practical)/ प्रयोगात्मक आनुवंशिकी (प्रायोगिक)
Course type	: Minor / Elective माइनर / इलेक्टिव
Paper	:
Max. marks	: 30 + 70 /Regular students
Min. marks	: 35
Credit value	: 02

Course Learning Outcomes: On successful completion of this course, the students will be able to:

1. Deep understanding of existing and emerging technologies that are important in the area of environment issues including air and water pollution.
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4. Learners will understand the concept of biodiversity: conservation and management, rules and acts.

Contents / विवरण

No. of lectures - 30

Unit	Topics
I	Isolation of Cyanobacteria (blue green algae).
II	Estimation of nitrate.
III	Estimation of nitrite.
IV	Estimation of ammonia.
V	Determination of biological oxygen demand (BOD) of water sample.
VI	Determination of chemical oxygen demand (COD) of water sample.
VII	To study air born microbes by agar plate technique.
VIII	To study pollution stress by chlorophyll and carotenoid ratio from algae sample.
IX	To study of effect of heavy metal on growth of bacteria.
I	साइनोबैक्टीरिया (नील हरित शैवाल) का पृथक्करण।
II	नाइट्राइट का आकलन।
III	नाइट्राइट का अनुमान।
IV	अमोनिया का अनुमान।
V	पानी के नमूने की जैविक ऑक्सीजन मांग का निर्धारण (बीओडी)
VI	पानी के नमूने की रासायनिक ऑक्सीजन मांग का ;सीओडी निर्धारण।
VII	अगर प्लेट तकनीक द्वारा वायुजनित रोगाणुओं का अध्ययन करना।
VIII	शैवाल के नमूने से क्लोरोफिल और कैरोटीनॉयड अनुपात द्वारा प्रदूषण तनाव का अध्ययन करना।
IX	बैक्टीरिया की वृद्धि पर भारी धातु के प्रभाव का अध्ययन करना।

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Learning Resources

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Suggestive digital platform web links:

Suggested Equivalent Online Courses:

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Suggested Academic Activities for Experiments for Students:

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Suggested Continuous Evaluation Methods:

Internal Assessment (आंतरिक मूल्यांकन)	Marks अंक	External Assessment (बाह्यमूल्यांकन मूल्यांकन)	Marks
Class Interaction/Quiz (कक्षा में संवाद / प्रश्नोत्तरी)	30	Viva on Voce practical. (मौखिकी वायवा)	70
Attendance (उपस्थिति)		Practical Record File (प्रायोगिकरिकॉर्डफाइल)	
Assignments (Charts/ Model Seminar. Rural Service/ Technology Dissemination/ Report of Excursion/ Lab Visits/ Survey/ Industrial visit) असाइनमेंट (चार्ट / मॉडल सेमिनार / ग्रामीण सेवा / प्रौद्योगिकी प्रसार / भ्रमण की रिपोर्ट / प्रयोगशाला दौरे / सर्वेक्षण / औद्योगिक दौरा)		Table work / Experiments (टेबलकप्रयोग)	
		Total (कुलअंक) = 100	
Any remarks/ suggestion:			

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