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. II 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 /कक्षा	:	**B.Sc. Second Year/** बी.एससी. द्वितीय वर्ष
Subject /विषय	:	**Biotechnology** / जैव–प्रोद्योगिकी
Title of Paper/ प्रश्नपत्र का शीर्षक	:	**Recombinant DNA Technology/** पुनः संयोजक डीएनए प्रौद्योगिकी
Course Type/कोर्स टाइप	:	**Core course/Major 2/Minor/Elective**
Paper/प्रश्नपत्र	:	**Second/** द्वितीय
Max Marks: अधिकतम अंक	:	**70 + 30** नियमित विद्यार्थी/ **Regular Student**
Min. Marks : न्यूनतम अंक	:	**33**
Credit Value	:	**04**

Course Learning Outcome:

1. The objectives of this course are to teach students with various approaches to conduct genetic engineering and their application in biological research as well as in biotechnology industries.
2. Genetic engineering is a technology that has been developed based on our fundamental understanding of the principles of molecular biology and this reflected in the contents of this course.
3. Given the impact of genetic engineering in modern society, the students should be endowed with strong theoretical knowledge of this technology.
4. Is conjunction with the practical in molecular biology and genetic engineering, the students should be able to take up biological research as well as placement in the relevant biotech industry.

Particular /विवरण

Unit-I	**The Basic Principles of Gene Cloning and DNA Analysis:** Introduction, History, the advent and importance of gene cloning and the polymerase chain reaction. Purification of DNA from living Cells. Manipulation of Purified DNA. Introduction of DNA into Living Cells. **Plasmids.**
इकाई 1	**जीन क्लोनिंग और डीएनए विश्लेषण के मूल सिद्धांत–** परिचय, इतिहास, जीन क्लोनिंग का आगमन और महत्व और पोलीकरेज चेन रिएक्शन, जीवित कोशिकाओं से डीएनए का शुद्धिकरण, शुद्ध डीएनए का हेरफेर, जीवित कोशिकाओं में डीएनए का परिचय, प्लास्मिड
Unit-II:	**Vectors for Cloning:** Cloning Vectors: PBR 322, Bacteriophage, Cosmid, Phagemid, Shuttle vectors Cloning Vectors for E coli, λ and other high capacity vectors, Cloning Vectors for Eukaryotes Genomics and cDNA Libraries.
इकाई 2	**क्लोनिंग के लिए वैक्टर–** क्लोनिंग वैक्टरः पीबीआर 322, बैक्टीरियोफेजण कॉस्मिड, फेजमिड, ई कोलाई, शटलवैक्टर और अन्य उच्च क्षमता वाले वैक्टर, युकेरियोट्स के लिए क्लोनिंग वैक्टर, जीनोमिक्स और सी –डीएनए लाइब्रेरी
Unit-III	**Enzymology of Genetic Manipulation:** Enzymes useful in molecular cloning, Restriction endonuclease, DNA Ligases, Polynucleotide kinase, Klenow enzyme, DNA Polymerase-I, reverse transcriptase, alkaline phosphatase, terminal nucleotidyltransferase

इकाई 3	आनुवांशिक हेरफेर की एंजाइमोलॉजी– आणविक क्लोनिंग में उपयोगी एंजाइमः प्रतिबंध एंडोन्यूक्लिज, डीएनए लाईगेज, पॉलीन्यूक्लियोटाइड काइनेज, क्लेनो एंजाइम, डीएनए पोलीमेरेज – 1, रिचर्व ट्रासक्रिपटेस, क्षारीय फास्फाटेज, टर्मिनल न्यूक्लियोटिडाइलट्रांसफेरेज
Unit-IV	**Gene Editing:** Gene Recombination and Gene Transfer: Bacterial Conjugation, Transformation, Transduction. Gene transfer techniques: Approaches gene silencing, Mutagenesis random, site directed. Knock-in, knock-out.
इकाई 4	**जीन संपादन – जीन पुनर्संयोजन और जीन स्थानांतरणः जीवाणु संयुग्मन, ट्रांसफॉर्मेशन, ट्रांसडक्शन, जीन स्थानांतरण तकनीकः** दृष्टिकोण, जीनसाइलेंसिंग, उत्परिवर्तनः यादृच्छिक, साइट निर्देशित, नॉक–इन, नॉक–आउट
Unit-V	**Application and Techniques of Gene Cloning:** Polymerase Chain Reaction and qPCR, labeling nucleic acids and blotting techniques (Southern, Northern, Western, Zooblot) DNA Sequencing. DNA Fingerprinting, Applications of recombinant, DNA technologies – Agriculture, Medicine, health.
इकाई 5	**जीन क्लोनिंग के अनुप्रयोग और तकनीक–** पॉलीमरेज चेन रिएक्शन और क्यू–पीसीआर न्यूक्लि एसिड और ब्लॉटिंग तकनीक को लेवल करना (दक्षिणी, उत्तरी, पश्चिमी, ज़ोब्लाट) डीएनए अनुक्रमण, डीएनए फिंगरप्रिंटिंग, पुनःसंयोजक, डीएनए प्रौद्योगिकियों के अनुप्रयोग – कृषि, चिकित्सा, स्वास्थ्य।

Suggested readings

1. Text Books of Biotechnology – By H.K. Das (Wiley Publications)
2. Text Books of Molecular Biology – By K.S. Sastry, G. Padmanabhan & C. Dubramanyam. Punl. Macmillan India.
3. Genes- By B. Lewin – Oxford Univ. Press
4. Molecular Biology & Biotechnology – By H.D. Kumar Publ. Vikas
5. Molecular Biology – By D. Freitelder, Publ. Narosa
6. Gene, Genomics and Genetics Engineering – By Irfan Ali Khan and Atiya Khanum (Ukaaz Publication)
7. Advanced Biotechnology – B.C. Dubey Books published by M.P. Hindi Granth Academy, Bhopal
8. Books published by M.P. Hindi Granth Academy, Bhopal

http://www.mphindigranthacademy.org/

Scheme of Marks: Suggested Continuous Evaluation Methods:

Maximum Marks: 100		
Continuous Comprehensive Evaluation 30 marks (CCE): Term End Exam Theory 70 marks		
Internal Assessment : Continuous Comprehensive Evaluation (CCE): **30 Marks**	There shall be 4 class tests of 10 marks each, out of which the 3 best scores are to be taken into account.	**10+10+10= 30**
External Assessment: Term End Exam (Theory) 70 **(Time : 03:00 Hrs.**	**Section (A) 10 Marks** **(a)** Objective questions – 5 **(b)** Very Short Answer type question – 5 (word limit 50 words) **Section (B) 24 Marks:** Short Answers Type Questions 1 question from each unit (word limit – 250 words) 4 to be attempted out of 7 given questions **Section (C) 36 Marks:** Long answer type questions (word limit 500 words) 4 to be attempted out of 7 given questions	**10 question 01 marks each - 10** **4 question 06 marks each - 24** **4 questions 09 marks each - 36**
		Total 70

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Particular / विवरण

List of practical

1. Isolation of DNA from Bacterial/Plant/Animal Cells.
2. Demonstration of Polymerase Chain Reaction.
3. Bacterial Transformation (Selection of transformation with blue white selection)
4. Demonstration of Southern Blotting.
5. Demonstration of Restriction Digestion of DNA
6. Demonstration of Conjugation
7. Demonstration of Transduction.

प्रयोग कार्यों की सूची–

1. जीवाणु / पादप / पशु कोशिकाओं में डीएनए की पृथक्करण।
2. पोलीमरेज़ चेन रिएक्शन का निरूपण।
3. जीवाणु रूपांतरण (ट्रांसफार्मेट का चयन – नीले सफेद चयन के साथ)।
4. दक्षिणी सोख्ता विरूपण।
5. डीएनए के प्रतिबंध पाचन का निरूपण।
6. संयुग्मन का निरूपण।
7. पारगमन का निरूपण।

Suggested readings

1. Molecular Biology & Biotechnology – By H.D. Kumar Publ. Vikas
2. Gene, Genomics and Genetics Engineering – By Irfan Ali Khan and Atiya Khanum (Ukaaz Publication)
3. Advanced Biotechnology – R.C. Dubey
4. Introductory Practical Biochemistry – By Sawheny and Singho Narosa Publication
5. Biochemistry A lab manual – By Farrell and Taylor, Cenage Learning
6. Laboratory manual on Biotechnology – By Sawheny, Rastogi Publication
7. Practical Microbiology – By Dubey and Maheshwar, S. Chand and co.
8. Trends in Molecular Biology and Biotechnology – By Srivstava, Srivstava and Tiwari, CBS Publication, Dehradun
9. Books published by M.P. Hindi Granth Academy, Bhopal

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Scheme of marks:

Suggested Continuous Evolution Methods			
Internal Assessment	Marks	External Assessment	Marks
Class Interaction/Quiz		Viva voce on Practical	
Attendance		Practical Record File	
Assignments (Charts/model/seminar/Rural Service/Technology Dissemination/Report/of Excursion/ Lab Visits/Survey/Industrial visit)		Table work/Experiment	
Total	**30**		**70**