



Sarva Vidyalaya Kelvani Mandal, Kadi Sanchalit  
**PRAMUKH SWAMI SCIENCE & H.D.PATEL ARTS COLLEGE, KADI**  
Re-Accredited with Grade 'A' by NAAC Third Cycle (CGPA 3.25)  
"College with Potential for Excellence" Phase I & II (2010-2019) by UGC,  
AAA Rank-1 by Govt. of Gujarat



# **PRAMUKH SWAMI SCIENCE & H D PATEL ARTS COLLEGE, KADI**

**Affiliated with**

**HEMCHANDRACHARYA NORTH GUJARAT  
UNIVERSITY, PATAN**

## **SCIENCE FACULTY**

**Department of Biotechnology**

**PSO & CO**



# **Pramukh Swami Science & H.D Patel Arts College, Kadi**

## **Department of Biotechnology**

### **Programme B.Sc. Biotechnology**

<b>Sr. No</b>	<b>On Completing B. Sc. Biotechnology, Student will be able to :</b>
<b>PSO 1</b>	Understand the scope and applications of biotechnology and acquire competence in the domain of Biotechnology to enable bright future prospects.
<b>PSO 2</b>	Demonstrate proficiency in specialized techniques and methodologies relevant to the field of biotechnology.
<b>PSO 3</b>	Acquire an ability to identify, formulate, analyze and solve scientific problems in various areas of Biotechnology and allied fields.
<b>PSO 4</b>	Develop ability to apply scientific research methodology and achieve ethical research aptitude.
<b>PSO 5</b>	Demonstrate awareness of current trends, advancements, and emerging technologies in biotechnology and related fields, and their potential impact on society and the environment.



**Pramukh Swami Science & H.D Patel Arts College, Kadi**  
**Department of Biotechnology**

**Course outcomes (Cos): B. Sc. Biotechnology**

**Semester I**

**Course Title: Introduction to Biotechnology**

**Course Code: SC23MJDSCBIO101**

<b>Sr. No</b>	<b>On Completing B. Sc. Biotechnology, Student will be able to :</b>	<b>PSOs Addressed</b>	<b>Cognitive Levels*</b>
<b>CO 1</b>	Course will help students in understanding basics of biotechnology and its applied areas.	1,5	R,U
<b>CO 2</b>	Students will understand use of biotechnology in Agriculture sector.	1,2,5	R,U
<b>CO 3</b>	Course targets application of biotechnology in human health care.	1,2,3	U,An
<b>CO 4</b>	Course aims to create basic understanding of use of biotechnology in resolution of various problems such as environmental pollution.	4,5	U,Ap

\*R- Remembering, U – Understanding , Ap- Applying, An- Analyzing , E- Evaluating, C- Creating



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**Semester II**

**Course Title: Cell Biology**

**Course Code: SC23MJDSCBIO201**

<b>Sr. No</b>	<b>On Completing B. Sc. Biotechnology, Student will be able to :</b>	<b>PSOs Addressed</b>	<b>Cognitive Levels</b>
<b>CO 1</b>	Students will understand the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially membranes, and organelles	1,5	R,U
<b>CO 2</b>	Students will understand how these cellular components are used to generate and utilize energy in cells	1,5	R,U
<b>CO 3</b>	Students will understand the cellular components underlying mitotic cell division.	1	U
<b>CO 4</b>	Students will apply their knowledge of cell biology to selected examples of changes or losses in cell function.	5	Ap

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**Semester III**

**Course Title: Concept of Metabolism**

**Course Code: SC23MJDSCBIO301**

<b>Sr. No</b>	<b>On Completing B. Sc. Biotechnology, Student will be able to :</b>	<b>PSOs Addressed</b>	<b>Cognitive Levels</b>
<b>CO 1</b>	The student studies here about the various cell metabolism concept	1	U
<b>CO 2</b>	understand enzyme kinetics; represent the equation in graphical forms; analyze factors that govern enzyme kinetics, thermodynamics	3	U,An,E
<b>CO 3</b>	Understand and recall various biochemical pathways associated with carbohydrates, lipids, nitrogenous bases and amino acids	1,3	R,U
<b>CO 4</b>	understand and compare mechanisms of ATP synthesis in plants and animals and discuss the interaction of transport system	3	U,An

\*R- Remembering, U – Understanding , Ap- Applying, An- Analyzing , E- Evaluating, C- Creating

**Semester III**

**Course Title: Food and Dairy Biotechnology**

**Course Code: SC23MJDSCBIO301A**

<b>Sr. No</b>	<b>On Completing B. Sc. Biotechnology, Student will be able to :</b>	<b>PSOs Addressed</b>	<b>Cognitive Levels</b>
<b>CO 1</b>	Discuss food fermentation processes, list the microbes involved and state their role in the fermentation process.	1,5	U
<b>CO 2</b>	explain different methods used for preservation of food and state their advantages and disadvantages	1	R,U
<b>CO 3</b>	food and milk borne diseases, categorize them and explain different methods used for detection, quantification or study of food borne pathogens	4,5	U,An
<b>CO 4</b>	Explain and discuss physical and chemical methods in microbial control and be able to distinguish between terms such as disinfection, sterilization and sanitation	5	U,Ap



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**Semester IV**

**Course Title: Industrial Biotechnology**

**Course Code: SC23MJDSBIO401**

<b>Sr. No</b>	<b>On Completing B. Sc. Biotechnology, Student will be able to :</b>	<b>PSOs Addressed</b>	<b>Cognitive Levels</b>
<b>CO 1</b>	The students will understand Industrial process and concept of screening, isolation and strain improvement	3,4,5	U,Ap,An
<b>CO 2</b>	Understanding the concept, design and working of fermentor and bioreactors	3,4	U,E,C
<b>CO 3</b>	Concept of bioreactor for a production process, suggest components of fermentation medium and design an experiment to isolate production strain.	3,4	U,E,C
<b>CO 4</b>	The students learn the Upstream and Downstream process of fermentation and Understanding of various fermentative products and their recovery.	1,2	U

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**Semester IV**

**Course Title: Molecular Biology**

**Course Code: SC23MJDSBIO401A**

<b>Sr. No</b>	<b>On Completing B. Sc. Biotechnology, Student will be able to :</b>	<b>PSOs Addressed</b>	<b>Cognitive Levels</b>
<b>CO 1</b>	Understanding structure and types of RNA and DNA, explain the evidence of DNA as genetic material	1,3	R,U
<b>CO 2</b>	Gain a fundamental understanding of the molecular mechanisms underlying major biological information processing pathways – DNA replication, transcription and translation – with a focus on prokaryotic system	1,3	U
<b>CO 3</b>	Concept of genetic codes, protein properties and translation in eukaryotic cells	1,3,4	U,An
<b>CO 4</b>	Discuss and understanding of gene transfer method in bacteria	4,5	U,An



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**Semester V**

**Course Title: PRINCIPLES OF MOLECULAR BIOLOGY**

**Course Code: BT-501**

<b>Sr. No</b>	<b>On Completing B. Sc. Biotechnology, Student will be able to :</b>	<b>PSOs Addressed</b>	<b>Cognitive Levels</b>
<b>CO 1</b>	Describe the structures and functions of nucleic acids (DNA and RNA) and proteins; Explain the molecular basis of gene expression and regulation.	1,5	U,An
<b>CO 2</b>	Illustrate the processes of DNA replication, transcription, and translation.	1,5	U,C
<b>CO 3</b>	Develop an understanding of the molecular basis of mutations, the mechanisms of action of mutagenic agents and how these lead to human genetic disorders.	4,5	U,Ap,E
<b>CO 4</b>	The course outcome is to train the students in understanding genetics and relate modern DNA technology for disease diagnostics and therapy	1,2,4,5	U,Ap,An

**Semester V**

**Course Title: IMMUNOLOGY**

**Course Code: BT-502**

<b>Sr. No</b>	<b>On Completing B. Sc. Biotechnology, Student will be able to :</b>	<b>PSOs Addressed</b>	<b>Cognitive Levels</b>
<b>CO 1</b>	Identify the cellular and molecular basis of immune responsiveness; and understand the roles of the immune system in both maintaining health and contributing to disease.	1,3	R,U
<b>CO 2</b>	Comprehend, compare and contrast the key mechanisms and cellular players of innate and adaptive immunity and their coordination in fighting invading pathogens.	1	R,U
<b>CO 3</b>	Outline key events and cellular players in antigen presentation and immunological events as seen in transplantation and allergic reactions.	1,2,4	U,Ap,E
<b>CO 4</b>	Explain the mechanisms involved in immune system alterations and comprehend the function of vaccines and immunotherapy.	3,4,5	An,E,C



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**Semester V**

**Course Title: PLANT BIOTECHNOLOGY**

**Course Code: BT-503**

<b>Sr. No</b>	<b>On Completing B. Sc. Biotechnology, Student will be able to :</b>	<b>PSOs Addressed</b>	<b>Cognitive Levels</b>
<b>CO 1</b>	Explain the principles of plant biotechnology and its relevance to agriculture and industry, markers.	1,5	U,An,Ap
<b>CO 2</b>	Describe the key techniques and tools used in plant biotechnology, such as genetic modification, tissue culture, and molecular	3,4,5	An,E
<b>CO 3</b>	Utilize molecular biology techniques to enhance traits such as resistance to pests, diseases, and environmental stress.	1,4,5	Ap,An,C
<b>CO 4</b>	Discuss the ethical, environmental, and regulatory considerations associated with plant biotechnology. Evaluate the implications of genetically modified organisms (GMOs) in agriculture and food systems.	4,5	U,E

**Semester V**

**Course Title: ENVIRONMENT BIOTECHNOLOGY**

**Course Code: BT-504**

<b>Sr. No</b>	<b>On Completing B. Sc. Biotechnology, Student will be able to :</b>	<b>PSOs Addressed</b>	<b>Cognitive Levels</b>
<b>CO 1</b>	The student studies here The Environmental issues related to biotechnology.	1,5	U,An
<b>CO 2</b>	Discuss treatment of solid waste management and bioremediation	4,5	An,Ap,E
<b>CO 3</b>	The student studies here waste water treatment and solid waste treatment.	2,3,4	An,Ap,C
<b>CO 4</b>	The student studies here Biofertilizer, Biopesticide and Bioremediation process.	4,5	An,Ap,E,C





**Pramukh Swami Science & H.D Patel Arts College, Kadi**  
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**Semester VI**

**Course Title: INDUSTRIAL BIOTECHNOLOGY**

**Course Code: BT-601**

<b>Sr. No</b>	<b>On Completing B. Sc. Biotechnology, Student will be able to :</b>	<b>PSOs Addressed</b>	<b>Cognitive Levels</b>
<b>CO 1</b>	The students will understand Industrial process and its concept for production of various biomolecules by the use of microbes	1,2,5	U
<b>CO 2</b>	Concept of bioreactor for a production process, suggest components of fermentation medium and design an experiment to isolate production strain.	1,2,5	U,Ap
<b>CO 3</b>	The students learn the Upstream and Downstream process of fermentation	2,5	U,Ap,E,C
<b>CO 4</b>	Understanding of various fermentative products and their recovery.	2,4	U,An

**Semester VI**

**Course Title: FUNDAMENTALS OF r-DNA TECHNOLOGY**

**Course Code: BT- 602**

<b>Sr. No</b>	<b>On Completing B. Sc. Biotechnology, Student will be able to :</b>	<b>PSOs Addressed</b>	<b>Cognitive Levels</b>
<b>CO 1</b>	Understand the fundamental concepts in recombinant DNA technology	1,2	R,U
<b>CO 2</b>	Understanding concepts of enzymes, techniques and steps involved in gene cloning.	2,3,4	An,Ap
<b>CO 3</b>	Understanding Various advance techniques of molecular biology	2,3	U
<b>CO 4</b>	The student studies here various Application of rDNA Technology.	2,5	Ap,E,C



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**Semester VI**

**Course Title: ANIMAL BIOTECHNOLOGY**

**Course Code: BT-603 (PAPER - XIII)**

<b>Sr. No</b>	<b>On Completing B. Sc. Biotechnology, Student will be able to :</b>	<b>PSOs Addressed</b>	<b>Cognitive Levels</b>
<b>CO 1</b>	To introduce a detailed achievements of Biotechnology, Genetic Engineering and r-DNA technology principles	1,5	U,An
<b>CO 2</b>	Understanding concepts of various cell cultures and cell lines	2,3,4	U,Ap
<b>CO 3</b>	To apply principles of Biotechnology concepts in veterinary sciences i.e. production of Transgenic animals, Artificial insemination, <i>In vitro</i> fertilization, Embryo transfer technology	2,3,4,5	An,Ap, C
<b>CO 4</b>	Understanding stem cell techniques and hybridoma technology	2,5	U,An,Ap

**Semester VI**

**Course Title: SUBJECT:- MICROBIAL GENETICS & BIOINFORMATICS**

**Course Code: BT-604 (PAPER - XIV)**

<b>Sr. No</b>	<b>On Completing B. Sc. Biotechnology, Student will be able to :</b>	<b>PSOs Addressed</b>	<b>Cognitive Levels</b>
<b>CO 1</b>	Understand the principles of microbial genetic and Bioinformatics. Its applications in biotechnology.	1,4,5	U,An
<b>CO 2</b>	Study of genetic material including conventional and updated methods of genomic studies for nuclear and mitochondrial genetic elements, coding and non-coding DNA and RNA.	2	U,An,Ap
<b>CO 3</b>	Analyze and interpret experimental data using statistical methods and bioinformatics tools. Design and execute independent research projects in biotechnology.	3,4	An,Ap,E,C