	<b>Pithapur Rajah's Government College(Autonomous)Kakinada</b>	<b>Program &amp;Semester II B.Sc Semester -III</b>			
CourseCode	<b>IMMUNOLOGY AND rDNA TECHNOLOGY</b>				
Teaching	<b>Hours Allocated: 60 (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
Pre-requisites:		3	1	-	4

### Course Objectives:

To acquaint students with concepts of immunology and recombinant DNA technology. This course is aimed to give an understanding of the basics of immunology dealing cells and organs of the immune system, types of immune responses, antigen-antibody interactions, vaccines and tools, techniques and strategies and applications of genetic engineering.

### Outcomes:

On Completion of the course, the students will be able to-

CO1	The course will provide an insight into basic aspects of immunology and rDNA technology.
CO2	Course will provide sound knowledge of how immune system deals with various pathogens, different processes and cell types involved in prevention of disease.
CO3	Understand the mechanism of action and the use of restriction enzymes in biotechnology research and recombinant protein production.
CO4	Explain the steps of a bacterial transformation and various selection processes for identifying transformants

SkillDevelopment		Employability		Entrepreneurship	
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### Syllabus:

#### UNIT-I:

##### Cells and Organs of the Immune System:

- 1.1 Hematopoiesis, Types of Immunity.
- 1.2 Cells and organs of the immune system.
- 1.3 Antigen, Hapten, Role and properties of adjuvants.
- 1.4 Structure and types of Antibody. Introduction to complement components.
- 1.5 Antigen and antibody interactions - precipitation, agglutination, immune diffusion and ELISA.

## **UNIT-II:**

### **Hybridoma technology, Hypersensitivity and Vaccines:**

2.1 MHC: Types.

2.2 Hybridoma technology.

2.3 Monoclonal antibodies and their application.

2.4 Introduction to Hypersensitivity and auto immunity,

2.5 Vaccines - Live, killed, attenuated, subunit and recombinant vaccines

## **UNIT-III:**

### **Tools and Techniques of rDNA Technology:**

3.1 Introduction to rDNA technology, Steps involved in cloning

3.2 Tools of genetic engineering (Enzymes – restriction endonucleases and DNA Ligase, Hosts bacteria and yeast Genes,

3.3 Cloning vectors - plasmids and Cosmids,.

3.4 Methods of transformation, recombinant selection and screening methods – Blue-White Screening

3.5 Construction of Genomic and cDNA libraries.

## **UNIT-IV:**

### **Cloning Strategies and Application of rDNA Technology:**

4.1 Principles and application of PCR.

4.2 Blotting techniques - Southern Blotting,

4.3 Northern and Western Blotting.

4.4 Introduction to DNA sequencing (Sanger Sequencing).

4.5 DNA fingerprinting.

## **UNIT – V**

### **Bioinformatics:**

5.1 Nucleotide and protein Databases (PubMed, NCBI, EMBL and ExPASy)

5.2 BLAST

5.3 FASTA.

5.4 Phylogenetic tree construction.

5.5 Introduction to omics (proteomics, genomics and transcriptomics)

### Textbooks

1. Kuby immunology, Judy Owen, Jenni Punt, Sharon Stranford., 7th edition (2012), Freeman and Co., NY
2. Introduction to Immunology- 2002, C. V. Rao- Narosa Publishing House
3. Molecular Biology - 4 th Edition, 2008, By D. Freifelder, Publ: Narosa Publishinghouse New York, Delhi


### Referencebooks:

1. Kuby immunology, Judy Owen, Jenni Punt, Sharon Stranford., 7th edition (2012), Freeman and Co., NY
2. Genes VII- 2000, By B. Lewin - Oxford Univ. Press
3. Glick, B.R., Pasternak, J.J. (2003). Molecular Biotechnology- Principles and Applications of recombinant DNA. ASM Press, Washington

### CO-POMapping:

(1:Slight[Low]; 2:Moderate[Medium]; 3:Substantial[High],;No Correlation]

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
C01	3	2	3	2	3	3	3	2	1	2	1	3
C02	3	2	3	3	2	3	2	2	1	2	1	3
C03	3	2	2	2	3	3	3	1	2	2	1	3
C04	2	3	2	3	2	2	2	1	3	3	1	3

	<b>Pithapur Rajah's Government College(Autonomous)Kakinada</b>	<b>Program &amp;Semester II B.Sc Semester -III</b>			
Course Code	IMMUNOLOGY AND rDNA TECHNOLOGY				
Teaching	<b>Hours Allocated: 30 (Lab)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
Pre-requisites:		-	-	2	1

### Course 3: Immunology and rDNA technology Lab

Total Hours: 30

Credits: 1

List of Practical: -

1. Determination of Blood Groups
2. Pregnancy test
3. Widal test
4. Ouchterlony immunodiffusion
5. Radial immune diffusion
6. ELISA
7. Production of antibodies (theory exercise)
8. Bleeding, separation of serum and storage
9. Lymphoid organs (theory exercise)
10. Isolation of plasmid DNA (alkaline lysis method)
11. Analysis of plasmid DNA by Agarose gel electrophoresis
12. Southern blotting (theory exercise)
13. PCR Amplification (theory exercise)