

**RAYALASEEMA UNIVERSITY**  
**ZOOLOGY SYLLABUS FOR SEMESTER - IV -2022-23**  
**PAPER - 5: IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY**

**HOURS: 60 (5X12)**

**Marks: 100**

**Unit - I Immunology - I (Overview of Immune system)**

- 1.1 Introduction to basic concepts in Immunology
- 1.2 Innate and adaptive immunity,
- 1.3 Cells of immune system
- 1.4 Organs of immune system

**Unit - II Immunology - II (Antigens, Antibodies, MHC and Hypersensitivity)**

- 2.1 Antigens: Basic properties of antigens, B and T cell epitopes, haptens and adjuvants; Factors influencing immunogenicity
- 2.2 Antibodies: Structure of antibody, Classes and functions of antibodies
- 2.3 Hypersensitivity – Classification and Types

**Unit - III Techniques**

- 3.1 Animal Cell, Tissue and Organ culture media: Natural and Synthetic media,
- 3.2 Cell cultures: Establishment of cell culture (primary culture, secondary culture, types of cell lines; Protocols for Primary Cell Culture); Organ culture; Cryopreservation of cultures
- 3.3 Stem cells: Types of stem cells and applications
- 3.4 Hybridoma Technology: Production & applications of Monoclonal antibodies (mAb)

**Unit-IV Applications of Animal Biotechnology**

- 4.1 Genetic Engineering: Basic concept, Vectors, Restriction Endonucleases and Recombinant DNA technology
- 4.2 Gene delivery : Microinjection, electroporation, biolistic method (gene gun), liposome and viral-mediated gene delivery
- 4.3 Manipulation of reproduction in animals: Artificial Insemination, *In vitro* fertilization, super ovulation, Embryo transfer, Embryo cloning

**Unit - V**

- 5.1. PCR: Basics of PCR.
- 5.2 DNA Sequencing: Sanger's method of DNA sequencing- traditional and automated sequencing
- 5.3 Fermentation: Different types of Fermentation and Downstream processing; Agriculture:

**PRACTICAL SYLLABUS**

**I. IMMUNOLOGY**

1. Demonstration of lymphoid organs (as per UGC guidelines)
2. Histological study of spleen, thymus and lymph nodes (through prepared slides)
3. Blood group determination
4. Demonstration of a. ELISA b. Immunoelectrophoresis

**II. Animal biotechnology**

1. DNA quantification using DPA Method.
2. Techniques: Western Blot, Southern Hybridization, DNA Fingerprinting
3. Separation, Purification of biological compounds by paper, Thin-layer and Column chromatography
4. Cleaning and sterilization of glass and plastic wares for cell culture.
5. Preparation of culture media.