

MAHARANI LAKSHMI AMMANI COLLEGE FOR WOMEN

DIPLOMA COURSE IN MOLECULAR TECHNIQUES

Prerequisite: Certificate in molecular techniques

Total hours: 160

Course structure

| Module | Title | Theory hours | Practical hours | Total hours |
|--------|---------------------|--------------|-----------------|-------------|
| I | Immunotechniques | 30 | 35 | 65 |
| II | Plant Biotechnology | 20 | 15 | 35 |
| III | Project | | 50 | 100 |

DIPLOMA COURSE IN MOLECULAR TECHNIQUES

COURSE SPECIFIC OUTCOME:

Upon completion of Module I:

The student would be able to understand the concept and applications of various immunological tests routine in molecular diagnostic lab.

The student would be able to learn practical skill related to Plant biotechnology and understand significance with respect to plant tissue culture industry.

Module I: **Immunotechniques**

30h

- **Introduction to immune system:** Anatomical barriers, innate and acquired immunity, nonspecific host defense mechanism, phagocytosis, cells of immune system, humoral and cell-mediated immunity, T & B lymphocytes, T & B cell interaction. Major histocompatibility complex.
- **Complement systems:** introduction, alternate and classical pathway and its regulation.
- **Immunoglobulins:** Structure and functions of immunoglobulins. Types of immunoglobulins, methods of raising antibodies, antibody production in rabbits. Monoclonal antibodies-production and purification. Theories of antibody formation, clonal selection, germ line and somatic mutation theory. MHC and TCR gene organization. Class switch of Ig genes.
- **Antigen antibody interactions:** Affinity and avidity, precipitation and agglutination reactions, characterization of antigens, principle and types of ELISA, applications of ELISA and RIA.

COURSE SPECIFIC OUTCOME:

Upon completion of Module II:

The student would be able to learn practical skill related to Plant biotechnology and understand significance with respect to plant tissue culture industry.

Module II: **Plant biotechnology**

20h

- Introduction to cell and tissue culture. Plant tissue culture media, preparation of suitable explant. Protoplast isolation and fusion. Synthetic seed preparation. Plant transformation techniques: Agrobacterium mediated gene transfer. Ti and Ri plasmids.

Practical

60 h

Immunotechniques

35h

- Production of immune sera, qualitative and quantitative assay of immunoglobulins, purification of Immunoglobulins by ion-exchange and affinity chromatography.
- Ag-Ab interactions: Immunodiffusion- ODD, RID, agglutination reactions- Direct and indirect agglutination reactions, bacterial agglutinations reactions, WIDAL, VDRL, blood typing, immunoelectrophoresis, rocket immunoelectrophoresis. ELISA: direct, indirect and sandwich ELISA. Labelling of antibodies with Biotin, Alkaline Phosphatase, HRP. Western blotting.

Plant biotechnology:

15h

- Preparation of plant culture media, organ culture: shoot tip, nodal and leaf culture, protoplast isolation, culture and fusion, callus culture: initiation and regeneration, synthetic seed preparation,

COURSE OUTCOME:

Upon completion of Module III:

- Students will be able to do projects which help them to get better understanding on topics and gain interest towards research.
- Active involvement of students in planning and execution of the project

Module III:

- **Project** **50h**