

**3205**  
**THIRD YEAR B.Sc. Botany**

**MOLECULAR BIOLOGY AND BIOTECHNOLOGY**

**Unit-1**

Bacterial genome. Methods of genetic recombination in bacteria (Transformation, Transduction and Conjugation). Principles of recombinant DNA technology. Basic tools and techniques. *Neurospora* genetics. Molecular aspects of biological nitrogen fixation.

**-10 hours**

**Unit-2**

Structure, chemistry and types of nucleic acids. Replication of DNA. Central dogma, transcription and translation, genetic code. Gene regulation - operon model, twocomponent regulatory system.

**-10 hours**

**Unit-3**

History of plant tissue culture, contribution made by Haberlandt, White, Nobecourt, Gautheret, Steward, Reinert, Morel and Vasil. Highlights of work done by Indian Scientists.

Basic tools and techniques of plant tissue culture, maintenance of aseptic conditions, Laminar Air Flow Bench, Autoclave, Growth Chamber, methods of sterilization, culture media and their preparation.

**-10 hours**

**Unit-4**

Explant types, initiation of cultures, maintenance of cultures, callus and liquid suspension culture, single cell culture, protoplast isolation, purification, culture and regeneration. Regeneration *in vitro* through organogenesis, somatic embryogenesis, androgenesis and haploid production.

**-10 hours**

**Unit-5**

Methods of gene transfer in plants - microinjection, electroporation, particle - gun technology, *Agrobacterium*-mediated gene transfer. Plant tissue culture in Industry. Secondary plant products with special reference to alkaloids. Prospects of drug production in cell cultures and Bioreactor.

**-10 hours**

**Note:**

The paper setter is required to set questions of 3 types contained in 3 Sections (**Section A-** 10 questions, **Section B-** 10 questions and **Section C-** 4 questions) from the 5 units of

each paper. There will be 10 questions in **Section A** which will be asked from all the 5 units, i.e., 2 questions from each unit. These questions have to be answered in one word or a few words only. Each question will be of half mark. All the questions in **Section A** are compulsory. In **Section B**, 10 questions will be set from the 5 units, i.e., 2 questions from each unit. Students are required to attempt at least 1 question from each unit. Each question will carry 5 marks. The answers of each question should be given in about 250 words. In **Section C** there will be 4 descriptive type questions set from all the 5 units, not more than 1 question from each unit. These questions may also have sub-divisions. The students are required to answer 2 questions, each in approximately 500 words. Each question will carry 10 marks.

In short, pattern of question paper and distribution of marks for UG classes will be as under:

- **Section A:** 10 questions, 2 questions from each unit, short answer, all questions compulsory. Total marks : **05**
- **Section B:** 10 questions, 2 question from each unit, 5 question to be attempted, at least 1 from each unit, answer approximately in 250 words. Total marks : **25**
- **Section C:** 04 questions (question may have sub-division), not more than 1 question from each unit, descriptive type, answer in about 500 words, 2 questions to be attempted. Total marks : **20**