

**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 one 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 10 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 subdivisions. The students are required to answer 2 questions, each in approximately 500 words. Each question will carry 20 marks .

**PAPER-II**  
**CYTOLOGY, GENETICS AND MOLECULAR**  
**BIOLOGY**

**Duration: 3 hrs.**

**M.M.: 100**

**UNIT – I**

Structure of pro- and eukaryotic cells; membrane structure and function, intra-cellular compartments, protein sorting, secretory and endocytotic pathways; cytoskeleton; mitochondria and chloroplast and their genetic organization.

Nucleus, cell cycle, C-value paradox; chromatin; structure, types, organisation and chemistry of the chromosome. Polytene, lambrush and B-chromosomes. Numerical and structural changes in chromosomes.

**UNIT – II**

Linkage and crossing over, cytological basis of crossing over, linkage and gene mapping, linked gene inheritances.

Mutation-molecular basis of spontaneous and induced mutations. Their role in plant breeding and evolution. Environmental mutagenesis and toxicity testing, Transposons and their significance. Reverse genetics.

**UNIT – III**

Classical concepts in genetics.

Genetic material: Structure, chemical composition, organization and replication, reverse transcription, artificial chromosomes, repetitive DNA.

Gene expression; transcription and its regulation in prokaryotes and eukaryotes, genetic code, operon theory; positive and negative control, attenuation and anti-termination controls.

#### UNIT – IV

The control sequences; operator, promoter, terminator, attenuator, enhancers, cis-acting elements and transacting factors, tissue-specific gene expression, translation.

Recombination: general and site specific recombination; role of Rec A protein, DNA damage and repair.

#### UNIT – V

Gene transfer in prokaryotes and eukaryotes: natural and artificial methods.

Coding and non-coding sequences, satellite DNA. RNA processing (capping, polyadenylation, splicing, introns and exons). Ribonucleoproteins, structure of mRNA.

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