

M.Sc. Botany
(Semester-III)

MBOTCC-10: Cell Biology & Cytogenetics (5 Credits)

Time: 3hrs

Marks: 70

The question paper will consist of 7 questions divided into 3 sections.

Section A: Question No.1 will be compulsory comprising ten objective type questions (two from each Unit) each carrying two marks (10x2=20 marks).

Section B: Question No. 2 will also be compulsory and comprises five short answer type questions (one from each Unit) and students will have to attempt only four questions (4 x 5=20marks).

Section C: Five long answer type questions are to be set (two from each Unit) of which any three questions are to be answered (3 x 10=30 marks).

Unit-I

Cell theory and organization of the cell (Prokaryotic and Eukaryotic)

Ultrastructure chemical composition of the following:

Cell wall, Plasma membrane, Cytoplasm and cytoplasmic organelles (origin, ultrastructure & function: Plastids, Mitochondria, Endoplasmic reticulum, ribosomes, Golgi complex, Lysosomes, Peroxisomes and Centrosomes)

Unit-II

Nucleus: Nuclear membrane, nuclear pore, nucleolus and karyolymp

Cell division, Cell cycle and apoptosis, Control mechanism, cytokinesis and cell plate formation

Unit-III

Chromosome; Organization and special types

Mendelian genetics

Gene interaction

Sex determination

Unit-IV

Extrachromosomal inheritance

Chromosomal aberration, polyploidy-types and role in speciation

Mutation- Molecular mechanism, induction by physical and chemical mutagens

Unit- V

Population Genetics

Microscopy: Phase contrast microscopy, Electron microscopy (SEM and TEM), Fluorescence microscopy

Microdensitometry

Alam
27/11/19

J. K. Singh
29/11/19

Abhishek
25/11/19

Anu R. Singh
27/11/19

Amey
28/11/19

Anu
27/11/19

gimbo
27/11/19

M.Sc. Botany
(Semester-III)

MBOTCC-11: Molecular Biology (5 Credits)

Time: 3hrs

Marks: 70

The question paper will consist of 7 questions divided into 3 sections.

Section A: Question No. 1 will be compulsory comprising ten objective type questions (two from each Unit) each carrying two marks (10x2=20 marks).

Section B: Question No. 2 will also be compulsory and comprise five short answer type questions (one from each Unit) and students will have to attempt only four questions (4 x 5=20marks).

Section C: Five long answer type questions are to be set (one from each Unit) of which any three questions are to be answered (3 x 10=30 marks).

Unit I

Organization of DNA: Nucleic acids as hereditary material; Structure and forms of DNA and RNA, double helix, supercoiling of DNA, Packaging of DNA in Prokaryotes and eukaryotes

Unit II

DNA replication: DNA replication models; Mechanism of DNA replication
DNA damage and repair mechanisms; Different types of DNA damage and repair mechanisms; Diseases caused due to impairment in repair mechanism

Unit III

Transcription: Importance of DNA binding Proteins, RNA polymerase-types, structure and functions; Mechanism of Transcription in prokaryotes & Eukaryotes; Processing of RNA: m-RNA processing, 5' capping, 3' polyadenylation, splicing t-RNA & r-RNA processing
Genetic code: Cracking of code; characteristics

Unit IV

Translation: Machinery and mechanism in prokaryotes and eukaryotes; role of t-RNA & ribosome; Post translational modification of proteins such as phosphorylation, acetylation, acylation and glycosylation

Unit V

Regulation of gene expression: Prokaryotes- Positive and negative control, inducible and repressible operons, lac operon, trp operon

Eukaryotes- Regulation at DNA, transcription, translation and post translational level

Antisense technology: Molecular mechanism of antisense molecules, application of antisense technologies.

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M.Sc. Botany
(Semester-III)

MBOTCC-11: Recombinant DNA Technology (5 Credits)

Time: 3hrs

Mark: 70

The question paper will consist of 7 questions divided into 3 sections.

Section A: Question No. 1 will be compulsory comprising ten objective type questions (two from each Unit) each carrying two marks (10x2=20 marks).

Section B: Question No. 2 will also be compulsory and comprise five short answer type questions (one from each Unit) and students will have to attempt only four questions (4 x 5=20marks).

Section C: Five long answer type questions are to be set (one from each Unit) of which any three questions are to be answered (3 x 10=30 marks).

Unit I

rDNA technology: Techniques used in RDT: Polyacrylamide and agarose gel electrophoresis Blotting techniques: Southern, Northern and Western Blotting Polymerase chain reaction and its applications, DNA sequencing: Various methods of DNA sequencing

Unit II

Core techniques and essential enzymes: Restriction enzymes-types and cleavage pattern; DNA ligase- types and ligation of DNA molecule *in vitro*
Cloning vectors: Plasmids (natural, pBR322, λ phage) vectors), phages, cosmid, artificial chromosome vector, Shuttle vectors; Expression vector

Unit III

Passager DNA: Different strategies used for isolation/synthesis of gene; Organ chemical synthesis of gene; Construction of genomic and cDNA libraries
Construction of rDNA: Different strategies for construction of rDNA (Use of restriction enzymes, Linkers, Adaptors, Homopolymer tailing)

Unit IV

Selection strategies: Different methods for selection of clone (antibiotic resistant markers, colony hybridization, plaque hybridization, immune screening)

Methods of DNA transfer in suitable host: electroporation, electroporation, microinjection, particle gun method, **Basic tools of DNA (CaCl₂) method-I, liposomes as transforming vehicle**
Expression of foreign gene

Unit V

Application of rDNA technology: In medicine, agriculture and environment protection

DNA finger printing: Methodology and its application

Intellectual property rights, biethics and patenting: IPR, sovereignty rights, CBD, biethics and patenting

Safety of recombinant DNA technology: Restriction and regulation for the release of GMOs; Social and ethical issue

Almas
7/3/19

Jalaram
24/06/18

14/06/18

21/3/19

M. A. Geo.
7-3-19

7-3-19

Unit-IV

Environmental Pollution: Air, Water, Soil, waste radioactive and noise pollution; Global warming; green house effect; O₃ depletion; Climate change

Unit-V

Environmental Awareness: Man and Biosphere (MAB); International Union for Conservation of Nature and Natural Resources (IUCN); United Nations Environment Programme (UNEP); World Environmental Day; Wildlife Preservation Act (1972); Indian Forest Conservation Act (1989)

MBOTCC-14: Practical 3 (Based on MBOTCC 5, 6, 7, 8 & 9) (5 Credits)

Time: 3 hrs

Marks: 70

1. Principle and use of different modern instruments used in Botany.
2. Cytological techniques: Preparation of cytological stains, fixation of sample etc.
3. Mitotic slide preparation of common plant.
4. Meiotic slide preparation of common plant.
5. Karyotype analysis.
6. Calculation of cell cycle frequency.
7. Isolation of antibiotic resistant mutant by auxanography technique.
8. Isolation of genomic DNA from cauliflower.
9. Spectrophotometric estimation of DNA by diphenyl method.
10. Separation of DNA by agarose gel electrophoresis.
11. Demonstration of amplification of DNA using PCR.
12. Study of local vegetation by quadrat method.
13. Study of ecological adaptations (Morphological and anatomical) in plants.
14. Water analysis for pollution studies (Dissolved Oxygen, BOD, Dissolved Carbon dioxide, Chloride, Alkalinity etc.)

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