

BOTANY M.Sc SYLLABUS

SEMESTER SYSTEM

Semester-Four

<u>Paper</u>	<u>Name of Paper</u>	<u>Max Marks</u>
Paper-I	: Molecular Genetics, Genetic Engineering and Biotechnology	50
Paper-II	: Plant resource Utilization and Conservation	50
Paper-III	: Biostatistics, Cytology and Plant Breeding	50
Paper-IV	: Dissertation based on Elective papers of III rd semester	50

Note : The allotment of the topic of dissertation shall be done at the beginning of **semester- Three** when the student opts for electives.

Practicals : Their shall be two practical examinations-

Practical- 1 : Based on Ist, IInd and IIIrd (General) papers having 75 maximum marks.

Practical- 2 : This will consist of viva-voce on dissertation having 25 maximum marks.

3. समिति ने निश्चय किया कि **dissertation** का मूल्यांकन चतुर्थ सेमेस्टर की समाप्ति पर वाहय एवं आंतरिक परीक्षक द्वारा मौखिकी परीक्षक के साथ की जायेगी।
4. समिति ने यह भी निश्चय किया कि **Elective Papers** का आवंटन छात्र द्वारा दी गयी वरीयता एवं उनके द्वारा प्राप्त प्रथम वर्ष के अकों के आधार पर किया जायेगा।
5. सत्र 2009 2010 की परीक्षा हेतु प्रधान परीक्षकों तथा प्रायोगिक परीक्षकों की सूचि तैयार की गयी।
6. निम्नलिखित शोधकर्ताओं के पी0 एच0 डी0 थीसिस के मूल्यांकन हेतु परीक्षकों की सूचि तैयार की गयी है।

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| 1. श्रीमती अनिता गौतम | 10. श्री उदयभान प्रजापति |
| 2. कु0 अमिता सिंह | 11. श्री हादी हसन |
| 3. श्री कौशल कुमार | 12. कु0 श्वेता पाण्डेय |
| 4. श्री अनिल कुमार | 13. श्री नवीन कुमार पाण्डेय |
| 5. श्री धनंजय मणि त्रिपाठी | 14. कु0 शुभ्रा बनर्जी |
| 6. कु0 प्रियंका प्रधान | 15. कु0 अनिता कुमारी |
| 7. कु0 सपना गुप्ता | 16. कु0 दिव्या सिंह |
| 8. कु0 पल्लवी शर्मा | 17. श्री राकेश कुमार |
| 9. श्री राहुल सिंह | 18. कु0 आश्रिता गौतम |

BOTANY M.Sc. SYLLABUS

FOURTH SEMESTER

SEMESTER-IV

PAPER-I: MOLECULAR, GENETICS, GENETIC ENGINEERING AND BIOTECHNOLOGY:

- 1. Nucleic acids:** Structure and form of DNA, Circular DNA in bacteria and chloroplast, packaging of DNA, DNA melting (T_m), DNA annealing, cot curves, repetitive, unique and satellite DNA, C- value paradox.
- 2. Gene Replication:** DNA replication in prokaryotes and eukaryotes (initiation, elongation and termination).
- 3. Gene Mutation:** Mutagenic agents, mechanisms of mutagenesis, DNA damage and repair mechanism, uses of mutation.
- 4. Gene Recombination:** Mechanism of recombination in viruses, bacteria and fungi.
- 5. Genetic Code:** Codon assignment, code in mitochondria, second genetic code, initiation and termination codons.
- 6. Gene Expression:** Mechanism of transcription and translation in eukaryotes (initiation, elongation and termination).
- 7. Regulation of Gene Expression:** Concept of operon, Tryptophan and Arabinose operons, eukaryotic operon (Britten and Davidson model).
- 8. Genetic Engineering:** Enzymes (Endonucleases, Ligases) and vector viz., plasmids phages, cosmids and *Agrobacterium* spp., recombinant DNA technology (gene cloning), gene isolation and sequencing, PCR.
- 9. Tissue and Organ Culture:** Micropropagation somaclonal variation, haploid production, protoplast culture and somatic hybridization.
- 10. Application of biotechnology in agriculture.**

Practical

1. Isolation of plasmid DNA.
2. Preparation of genomic DNA from bacteria.
3. Preparation of agarose gel.
4. DNA detection of gel electrophoresis.
5. Preparation of standard curve for RNA.
6. Colorimetric estimation of RNA content in given RNA solution.
7. Preparation of standard curve for DNA.
8. Nitrous acid mutagenesis in *Aspergillus nidulans*.
9. Isolation of milk protein.
10. Isolation of protoplasts from plant tissue and demonstration of somatic fusion.
11. Preparation of spawn and substrate for mushroom cultivation.

SEMESTER-IV

PAPER- II: PLANT RESOURCE UTILIZATION AND CONSERVATION

A. PLANT RESOURCE UTILIZATION:

1. Plant biodiversity for Man and their importance.
2. Botanical names, families, morphology of the past used, mode of extraction, nature and economic importance with reference to the following:
 - a. Cereals: Wheat, Rice, Maize.
 - b. Legumes and Pulses.
 - c. Forage crops.
 - d. Fiber plants and their products.
 - e. Medicinal plants.
 - f. Beverage yielding plants.
 - g. Important wood and timber yielding plants.
 - h. Sugar and sugar yielding plants.
 - i. Tropical and subtropical fruits.
 - j. Spices and flavoring materials.
 - k. Vegetables.
 - l. Drugs and narcotics.
 - m. Gum and dye yielding plants.
 - n. Latex yielding plants.
 - o. Fumitories and mastigatories.
 - p. Insecticide yielding plants.
3. Origin of cultivated plants: Center of origin, criteria and Vavilov's center of origin.
4. Botanical, origin and cultivation of wheat, rice, maize, sugarcane, mustard and potato.
5. History, Botany, cultivation and processing of tea/ coffee, tobacco and rubber.

B. CONSERVATION:

1. Principles of conservation.
2. *In situ* conservation: Sanctuaries, national parks, biosphere reserves, wet lands, mangroves and coral reef.
3. *Ex-situ* conservation: principles and practices, National seed corporation (NSC), Botanic gardens, role and impact of NSC, botanical survey of India (BSI), NBPGR (National Bureau of plant Genetics Resource), ICAR (Indian Council of Agriculture Research), Council of Scientific and Industrial Research (CSIR), Department of Science and Technology (DST) and Department of Biotechnology (DBT) and Germplasm conservation.

Practical: Based on the Above.

SEMESTER-IV

M.Sc. Botany – Fourth Semester

PAPER- III: BIOSTATISTICS, CYTOLOGY AND PLANT BREEDING

A. BIOSTATISTICS:

1. Relevance of biostatistics to biological interpretative, elementary idea of probability, combination and permutations, continuous and discontinuous variables.
2. Measures of central tendency: Mean, Median and Mode.
3. Measures of dispersion: Standard deviation, Standard error, Mean deviation.
4. Test of significance:
 - a. Chi- square test
 - b. t- test
5. Analysis of variance
6. Correlation and regression

B. CYTOLOGY:

1. Cell membrane: Structure and Function.
2. Cytoskeleton: Microtubules, Microfilaments, basal bodies and cilia.
3. Interphase nucleus and nucleolus.
4. Chromosome structure, types.
5. Chromatin fibers, nucleolus, solenoid model, heterochromatin and euchromatin.
6. Centromere and telomere structure.
7. Cell division: Cell cycle, mitosis and meiosis; Control of cell division, spindle organization and chromosomal movement, Synapsis and Synaptonemal complex, crossing over, mechanism and cytological proof.

C. PLANT BREEDING:

1. Introduction to plant breeding.
2. Domestication, plant introduction and acclimatization.
3. Method of selection and hybridization.
4. Techniques of selfing and crossing.
5. Cytoplasmic male sterility.
6. Heterosis and hybrid seed production.
7. Mutant breeding.
8. Polyploidy in plant breeding.
9. Breeding for nutritional quality.

SEMESTER IV

**PAPER IV: DISSERTATION BASED ON OPTIONAL PAPERS
(SEMESTER III- PAPER IV)**