

Fourth Semester

Course No.	Name of the Course	Total
PG 401	Biotechnology	85 + CCE 15 = 100
PG 402	Genetic Engineering and Genomics	85 + CCE 15 = 100
PG 403	Elective I*	85 + CCE 15 = 100
PG 404	Elective II*	85 + CCE 15 = 100
PG 405	Practical I – based on Course PG 401 and 402	50
PG 406	Practical II – based on Course PG 403 and 404	50
PG 407	Project work related to course Paper	100
	Total	600

Note: Excursion is compulsory for all students (Both local and out station) in Previous and Final year.

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Prakash 8/2/18 ADY
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Department of Higher Education, Govt. of M.P.

Post Graduate Semester wise Syllabus

As recommended and Approved by Board of Studies D.A.V.V.

उच्च शिक्षा विभाग, म.प्र. शासन

स्नातकोत्तर कक्षाओं के लिये सेमेस्टर अनुसार पाठ्यक्रम
अध्ययन मण्डल देवी अहिल्या विश्वविद्यालय द्वारा अनुशंसित तथा अनुमोदित

Session (सत्र) 2017-2018

M. Sc. Botany (Semester System)

Fourth Semester

Course PG 401: Biotechnology 85+15

- UNIT I: Plant Tissue Culture:** General introduction, History and scope and basic concepts, laboratory organization; media preparation and sterilization techniques, Nutrition of plant tissue - Growth limiting factors, Concept of cellular differentiation and totipotency, Types of culture, Embryo and endosperm culture, Induction and maintenance of callus and suspension culture.
- UNIT II: Somatic embryogenesis:** Fundamental aspects of morphogenesis, study of differentiation through Organogenesis and Embryogenesis, Somatic embryogenesis, Zygotic vs. Somatic embryogenesis, Micropropagation, Advances and encapsulation of somatic embryo and shoot tip for artificial seeds and its applications. In vitro production of haploids for breeding and selection of mutants.
- UNIT III: Protoplast culture:** Isolation, fusion, culture, hybrid selection and regeneration of Protoplast and possibilities with special reference to crop plants, Limitation of protoplast research, Somatic hybridization and selection mechanism for hybrids and cybrids, cell line selection through callus/suspension culture for the production of stress resistant plants, their application in crop improvement.
- UNIT IV: Clonal variation:** Clonal Propagation; Somaclonal and Gemetoclinal variations, Large scale clonally propagation of plants, Cryopreservation and germplasm storage. Embryo and endosperm culture. Genetic manipulation of plants: *Agrobacterium tumefaciens* and *Agrobacterium rhizogenes*.
- UNIT V: Applications of plant tissue culture:** Productions of transgenic plants, methods of transformation in plants, Applications of plant tissue culture in forestry, ornamental plants, disease free plants and in the production of secondary metabolites and natural products. Role of tissue culture in Agriculture.

PRACTICALS: Laboratory exercises corresponding to theory courses covering.

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Session (सत्र) 2017-2018

M. Sc. Botany (Semester System)

Fourth Semester

Course PG 402: Genetic Engineering and Genomics 85+15

- UNIT I: **Basics concept:** Recombinant DNA technology and its Tools– Cloning Vectors (Plasmids, Bacteriophage M13 Cosmids, Phasmid, Lambda YACs, BAC Vectors), Restriction enzymes and others –Types and applications.
- UNIT II: **Cloning Methodology:** Gene cloning, principle and techniques; Construction of libraries, cDNA and genomic library. cDNA Genomic Cloning; Principle of DNA sequencing, Polymer Chain reaction; DNA finger printing.
- UNIT III: **Genomics:** Basic concept, types and strategies for genome analysis. DNA chips technology and microarrays; Genetic improvement of industrial microbes, Nitrogen fixers; Transcriptome; Rice Genome Project, Arabidopsis Genome Project.
- UNIT IV: **Proteomics:** Concept, methodology and application of Proteomics; Protein profiling. Bioinformatics basic concept and its application in biological science; Ribotyping.
- UNIT V: **Transgenic plants:** Strategies and methodology for development transgenic plants; Agrobacterium mediated gene transfer; Transposon tagging and direct gene transfer techniques. Ecological risk and ethical concern; Intellectual property rights.

PRACTICALS:

Laboratory exercises corresponding to theory courses covering all units.

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Session (सत्र) 2017-2018

M. Sc. Botany (Semester System)

Fourth Semester

403: List of Elective Papers.

The student may opt any one of the following Elective paper (operative in the university/college) List of suggested Elective Papers.

1. Industrial Microbiology
2. Plant Taxonomy
3. Applied Mycology
4. Plants and Society

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Session (सत्र) 2017-2018

M. Sc. Botany (Semester System)

Fourth Semester

Course PG 403: Industrial Microbiology (Elective Paper I)

85+15

- UNIT I:** Basic techniques in microbiology - Microscopy, staining techniques, Culture, Nutrition and growth of microorganisms. Replication and structure of viruses and other a cellular microorganisms, prokaryotic microorganisms, classification and diversity of Bacteria, Eukaryotic microorganisms.
- UNIT II:** Food Microbiology: Food spoilage, Food preservation methods, Microbiological production of food such as fermented products, alcoholic beverages, vinegar. Fermented vegetables. Single cell protein production in industry, fermented dairy products and uses.
- UNIT III:** Fermentation Industry: Selection of micro-organisms, Techniques and quality control, Production of antibiotics, steroids, Human proteins, Vaccines and vitamins. Survey of microorganisms of industrial uses. Production of organic acids, amino acids, Enzymes, Solvents and fuels.
- UNIT IV:** Microbial Products: Recovery of minerals by using microbes, Oil recovery, Biodeterioration, Mushroom culture, Biotech products including human insulin, Microbial Growth-Environmental influences, Physical control, Chemical control and Antibiotic controls.
- UNIT V:** Water quality in industry: Bacteriological safety of potable water, water quality analysis, importance of BOD. Biodegradation of wastes and pollutants, Primary, Secondary and Tertiary Sewage treatments.

PRACTICALS

Laboratory exercises corresponding to theory courses covering all Units.

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Session (सत्र) 2017-2018

M. Sc. Botany (Semester System)

Fourth Semester 2017-18

Course PG 403: Plant Taxonomy (Elective Paper I)

85+15

- UNIT I: Concept of Plant Taxonomy:** Basic Aims, Principle, phases and significance of Taxonomy. Evolutionary trend of flower and in florescence. History of plant exploration work in India. Monophyly and polyphyly, Parallelism and convergence, Homology and Analogy, Primitive and advanced characters.
- UNIT II: Classification:** History and Types of classification (Artificial, Natural and phylogenetic system of classification). Principle, outline, merit and demerit of Bentham and Hooker: Engler and Prantle system of classification. Principle, outline merit and demerit of Hutchinson and Cronquist system of classification. Angiosperm phylogeny group system (APG) of flowering plant classification.
- UNIT III: Nomenclature and plant identification:** Principle of plant nomenclature, Binomial nomenclature. Rank of Taxa, Author citation, Nomenclatural Type, Rule of priority, Effective and valid publication, Rejection of Name. Methods of collecting plant: Field collections preparation of plant specimen, documentation of plant collection (Field site Data, Plant Data). Preparation of Herbarium specimens, Herbarium operations. Methods of Plant identification: Flora, Monograph, Taxonomic keys, written description, specimen comparison, image comparison, Expert determination.
- UNIT IV: Systematic of orders and tools of modern Taxonomy :** Taxonomy, Floral structure and phylogeny of order. Magnoliales, Rosales, Caryophyllales. Taxonomy, Floral structure and phylogeny of order Alismatales, Zingiberales, Orchidales. Numerical Taxonomy and its importance. Molecular characters and their importance in systematic.
- UNIT V: Plant Geography:** Botanical region of India. Speciation and species concept. Phenotypic plasticity, physical factors affecting phenotypic plasticity. Endemism and Endemic plants in India.

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Suggested Laboratory Exercise based on P.G. 403 :

1. Comparison of different species of a genus or different genera of a family to calculate similarity Co-efficient and preparation of dendrograms.
2. Plant identification upto specie level.
3. Select a genus such as Ipomoea, with five or more species within the area for leaf variation study. Prepare a character taxon matrixe for leaf shape, apex, margin and lower surface, vestiture for each species .
4. Preparation of Artificial-key.
5. Field survey of plants.
6. Preparation of Harbarium of available common plants. (At least 50 plants).
7. Exercise on similar and Dissimilar character of plants.

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Session (सत्र) 2017-2018

M. Sc. Botany (Semester System)

Fourth Semester

Course PG 403: Applied Mycology (Elective Paper I)

85+15

- UNIT I:** General Characteristics of Fungi. Taxonomic Status and classification of Fungi. Harmful activities of fungi-fungi as plant pathogens. Fungal disease of human-being and animals. Fungi involved in degradation of goods and spoilage of foodstuffs.
- UNIT II:** Fungi s food- Detailed account of edible fungi with special reference to Agaricus, Pleurotus, Geastrum, Lycoperdon, and mushroom toxins. Cultivation of mushroom. Yeast and single cell protein.
- UNIT III:** Fungi as medicines. Steroid bioconversion through fungi. Production of vitamins. Riboflavin, vitamin A Antibiotics Medicinal value of Ergot. Glycerol reduction.
- UNIT IV:** Fungi in industry. Baking Brewery and Dairy industry. Enzyme Production- Amylase, invertase, protease and cellulose. Production of Organic acid, Fumaric acid, Gluconic acid, Kojic acid.
- UNIT V:** Principles of Fungal disease management. Disease forecasting, Regulatory methods. Physical and cultural measures of disease management chemical and biological control methods. Fungi in agriculture – In improvement of soil fertility, Mycorrhiza. Laboratory Exercise based on theory Syllabus.

PRACTICALS:

Laboratory exercises corresponding to theory courses covering.

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Dr. S. S. S.

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Dr. S. S. S.

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Session (सत्र) 2017-2018

M. Sc. Botany (Semester System)

Fourth Semester

Course PG 403: Plants and Society (Elective Paper I)

85+15

- UNIT I:** History of plants and development of society, Role of plants in tracing human history, green revolution: benefits and adverse consequences. Innovations for meeting world food demands. Early domestication centers of major cultivated plants, Plants in Mythology, folklores Role of Ethno botany in relation to development of society.
- UNIT II:** Plants and Human Health, Usage of plants in different systems of medicine allopathic, Homeopathic Aurvedic, Herbal Medicine, and concept of Herbal Cosmetic. Plants as health hazards. Food spoilage. Viral, Bacterial and fungal diseases of human beings.
- UNIT III:** Plants in Entrepreneurial Areas-A: Techniques of cultivation and marketing of few Chlorophytum, Guggul, Commiphera wightii, Rauwolfia serpentina. Plants and other uses: Agriculture and Horticulture.
- UNIT IV:** Plants in Entrepreneurial Areas - B: Use of plants in earning livelihood - Such as Bamboos, Rattans, Raw Materials of papermaking, Gums tannins, dyes, resins and fruits. Techniques of cultivation and marketing of - Aromatic Plants - Lemon grass, plasma Rosa, Floriculture - rose and gladioli.
- UNIT V:** Plants in Entrepreneurial Areas - C: Techniques of cultivation and marketing of - Mushroom Cultivation, Nursery management, Vermiculture and Vermicompost. Mass cultivation of few plants using tissue culture techniques. Bonsai Techniques.

PRACTICALS:

Laboratory exercises corresponding to theory courses covering all Units.

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Session (सत्र) 2017-2018

M. Sc. Botany (Semester System)

Fourth Semester

404: List of Elective Paper -II

The student may opt any one of the following Elective paper (operative in the university/college) List of suggested Elective Papers.

1. Plant pathology.
2. Molecular biology and biotechnology.
3. Pollution Ecology.
4. Ethnobotany.

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Session (सत्र) 2017-2018

M. Sc. Botany (Semester System)

Fourth Semester

Course PG 404: Plant Pathology (Elective Paper II)

85+15

- UNIT I: Nature and concept of plant disease, impact of plant disease pathological terms and definitions. History and progress of plant pathology. Agents of infectious disease: Fungi Bacteria Mycoplasma and Viruses. Classification of plant disease. Symptoms of plant disease Methods of studying plant disease
- UNIT II: Phenomenon of infection prepenetration, penetration and development of pathogen inside the host. Role of enzyme, Toxins and hormones in pathogenesis. Defense mechanisms in plants: Structural defense, Biochemical defence. Effect of infection on physiology of the host plant.
- UNIT III: Genetics of Virulence in pathogen and of resistance in host plant, physiological specialization and its significance. Effect of environment on pathogenesis. Survival of plant pathogens. Dispersal of plant pathogens.
- UNIT IV: General principles of disease control. Chemical methods for plant disease control. Biological control. Chemotherapy. Breeding for disease resistance.
- UNIT V: Important disease of main crops of M.P. such as Wheat Barley, Jowar, Bajra, Potato, Pulses, Sugarcane, Oil-Seeds (Ground nut, Til and Lin seed).Vegetables, Fruits (Papaya, Mango, Guava, Lemon and Banana) and Cotton.

PRACTICALS:

Laboratory exercises corresponding to theory courses covering.

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Session (सत्र) 2017-2018

M. Sc. Botany (Semester System)

Fourth Semester

Course PG 404: Molecular Biology and Biotechnology (Elective Paper II) 85+15

- UNIT I: Genetic material of prokaryotes and eukaryotes, properties, function, replication, transcription, reverse transcription, mechanism of gene expression in prokaryotes and eukaryotes, inhibition of gene expression.
- UNIT II: Biotechnology- History, scope, and achievements, genetic engineering, recombinant DNA technology, genetic engineering procedure enzymes and vectors, isolations of plasmid and chromosomal DNA, PCR, hybridization techniques-Southern, Northern, and Western blotting technology.
- UNIT III: History of tissue culture, Media preparation for plant tissue culture, plant tissue culture techniques, production of haploid, anther and pollen culture, organogenesis and embryogenesis, Transformation and growth of cell. somaclonal variation, Transgenic plant.
- UNIT IV: Monoclonal Antibody and hybridoma technology, Application of Biotechnology in Agriculture, Horticulture, Forestry, food and industries, health and immunology, environment, ethics of biotechnology.
- UNIT V: Instrumentation – Spectrophotometer, Electrophoresis, Chromatography, Microscopy, Importance of statistics in biological studies, test of significance based on small and large samples t, z, x², And f test, Basic of computer and Bioinformatics, computer application in biology.

PRACTICALS:

Laboratory exercises corresponding to theory courses covering.

S. P. Singh
8.2.18

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Session (सत्र) 2017-2018

M. Sc. Botany (Semester System)

Fourth Semester

Course PG 404: Pollution Ecology (Elective Paper II)

85+15

- UNIT I: Pollution: Status and Concerns Classification of contaminants and pollutants. Brief account of major environmental disasters of the past. Indicator concept- biological indicators of pollution.
- UNIT II: Air pollution Sources and causes of air pollution. Effects of air pollution on flora and fauna, materials and structures, soil atmosphere, water bodies and on human health. Transport and dispersion of pollutants.
- UNIT III: Water Pollution Sources and causes of water pollution Status of water pollution in India and M.P. Water harvesting and recharging of water resources-concerns and remedies.
- UNIT IV: Soil pollution and other pollution types Causes and sources of soil pollution. Pesticides and heavy metal pollution-sources, causes and effects Nuclear, thermal and noise pollution-sources, causes and effects.
- UNIT V: Pollution: Monitoring and Control Monitoring systems and analytical methods for air, water and soil pollution. Control and abatement measures for air, water and soil pollution. Brief account of legislation and environmental protection acts in India.

PRACTICALS:

Laboratory exercises corresponding to theory courses covering.

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M. Sc. Botany (Semester System)

Fourth Semester 2017-18

Course PG 404: ETHNOBOTANY (Elective Paper II)

85+ 15

- UNIT I:** Definition, Concept, relevance and Scope of Ethnobotany. Sub disciplines of Ethnobotany. Indian work of Ethnobotany. Relation between Economic botany and Ethnobotany.
- UNIT II:** Sources of Data and methods of study of Ethnobotany. The origin and utility of some vernacular plant names. Sacred groves- Concept, classification, distributions of sacred groves in India, threats to sacred groves and significance. Plants in Mythology.
- UNIT III:** Wild edible plants used by ethnic people. Ethnoreligious plants used by tribals. Ethnobotany and its role in conservation of native plant genetic resources. Ethnobotanical plants used in different veterinary disease.
- UNIT IV:** Ethnobotanical importance of *Butea monosperma*, *Madhuca indica*, *Azadiracta Indica*. Ethnobotanical importance – *Buchnanan lanzan*, *Diospyros melanoxylon*, *Nyctanthes arbortristis*. Ethnobotanical plants used in fish poisoning, musical instruments. Totem and Taboos and their role in Conservation.
- UNIT V:** Study of common Ethnobotanical plants and their parts used in the treatment fever cough, bronchial asthma, tuberculosis, skin disease, leukoderma, expulsion of worm and leprosy. Study of common ethnomedicinal plants used in dysentery, digestive problem, abdominal disorder, jaundice, piles, rheumatism, bone fracture, heart disease and urino-genital problem.

PRACTICALS:

Laboratory exercises corresponding to theory courses covering.

Sanjivani
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Sanjivani
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Dr. S. S. 2017

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Dr. S. S.

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Session (सत्र) 2017-2018

Scheme of Practical Examination 2017-18

M.Sc. IV Sem. Botany (Practical – I)

(Based on PG 401 and 402)

Time – 4 Hrs.

Max. Marks - 50

1. Exercise based on Biotechnology	- 10
2. Practical based on Genetic Engineering and Genomics	- 15
3. Spot 1 to 5	- 10
4. Viva-Voce	- 05
5. Sessionals and Record	- 10

Total - 50

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Dr. S. S. S.
8/2/18

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Devi Ahilya Vishwavidyalaya Indore (M.P.)

Department of Higher Education, Govt. of M.P.

Post Graduate Semester wise Syllabus

As recommended and Approved by Board of Studies D.A.V.V.

उच्च शिक्षा विभाग, म.प्र. शासन

स्नातकोत्तर कक्षाओं के लिये सेमेस्टर अनुसार पाठ्यक्रम

अध्ययन मण्डल देवी अहिल्या विश्वविद्यालय द्वारा अनुशंसित तथा अनुमोदित

Session (सत्र) 2017-2018

Scheme of Practical Examination 2017-18

M.Sc. IV Sem. Botany (Practical – II)

(Based on PG 403 and 404)

Time – 4 Hrs

Max. Marks - 50

1. Major Exercise based on Elective -I	-	08
2. Minor Exercise based on Elective -I	-	04
3. Major Exercise based on Elective -II	-	08
4. Minor Exercise based on Elective -II	-	04
5. Spot 1 to 5	-	10
6. Viva-Voce	-	06
7. Sessionals and Record	-	10

Total - 50

Project (As per Higher Education Instructions) –100Marks

Soni
08.2.18

Spicco
8.2.18

8/2/18

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