

# 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 Ⅳ = ½ 2013&2014**

## M.Sc. Botany

### First Semester

Course No.	Name of the Course	Total
PG 101	Biology & Diversity of Viruses, Bacteria and Fungi	85 + CCE 15 = 100
PG 102	Biology & Diversity of Algae & Bryophytes	85 + CCE 15 = 100
PG 103	Biology & Diversity of Pteridophytes & Gymnosperms	85 + CCE 15 = 100
PG 104	Plant Ecology	85 + CCE 15 = 100
PG 105	* Practical I. based on Course PG 101 & 104	50
PG 106	Practical II. based on Course PG 102 & 103	50
	Total	500

### Second Semester

Course No.	Name of the Course	Total
PG 201	Plant Development & Reproduction	85 + CCE 15 = 100
PG 202	Morphology & Taxonomy of Angiosperms	85 + CCE 15 = 100
PG 203	Utilization & Conservation of Plant Resources	85 + CCE 15 = 100
PG 204	Cell Biology of Plants	85 + CCE 15 = 100
PG 205	* Practical I . based on Course PG 201 & 202	50
PG 206	Practical II . based on Course PG 203 & 204	50
	Total	500

\*N.B.: PG 205 will include the following points:

1. Numbers of representative families (about 25) shall be taken up in the practical classes describing the plants up to species level.
2. Study of the primary and secondary anomaly of root and stem in dicots and monocots.

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

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Session (सत्र) 2013–2014

## M. Sc. Botany (Semester System)

### First Semester

#### Course PG 101: Biology & Diversity of Viruses, Bacteria and Fungi 85+ 15

- UNIT I: Viruses: - Characteristics and ultrastructure of virions, isolation and Purification of viruses; chemical nature of viruses; replication, transmission and economic importance of viruses.
- UNIT II: Archaeobacteria and Eubacteria: - General account of archaeobacteria, eubacteria: general characters, ultrastructure, nutrition, classification, reproduction and economic importance; General account of Actinomycetes. *Mycoplasma* : Salient features, cell structure, reproduction, transmission, plant and animal diseases and their control measures. Cyanobacteria: salient features, ultrastructure, reproduction and biological importance.
- UNIT III: Mycology: General characters, substrate relationship of fungi, cell ultrastructure, thallus organization, mode of nutrition (saprotrophic, parasitic, symbiotic), reproduction. Economic importance of fungi.
- UNIT IV: Mycology- classification (Alexopoulos, Ainsworth), recent trends in classification, heterothallism, General account of Mastigomycotina and Zygomycotina.
- UNIT V: Mycology: Diagnostic features and general account of Ascomycotina, Basidiomycotina, and Deuteromycotina. Parasexuality. Diseases in plants and Humans; Mycorrhiza, symbiosis and Fungi as biocontrol agent.

#### Suggested Readings

1. Alexopoulos, C.J. Mims, C. W. and Blackwell, M; 1996: Introductory coO' Mycology, Jbon Wiley & Sons Inc.
2. Clifton, A; 1958: Introduction to Bacteria, Mcgraw- Hills Book Co. New Delhi.
3. Madigan, M T. Martinko, J. M and Parker Jack; 1997: Brock Biology Of Microorganisms, (8<sup>th</sup> edition) Prentice Hall, N,J. U.S.A
4. Mandahar, C. L.; 1978: Introduction to Plant Viruses. Chand & Co.Ltd. Delhi.
5. Mehrotra, RS. and Aneja, RS.; 1998: An Introduction to Mycology. New Age Intermediate Press.
6. Rangaswamy, G. and Mahadevan, A; 1999: Diseases of Crop Plants in Indja (4<sup>th</sup> edjtjon).PrentjceHaJl ofnilia Ltd. New Delbj.
7. Webster, J.; 1985: Introduction to Fungi Cambridge University Press.
8. Dubey, R C. & Maheshwari, D. K.; 2005: A Text Book of Microbiology, S. Chand Publisher, New Delhi

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Session (सत्र) 2013–2014

## M. Sc. Botany (Semester System)

### First Semester

#### Course PG 102: Biology & Diversity of Algae & Bryophytes 85+15

- UNIT I: Algae – General characters, diversified habitats, thallus organization, criteria of classification (pigments, reserve food, flagella) economic importance, (as food, feed, industry, algal blooms and biofertilizer), salient features of Protochlorophyta.
- UNIT II: Algae: Salient features, classification, reproduction and economic importance of Chlorophyta, Charophyta and Xanthophyta.
- UNIT III: Algae: Salient features, classification, reproduction and economic importance of Bacillariophyta, Phaeophyta and Rhodophyta.
- UNIT IV: Bryophyta: General characters, classification, vegetative propagation and sexual reproduction of bryophytes, Life cycle and alternation of generation. Economic importance of bryophytes. General account of Sphagnales, Marchantiales and Jungermaniales.
- UNIT V: Bryophyta: General account of Anthocerotales, Funariales, Sphagnales, Andraeales and Polytrichales.

#### Suggested Readings

1. Smith G. M.~ Cryptogamic Botany VoL I(2nd edition)~ TataMcGraw-Hill Publishing Company Ltd. Bombay -New Delhi.
2. Kumar H. D. 1988: Introductory Phycology. Affiliated East-West Press Ltd. New Delhi.
3. Parihar~ N.S. 1991: Bryophyta. Central Book Depot. Allahabad.
4. Brower~ 1926: Primitive Land Plants~ Cambridge At the University Press.
5. Kashyap~ 1972 Liver worts of Western Himalayas and Punjab. Research co Publication.
6. Smith, G. M.~ Cryptogamic Botany VoL I (2nd edition)~ TataMc Graw -Hill Publishing Company~ Bombay -New Delhi.
7. Puri P. 1980~ Bryophyta -Morphology, Growth & Differentiation. Atmaram & Sons, Delhi.
8. Chopra & Kumar~ 1988: Biology of Bryophyta; Wiley Eastern Ltd.
9. Ram Udar; 1970: An Introduction to Bryophyta; Shashidhar Malviya Prakashan
10. Watson; 1968: Structure and life of Bryophyta; Hutchinson & Co. Ltd.

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## M. Sc. Botany (Semester System)

### First Semester

#### Course PG 103: Biology & Diversity of Pteridophytes & Gymnosperms

85+15

UNIT I: Pteridophyta: General characters, morphology, anatomy and life history of Pteridophyta. Classification, Evolution of stele, heterospory and origin of seed habit. Basic idea about paleobotany, General account of Psilopsida.

UNIT II: Pteridophyta: Morphology, anatomy reproduction and life history of Psilopsida: Morphology, anatomy reproduction and life history of Lycopside: Morphology, anatomy reproduction and life history of Sphenosida: Morphology, anatomy reproduction and life history of Pteropsida

UNIT III: Gymnosperms: General Characters - Morphology, anatomy, reproduction and life history of gymnosperms. Classification (Pant and Raizada; Bierhort), economic importance of gymnosperms. General account of Pteridospermales.

UNIT IV: Gymnosperms:  
General account of Cycadeoidales,  
General account of Corditales,  
General account of Cycadales.  
General account of Ginkgoales.

UNIT V: Gymnosperms: Morphology, structure and reproduction of Coniferales,  
Morphology, structure and reproduction of Ephedrales  
Morphology, structure and reproduction of Welwitschiales  
Morphology, structure and reproduction of Gnetales.  
Inter relationships of Gnetopsida.  
Evolution of gymnosperms.

#### Suggested Readings

1. Bhatnagar, S.P. and Moitra, A; 1996: Gymnosperms. New Age International Pvt. Ltd., New Delhi.
2. Singh H.; 1978: Embryology of Gymnosperms, Encyclopedia of Plant Anatomy X. Gebruder Borntraeger, Berlin.
3. Sporne K R; 1991: The Morphology of Gymnosperms; Hutchinson Univ. Library; London.
4. Foster A S. & Gifford E. M; Comparative morphology of vascular Plants; Vakils, Feffer, & Simons Private Ltd. Bombay.
5. Chamberlain; Gymnosperms -Structure & Evolution; CBS Publishers & Distributors Delhi.
6. Shukla A C. & Mishra S. P.; Essentials of Paleobotany; Vikas Publishing House Pvt. Ltd. Delhi-Bombay-:6angalore-Calcutta-Kanpur .
7. Campbell; 1939: The evolution of land plants; Stanford University.
8. Sporne, K.R. 1991. The Morphology of Pteridophytes.

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Session (सत्र) 2013–2014

## **M. Sc. Botany (Semester System)**

### **First Semester**

#### **Course PG 104: Plant Ecology**

**85+15**

- UNIT I: Ecology and Ecosystem- Ecology and ecosystem, definition, Trophic organization and structure, Food chains & webs; energy flow pathways, Ecological efficiencies consumption, assimilation and production; Primary production -Methods of measurement of primary production, Global patterns, Limiting factors.
- UNIT II: Fate of matter in ecosystems and soil: Recycling pathway, Relationship between energy flow and recycling pathways; Nutrient exchange and cycling; Global biogeochemical cycles of C, N, P and S; Physical, chemical and biological characteristics of soil.
- UNIT III: Ecosystem development and stability: Temporal changes, cyclic and non cyclic; Succession processes & types; Mechanism of succession facilitation, Tolerance and inhibition models; Concept of climax community. Ecological perturbation natural and anthropogenic, Ecosystem restoration.
- UNIT IV: Community organization: Concepts of community and continuum; Analysis of community, analytical and synthetic characters, Community coefficients. Indices of diversity, interspecific association negative and positive Inter action concept of ecological niche; Concepts of biodiversity; evolution and differentiation of species. allopatric & sympatric speciation; ecads and ecotypes
- UNIT V: Population ecology -Population & Environment; Population ecology, density & distribution, Natality, Mortality, Survivorship curves, Age structure & pyramids, Fecundity schedules, Life tables; Population growth . Exponential and logistic curves; Intra specific competition and self regulation; r-and k-strategies.

### **Suggested Readings**

1. Smith. R.L. 1996. Ecology and Field Biology. Harper Collins. New York.
2. Muller-Dombois. D. and Ellenberg. H.1974. Aims and Methods of Vegetation Ecology, Wiley, New York
3. Begon. M., Harper, J.L. and Townsend, C.R. 1996. Ecology. Blackwell Science. Cambridge.
4. Ludwig. J. and Reynolds. J.F. 1988. Statistical Ecology. John Wiley & Sons.
5. Odum. E.P. 1971. Fundamentals of Ecology. Saunders, Philadelphia.
6. Odum, E.P. 1983. Basic Ecology. Saunders, Philadelphia.
7. Barbour, M.G., Burk, J.H. and Pitts, W.O. 1987. Terrestrial Plant Ecology. Cummings Publication Company, California.
8. Kormondy, E.J. 1996. Concepts of Ecology. Prentice-Hall of India Pvt. Ltd., New Delhi.
9. Chapman, J.L. and Reiss, M.J. 1988. Ecology: Principles and Applications. Cambridge University Press, Cambridge, U.K.
10. Moldan, B. and Billharz, S. 1997. Sustainability Indicators. John Wiley & Sons, New York.

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Session (सत्र) 2013-2014

## Scheme of Practical Examination 2013-14

### M.Sc. I Sem. Botany (Practical – I)

(Based on PG 101 & 104)

Time 4 hrs.		Maximum Marks	50
1.	Microbiology exercise.	-	05
2.	Study of Mycological Material.	-	10
3.	Major ecological exercise.	-	10
4.	Spotting (1-5)	-	10
5.	Viva - Voce	-	05
6.	Record & Sessional.	-	10
		Total	50

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Session (सत्र) 2013–2014

## Scheme of Practical Examination 2013-14

### M.Sc. I Sem. Botany (Practical – II)

(Based on PG 102 & 103)

Time 4 hrs.	Maximum Marks	50
1. Study of Algal Material .	-	06
2. Study of Bryophyta.	-	06
3. Study of Pteridophyta material.	-	06
4. Detailed Study of Gymnosperm Material.	-	07
5. Spotting. (1-5)	-	10
6. Viva.	-	05
7. Record & Sessional.	-	10
	Total	50

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Session (सत्र) 2013–2014

## M. Sc. Botany (Semester System)

### Second Semester

**Course PG 201: Plant Development & Reproduction**

**85+ 15**

- UNIT I: Unique features of plant development;  
Organization of root and shoot apical meristems  
Leaf- leaf growth and differentiation.  
Root-stem organization,  
Nodal anatomy.
- UNIT II: Cell fates and lineages, tissue differentiation specially xylem and phloem,  
Secretory ducts and laticifers.  
Secondary growth. Primary and secondary anomalies.  
Wood development in relation to environmental factors.
- UNIT III: Vegetative propagations and sexual reproduction; flower as a modified shoot;  
flower development (A, B, C model) and genetics of floral-organ  
differentiation;  
Homeotic mutants in *Arabidopsis* and *Antirrhinum*;  
Structure of anthers, microsporogenesis, role of tapetum,  
Pollen development and gene expression. Male sterility.
- UNIT IV: Structure of Pistil, ovule development,  
Mega-sporogenesis and mega-gametogenesis;  
Monosporic, bisporic and tetrasporic embryo sacs.  
Pollination, mechanism and vectors.  
Pollen tube growth and guidance, pollen stigma interaction.  
Parthenocarpy.
- UNIT V: Sporophytic and gametophytic self-incompatibility.  
Double fertilization and triple fusion,  
Endosperm development,  
Embryo-genesis, monocot & dicot embryo development  
Polyembryony, apomixis.  
Dynamics of fruit growth; biochemistry and molecular biology of fruit  
maturation.

### **Suggested Readings**

1. Bhojwani, S.S. and Bhatnagar, S.P. 2000. The Embryology of Angiosperms (4th revised and enlarged edition). Vikas Publishing House, New Delhi.
2. Burgess, J. 1985. An introduction to Plant Cell Development. Cambridge University Press, Cambridge.
3. Fageri, K. and Van der Pijl, L. 1979. The Principles of Pollination Ecology. Pergamon Press, Oxford.
4. Fahn, A. 1982. Plant Anatomy. (3rd edition). Pergamon Press, Oxford.
5. Fosket, D. E. 1994. Plant Growth and Development. A Molecular Approach. Academic Press, San Diego.
6. Howell, S.H. 1998. Molecular Genetics of Plant Development, Cambridge University Press, Cambridge.
7. Leins, P., Tucker, S.C. and Endress, P. K. 1988. Aspects of Floral Development. J. Cramer, Germany.
8. Lyndon, R.F. 1990. Plant Development. The Cellular Basis. Unin Hyman. London.
9. Murphy, T. M. and Thompson, W. E. 1988. Molecular Plant Development. Prentice Hall, New Jersey.
10. Proctor, M. and Yeo, P. 1973. The Pollination of Flowers. William Collins Sons, London.
11. Raghvan, V. 1997. Molecular Embryology of Flowering Plants. Cambridge University Press, Cambridge.
12. Raghvan, V. 1999. Development Biology of Flowering Plants. Springer-verlag.
13. Chandurkar P.J. Plant Anatomy.
14. Vashishitha P.C. Plant Anatomy.
15. Pandey B.P. Plant Anatomy.
16. Esau K. Plant Anatomy.

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Session (सत्र) 2013–2014

## M. Sc. Botany (Semester System)

### Second Semester

#### Course PG 202: Morphology & Taxonomy of Angiosperms

- UNIT I: Morphology of stamens.  
Morphology of carpels, carpel evolution.  
Morphology of inferior ovary;  
Placentation types and their origin.
- UNIT II: The species concept: taxonomic hierarchy,  
Binomial nomenclature & ICBN.  
Modern trends in taxonomy; morphology, anatomy, palynology, embryology,  
cytology, phytochemistry in relation to taxonomy.  
Serological, biochemical and molecular techniques.
- UNIT III: Systems of angiosperm classifications, phenetic versus phylogenetic systems,  
Bentham and Hooker's classification, Takhtajan's classification, Dahlgren's  
APJ system of classification, merits & demerits of above classifications,  
Taxonomic tools- herbarium and floras.
- UNIT IV: Taxonomic studies of families - Magnoliaceae, Annonaceae, Papaveraceae,  
Capparidaceae, Caryophyllaceae, Meliaceae, Rosaceae, Myrtaceae,  
Cucurbitaceae.
- UNIT V: Taxonomic studies of families – Rubiaceae, Apocynaceae, Convolvulaceae,  
Acanthaceae, Verbenaceae, Orchidaceae, Arecaceae, Poaceae

#### Suggested Readings

1. Heywood & Moore, D.M; 1984: CWTent concept *in* Plant Taxonomy Academic Press.
2. Banson, L.B.; 1957: Plant Classification, Health & Co. Boston.
3. Davis, P.R & Heywood, V.H 1973: Principles of Angiosperms and Taxonomy, Robert E.
4. Kreiger Pub. Co. New York, USA
5. Eames, AI.; 1961: Morphology of Angiosperms, Mc-Graw Hill, New York.
6. Jeffery, C.; 1968: An Introduction to Plant Taxonomy J. & H. Churchill Limited.
7. Lawrence, G .H.M.; 1951: Taxonomy of Vascular Plants Macmillan, New York.
8. Naik V. N.; 1984: Taxonomy of Angiosperms. Tata Mc-Graw Hill Pub. Co. Ltd. New Delhi.
9. Porter, L.L.; 1959: Taxonomy of Flowering Plants. San Francisco. Radfor~ AE. Dickinson,
10. W.C. Massey J.R and Ben. C.R: 1974: VQ~llar Plant SYstematics, Harper & Row, New York
11. Core E.L.; Plant Taxonomy.
12. Heywood V.H.: Plant Taxonomy
13. Nath R. : Plant Taxonomy.
14. Clive A. Stace : Taxonomy.
15. Houpt. A.W. Plant Morphology
16. Bold H.C. Plant Morphology
17. Biol H.C. Plant Morphology

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Session (सत्र) 2013–2014

## M. Sc. Botany (Semester System)

Second Semester

85+15

### Course PG 203: Utilization & Conservation of Plant Resources

- UNIT I: Major Biomes of the world-  
Tropical, Temperate, Boreal and Seasonal forests,  
Rain & Seasonal Forests,, Grasslands, Deserts;  
Aquatic Ecosystems, wetland, Lake, Pond, River, Stream, Estuarine, Marine habitats.
- UNIT II: Organization of Resources-  
Utilization of Resources from forest, grassland and aquatic habitat ;  
Food, forage, Fodder, Timber & Non-wood forest products;  
Threats to quality & quantity of Resources due to overexploitation.
- UNIT III: Conservation of resources: Classifications of resources; Principles of conservation, *in-situ*” conservation, Sanctuaries, National parks, Biosphere reserves for wildlife conservation;  
Habitat conservation practices of conservation for forests, ranges, soil and water;  
Ex-situ conservation- Botanical gardens, field gene banks, seed banks. Cryo-banks.
- UNIT IV: Pollution & Climate Change: Air, Water and Soil pollution, Kinds, Sources, Quality parameters, Effects on structure & function of ecosystems; Management of pollution; Bioremediation; Climate change Sources, Trends & Role of greenhouse gases, Effect of global warming on climate, Ecosystem processes & Biodiversity; Ozone layer & Ozone hole.
- UNIT V: Resource monitoring: Remote sensing concepts & Tools, Satellite remote sensing basics sensors,  
Visual & digital interpretation, EMR bands and their applications;  
Indian remote sensing programme; thematic mapping of resources  
Application of remote sensing in Ecology & Forestry.GIS

## Suggested Readings

1. Moldan, B. and Billharz, S. 1997. Sustainability Indicators. John Wiley & Sons, New York.
2. Treshow. M. 1985. Air Pollution and Plant Life. Wiley Interscience.
3. Heywood, V.H. and Watson. R.T. 1995. Global Biodiversity Assessment. Cambridge University Press.
4. Mason, C.F. 1991. Biology of Freshwater Pollution. Longman. '
5. Hill. M.K. 1997. Understanding Environmental Pollution. Cambridge University Press.
6. Brady, N.C. 1990. The Nature and Properties of Soils. MacMillan.
7. Kothari, A 1997. Understanding Biodiversity: Life'Sustainability and Equity. Orient Longman.
8. Kohli, R., Arya, K.S., Singh, P.H. and Dhillon, H.S. 1994. Tree Directory of Chandigarh.Lovedale Educational, New Delhi.
9. Nair, M.N.B. et. al (Eds) 1998. Sustainable Management of Non-wood Forest Products.
10. Faculty of Forestry, Universiti Putra Malaysia. 434004 PM Serdang, Selangor, Malaysia.
11. Paroda, R.S. and Arora, R.K. 1991. Plant Genetic Resources Conservation and Management. IPGRI (Publication) S0uth Asia Office, C/o NBPGR, Pusa Campus, New Delhi.
12. Pjmentel, D. and Hall, C.W. (eds) 1989. Food.and Natural Resources. Academic Press, London-New York. .

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स्नातकोत्तर कक्षाओं के लिये सेमेस्टर अनुसार पाठ्यक्रम

अध्ययन मण्डल देवी अहिल्या विश्वविद्यालय द्वारा अनुशंसित तथा अनुमोदित

Session (सत्र) 2013–2014

## M. Sc. Botany (Semester System)

### Second Semester

**Course PG 204: Cell Biology of Plants 85+15**

- UNIT I: Structural organization of the plant cell; specialized plant cell types. Biogenesis, structure and functions of cell wall. Cytoskeleton: organization and role of microtubules and microfilaments. Chemical composition of cell wall.
- UNIT II: Plasma membrane: structure, models and functions; sites for ATPases; ion carriers, channels and pumps; receptor, structure of plasmodesmata, role in movement of molecules; comparison with gap junctions. vacuoles: tonoplast.
- UNIT III: Chloroplast: structure, genome organization, gene expression, nucleochloroplastic interactions; mitochondria: structure, genome organization, biogenesis. Plant ATPases, transporters, as storage organelle. Other cell organelles: golgi apparatus, lysosomes, endoplasmic reticulum.
- UNIT IV: Nucleus: structure. Cell cycle: control mechanisms; role of cyclins and cyclindependent kinases; mechanisms of programmed cell death. Chromosome structure and packaging of DNA; euchromatin and heterochromatin; karyotype analysis and evolution; banding patterns; special types of chromosomes.
- UNIT V: Origin, meiosis and breeding behaviour of duplication, deficiency, inversion and translocation heterozygotes; origin, occurrence, production and meiosis of haploids, aneuploids and euploids; Origin and production of autopolyploids. Allopolyploids; types, genome constitution and analysis.

### Suggested Readings

1. Lewin, B. 2000, Genes VII Oxford University Press, New York.
2. Alberts, B., Bray, D., Lewis, J., Ratf, M., Roberts, K., and Watson, J.D. Molecular Biology of the Cell. Garland Publishing:Inc., New York.
3. Wolfe, S.L. 1993. Molecular and Cellular Biology, Wadsworth Publishing Co., California, USA
4. Rost, T. et: aI. 1998. Plant Biology, Wadsworth Publishing Co., California, U.S.A

5. Krishanmurthy K V. 2000 Methods in Cell Wall Cytochemistry, CRC Press, Boca Raton,Florida U.S.A
6. Buchanan, B.B. Groissem, W. and Jones, RL. 2000. Biochemistry And Molecular Biology of  
Plants. American Society of Plant Physiologists, Maryland, USA
7. De, D.N. 2000: Plant Cell Vacuoles: An Introduction. CSIRO Publication, ColliJ18W~Australia.

# Devi Ahilya Vishwavidyalaya Indore (M.P.)

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

Post Graduate Semester wise Syllabus

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Session (सत्र) 2013–2014

## Scheme of Practical Examination 2013-14

M.Sc. II Sem. Botany

(Based on PG 201 & 202)

Plant development and Reproduction

&

Morphology and Taxonomy of Angiosperm

Time – 4 Hrs

Max. Marks - 50

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1.	Major exercise based on Anatomy.	-	10
2.	Major exercise based on Taxonomy.	-	10
3.	Minor exercise based on Embryology/ Placentation	-	05
4.	Spotting 1 to 5	-	10
5.	Viva-Voce	-	05
6.	Sessional/Record	-	10

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Total - 50

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Session (सत्र) 2013-2014

## Scheme of Practical Examination 2013-14

M.Sc. II Sem. Botany

(Based on PG 203 & 204)

Time – 4 Hrs		Max. Marks - 50
1.	Exercise based on cell biology.	- 05
2.	Exercise based on Cytogenetics.	- 05
3.	Morphology, anatomy and Economic Important of any (Food/Forage/Fibre oil Yielding)	- 10
4.	Report of Field Survey Prescribed in Syllabus.	- 05
5.	Spotting 1 to 5	- 10
6.	Viva-Voce	- 05
7.	Sessional and Record	- 10
Total -		50

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**Session Ⅳ = ½ 2014&2015**

**M.Sc. Botany**

**Third Semester**

Course No.	Name of the Course	Total
PG 301	Plant Physiology	85 + CCE 15 = 100
PG 302	Plant Biochemistry & Metabolism	85 + CCE 15 = 100
PG 303	Genetics & Biostatistics	85 + CCE 15 = 100
PG 304	Molecular Biology	85 + CCE 15 = 100
PG 305	Practical I – based on Course PG 301 & 302	50
PG 306	Practical II – based on Course PG 303 & 304	50
	Total	500

**Fourth Semester**

Course No.	Name of the Course	Total
PG 401	Plant Cell, Tissue & Organ Culture	85 + CCE 15 = 100
PG 402	Biotechnology & Genetic Engineering	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 & 402	50
PG 406	Practical II – based on Course PG 403 & 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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Session (सत्र) 2014–2015

## M. Sc. Botany (Semester System)

### Third Semester

#### Course PG 301: Plant Physiology

85+15

- UNIT I: Osmotic relation of plant cells-osmosis and diffusion, Osmotic pressure, Wall pressure, turgor pressure, DPD, water potential, Absorption of water, Ascent of sap Transpiration, mechanism of water transport through xylem.
- UNIT II: Phloem transport –Phloem transport, loading and unloading. Passive and active solute transport. Signal transduction over view, receptor-proteins, phospholipids signaling, role of cyclic nucleotides Calcium calmodulin cascade
- UNIT III: plant growth regulator and elicitors- physiological effects and mechanism of action of auxins, gibberellins, cytokinins, ethylene, abscisic acid, Brassinosteroids, polyamines Jasmonic acid and salicylic acid. Hormone receptors.
- UNIT IV: Flowering process- Photoperiodism and its significance. Endogenous clock and its regulation. Floral induction and development Phytochrome and cytochrome, their photochemical and biochemical properties Vernalization
- UNIT V- Stress physiology  
Plant responses to biotic and abiotic stress,  
Water deficit and drought resistance.  
Salinity stress and resistance,  
Concept of freezing, heat and oxidative stresses.

#### Suggested Laboratory Exercise based on P.G.301:

1. Radioisotope methodology, autoradiography, instrumentation ( GM counter and scintillation counter) and principles involved
2. Principles of colorimetry, spectrophotometry, and fluorimetry/calorimetry.
3. Determine rate of transpiration by Ganong's potometer
4. Determine rate of respiration in germinating/young buds by Ganong's respirometer

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Session (सत्र) 2014–2015

## M. Sc. Botany (Semester System)

### Third Semester

#### Course PG 302: Plant Biochemistry and Metabolism

85+15

- UNIT I: Fundamental Enzymology  
Characters and classification of Enzymes. Factors affecting enzymetic activities.  
Allosteric mechanism, Regulatory and active site, isoenzymes.  
Mechanism of enzyme action  
Michalis Menton equation and its significance.  
Inhibition of enzymes- competitive, noncompetitive and mixed inhibition.
- UNIT II: Photochemistry and photosynthesis.  
General concept, evolution of photosynthetic apparatus,  
Photosynthetic pigments and photosystem,  
Photo-oxidation of water, mechanism of electron and proton transport.  
Carbon assimilation- calvin cycle, photorespiration and its significance, C4 cycle.  
Factors affecting photosynthesis.
- UNIT III: Respiration- general Concept.  
Overview of plant respiration,  
Glycolysis, TCA cycle  
Electron transport system and ATP synthesis, Oxidative phosphorylation  
Pentose phosphate Pathway.  
Glyoxalate cycle, alternative oxidase system,  
Structure and function of ATP.
- UNIT IV: Lipid and Sulphate Metabolism  
Structure and function of lipids.  
Fatty acid biosynthesis and oxidation Ketone bodies.  
Sulphate uptake, transport and assimilation.
- UNIT V: Nitrogen Metabolism  
Nitrogen metabolism over view  
Nitrogen fixation mechanism  
Nodule formation  
Ammonium assimilation

### **Suggested Laboratory Exercise based on P.G. 302.**

1. Effect of time and enzyme concentration on the rate of reaction of enzyme C e.g. acid phosphate, nitrate reductase.
2. Effect of substrate concentration on activity of any enzyme C( catalase, amylase).
3. Demonstration of the substrate inducibility of the enzyme nitrate reductase..
4. Determination of succinate dehydrogenase activity, its kinetics and sensitivity to inhibitors.
5. Separation of isoenzyme of esterase, peroxidases by native polyacrelamide gel electrophoresis.6- 6-6. To demonstrate photophosphorylation in intact chloroplast, resolve the phosphoproteins by SDS-PAGE and perform autoradiography desalting of proteins by gel filtration chromatography embaying Sephadex G-25.
7. Extraction of seed proteins depending upon the solubility.
8. Desalting of proteins by gel filtration chromatography employing Sephadex G-25.
9. Preparation of standard curve of protein and estimation of protein contents in extracts of plant material by Lowry's Bradford's method.
10. Fraction of proteins using gel filtration chromatography by Sephadex G-100 or Sephadex G-200.

### **Suggested readings-**

1. Lodish,H.,Berk,A., Zipursky,S.L., Matsudaira,P., Baltimore,D. and Darnell,J.2000.Molecular cell biology (4<sup>th</sup> edition).W.H.,Freeman and Company, New York USA.
2. Moore, T.C.1989. Biochemistry and Physiology of Plant harmones (2ed.). Sp[ringer-Verlag, New York USA.
3. Nobel,P.S.1999.Physiochemical and environmental plant physiology(2ed). Academic press, San Diego, USA
4. Salisbury. F.,B., and Ross, C.W .1991. Plant physiology 4<sup>th</sup> edition. Wdsworth Publishing CO. California USA.
5. Taiz,I. and Zeiger,E.1998. Plant Physiology(2<sup>nd</sup>. Ed.).Sinauer Associates Inc.Publisher MS.
6. Dennis,D.T. and Terpin,D.H. Lefevere DD and Layzell D.V. 1997. Plant Metabolism.2ed. Longman England.
7. Buchanan,B.B.grulssem,W. and jones,R.L.2000. Biochemistry and Molecular Biology of Plants. American society of plants physiologists, Maryland USA.

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

Post Graduate Semester wise Syllabus

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Session (सत्र) 2014–2015

## M. Sc. Botany (Semester System)

### Third Semester

#### Course PG 303: Genetics and Biostatistics

85+15

- UNIT I: Mendelian genetics, monohybrid, dihybrid crosses, gene interaction, co-dominance and lethal allele, extranuclear inheritance, chloroplastic DNA and mitochondrial DNA. Mechanism of genetic recombination gene mapping in prokaryotes.
- UNIT II: Genetics of eukaryotes- linkage phenomenon , detection of linkage through test cross genetics recombinations in eukaryotes. Crossing over, mechanism of genetics recombinations . hybrid DNA models, constructions of genetic maps using two point and three point test cross, tetrad analysis mitotic recombinations, genetic markers.
- UNIT III: Gene mutation- spontaneous, induced, physical, chemical mutagens, molecular basis of mutation. Importance of mutation, DNA damage and repair mechanism. Transposable genetic elements in prokaryotes and eukaryotes. Mutation by transposones..
- UNIT IV: Nuclear DNA content, c-value paradox, cot curve and its significance, repetition and satellite DNA. *in situ* hybridization of satellite DNA. Introns and their significance. Multigene family and their evolution.
- UNIT V: Measurement of central tendencies. Standard deviation, standard error Probability rules, t-text,  $X^2$  (chi-square) test, correlation, regression analysis Binomial distribution.

#### Suggested Laboratory Exercises based on course 303-

1. Isolation of DNA and preparation of cot curve.
2. Demonstration of Mitosis/Meiosis (normal and abnormal).
3. Determination of Mitotic index in various plant materials.
4. Exercise based on probability rules.

5. Genetic exercise on Mendel's laws, Monohybrid and Dihybrid crosses.
6. Numerical exercise on gene interactions.
7. Numerical on chi square test, F-test and central tendencies.
8. Numerical exercise on genetical mapping in Eukaryotes.
9. Experiments on mutation.
10. Demonstration of aneuploidy, polyploidy etc.

**Suggested Readings-**

1. Atherly, A.G. Girton, J.R. and Mc Donald, J.E. 1999. The Science of Genetics: SaPosts college publishing, Fort Worth, USA.
2. Burnham, C.R. 1962. Discussions in Cytogenetics, Burgess publishing Co. Minnesota.
3. Busch. H. and Rothblum. L. 1982. Volume X. The cell nucleus rDNA part A. Academic press.
4. Hartl, D.L. and Jones, E.W. 1998. Genetics: Principles and Analysis (4<sup>th</sup> edition). Jones and Bartlett publishers, Massachusetts, USA.
5. Hattl, D.L. and Jones, E.W. 2006. Genetics: Principles and Analysis (5<sup>th</sup> edition). Jones and Bartlett publishers, Massachusetts, USA.
6. Khush, G.S. 1973. Cytogenetics of Aneuploids. Academic press, New York, London.
7. Lewis, B. 2000 Gene 7. Oxford University Press, New York, USA.
8. Lewis, R. 1997, Human, Genetics: Concepts and Application (2<sup>nd</sup> edition). WCB McGraw, Hill, USA.
9. Russel, P.J. 1998. Genetics (5<sup>th</sup> edition). The Benjamin/Cummings publishing company Inc., USA.
10. Snusted, D.P. and Simmons, M.J. 2000. Principles of Genetics (2<sup>nd</sup> edition). Jhon Wiley and Sons Inc., USA.
11. Snusted, D.P. and Simmons, M.J. 2006 Principles of Genetics (3<sup>rd</sup> edition). Jhon Wiley and Sons Inc., USA.
12. Lewin, B. 2006, Genes 7, Oxford University press, New York.

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Post Graduate Semester wise Syllabus

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Session (सत्र) 2014–2015

## M. Sc. Botany (Semester System)

### Third Semester

#### Course PG 304: Molecular Biology

85+15

- UNIT I: DNA structure, A, B and Z forms  
DNA replication in prokaryotes and eukaryotes  
Satellite and repetitive DNA  
.Plant promoters  
Structure of t-RNA, m-RNA and r-RNA.  
DNA damage and repair
- UNIT II: Fine structure of gene. Split gene, overlapping gene  
Cis trans test ,  
Gene expression in prokaryotes and eukaryotes and their regulation.  
Gene interaction.
- UNIT III: Mechanisms of transcription, translation, initiation, elongation and termination  
in prokaryotes and eukaryotes, transcription factors. m-RNA splicing.  
Protein sorting and protein targeting, physical mapping – restriction mapping,  
sequenced tagged site (STS) mapping,  
Chromosome walking.
- UNIT IV: Molecular techniques- basic concept, principles, technique and application  
Gel electrophoresis.  
In situ hybridization, Southern blotting technique, Northern blotting technique,  
Western blotting technique. Dot blots technique
- UNIT V: Immune techniques- precipitin test, agglutination, complement fixation test,  
radio immune assay, immunosorbent assay, ELISA, Florescent antibody  
technique-Flow cytometry  
Florescent in situ hybridization (FISH).  
Genomic in situ hybridization (GISH).

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Session (सत्र) 2014–2015

## **Scheme of Practical Examination 2014-15**

### **M.Sc. III Sem. Botany (Practical – I)**

**(Based on PG 301 & 302)**

**Time : 4 hrs.**

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<b>1. Exercise based on Physiology</b>	<b>-</b>	<b>15</b>
<b>2. Exercise based on Biochemistry</b>	<b>-</b>	<b>10</b>
<b>3. Spot 1 to 5</b>	<b>-</b>	<b>10</b>
<b>4. Viva-Voce</b>	<b>-</b>	<b>05</b>
<b>5. Sessionals and Record</b>	<b>-</b>	<b>10</b>

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**Total - 50**

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**Devi Ahilya Vishwavidyalaya Indore (M.P.)**

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Session (सत्र) 2014–2015

**Scheme of Practical Examination 2014-15**

**M.Sc. III Sem. Botany (Practical – II)**

**(Based on PG 303 & 304)**

**Time : 4 hrs.**

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<b>1. Exercise based on Cytology</b>	<b>-</b>	<b>10</b>
<b>2. Exercise based on Genetics</b>	<b>-</b>	<b>05</b>
<b>3. Exercise based on Molecular Biology-</b>	<b>10</b>	
<b>4. Spot 1 to 5</b>	<b>-</b>	<b>10</b>
<b>5. Viva-Voce</b>	<b>-</b>	<b>05</b>
<b>6. Sessionals and Record</b>	<b>-</b>	<b>10</b>

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**Total            50**

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Session (सत्र) 2014–2015

## M. Sc. Botany (Semester System)

### Fourth Semester

#### Course PG 401: Plant Cell, Tissue and Organ Culture

85+15

- UNIT I: Plant tissue culture-General introduction and Scope.  
Concept of Totipotency and importance of totipotency in plant science.  
Concept of cytodifferentiation and organogenesis.  
General technique of plant tissue culture.  
Callus and suspension culture.
- UNIT II: Somatic embryogenesis.  
Organ culture-meristem, anther and embryo culture-Principle, techniques and significance.
- UNIT III: Protoplast culture-  
Principle, technique of isolation of protoplast and its significance.  
Viability testing of protoplast  
Protoplast fusion- methods and importance  
Hybrid selection and regeneration.  
Somatic hybridization.
- UNIT IV: Monoclonal variation - Role of tissue culture in Agriculture.  
Production of disease resistant plants, viral free plants.  
Stress resistant plants, Herbicide resistant plants.
- UNIT V: Application of plant tissue culture-clonal propagation  
Artificial seeds  
Production of secondary metabolites/natural products.  
Cryopreservation and Germplasm storage.

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Session (सत्र) 2014–2015

## **M. Sc. Botany (Semester System) Fourth Semester**

### **402: Biotechnology and Genetic Engineering.**

**85+15**

- UNIT I: Biotechnology- basic concept, principle and scope  
Recombinant DNA technology.  
Tools (Vectors and enzymes) and techniques.  
cDNA and genomic library.
- UNIT II: Agrobacterium mediated gene transfer  
Transposon tagging direct gene transfer techniques  
DNA finger printing.  
Polymerase chain reaction.
- UNIT III: Strategies for development of transgenic plants  
Transgenic plants –Ecological risk and ethical concern.  
Intellectual property rights
- UNIT IV: Genetic improvement of industrial microbes, Nitrogen fixers  
Fermentation technology- Basic concept, characteristic of ideal ferment or,  
Types of ferment or.  
Up stream and downstream processing  
Genomics-basic concept, types and strategies for genome analysis.
- UNIT V: Protein profiling technology and its application.  
Bioinformatics-Basic concept and its application in biological science.  
Genomic projects-basic concept.  
High through put sequencing  
Microarrays.

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Session (सत्र) 2014–2015

## **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

# 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) 2014–2015

Class / d{k	%	M.Sc.
Semester / I e{Vj	%	IV semester
Subject / fo"k;	%	Botany
Title of Subject Group	%	Industrial Microbiology
fo"k; I e{ dk 'k{k;d	%	Course PG 403
Paper No. / i{ui = d{kd	%	Compulsory / vfuok; l ; k
Optional / odfi d vfuok; l	%	Elective Paper
Max. Marks vf/kdre v{	%	85 + 15

## Particulars / fooj .k

Unit-1	Basic techniques in microbiology - Microscopy, staining techniques, Culture, Nutrition and growth of microorganisms. Replication and structure of viruses & other a cellular microorganisms, prokaryotic microorganisms, classification and diversity of Bacteria, Eukaryotic microorganisms.
Unit-2	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-3	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-4	Recovery of minerals by using microbes, Oil recovery, Biodeterioration, Mushroom culture, Biotech products including human insulin, Microbial Growth-Environmental influences, Physical control, Chemical control & Antibiotic controls.
Unit-5	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) 2014–2015

## M. Sc. Botany (Semester System)

### Fourth Semester 2014-15

#### Course PG 403: Elective Paper I Plant Taxonomy

85+15

#### UNIT I: Concept of Plant Taxonomy:

1. Basic Aims, Principle, phases and significance of Taxonomy.
2. Evolutionary trend of flower and in florescence.
3. History of plant exploration work in India.
4. Monophyly and polyphyly, Parallelism and convergence, Homology and Analogy, Primitive and advanced characters.

#### UNIT II: Classification:

1. History and Types of classification (Artificial, Natural and phylogenetic system of classification).
2. Principle, outline, merit and demerit of Bentham & Hooker : Engler & Prantle system of classification.
3. Principle, outline merit and demerit of Hutchinson and Cronquist system of classification.
4. Angiosperm phylogeny group system (APG) of flowering plant classification.

#### UNIT III: Nomenclature and plant identification:

1. Principle of plant nomenclature, Binomial nomenclature.
2. Rank of Taxa, Author citation, Nomenclatural Type, Rule of priority, Effective and valid publication, Rejection of Name.
3. Methods of collecting plant: Field collections preparation of plant specimen, documentation of plant collection (Field site Data, Plant Data)
4. 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 :

1. Taxonomy, Floral structure and phylogeny of order. Magnoliales, Rosales, Caryophyllales.
2. Taxonomy, Floral structure and phylogeny of order alismatales, Zingiberales, Orchidales.
3. Numerical Taxonomy and its importance.
4. Molecular characters and their importance in systematic.

UNIT V: Plant Geography:

1. Botanical region of India.
2. Speciation and species concept.
3. Phenotypic plasticity, physical factors affecting phenotypic plasticity.
4. Endemism and Endemic plants in India.

**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) 2014–2015

## M. Sc. Botany (Semester System)

### Fourth Semester

#### 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 production.
- 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.

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Session (सत्र) 2014–2015

Class / d{k	%	M.Sc.
Semester / I e{Vj	%	IV semester
Subject / fo"k;	%	Botany
Title of Subject Group	%	Plants & Society
fo"k; I e{ dk 'k{k;d	%	Course PG 403
Paper No. / i{ui = d{e;d	%	Compulsory / vfuo;k; l ; k
Optional / odfyid vfuo;k; l	%	Elective Paper
Max. Marks vf/kdre v;d	%	85+ 15

## Particulars / fo{j .k

Unit-1	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-2	Plants & 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-3	Plants in Entrepreneurial Areas-A: Techniques of cultivation and marketing of few Chlorophytum, Guggul, Commiphora wightii, Rauwolfia serpentina. Plants and other uses : Agriculture & Horticulture.
Unit-4	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-5	Plants in Entrepreneurial Areas - C: Techniques of cultivation and marketing of - Mushroom Cultivation, Nursery management, Vermiculture & 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) 2014–2015

## **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. Ethno botany.

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Session (सत्र) 2014–2015

Semester / सेमेस्टर	:	IV semester
Subject / विषय	:	Botany
Title of Subject Group	:	Plant Pathology
विषय समूह का शीर्षक	:	Course PG 404
Paper No. / प्रश्नपत्र क्रमांक	:	Compulsory / अनिवार्य या
Optional / वैकल्पिक अनिवार्य	:	Elective Paper 85+15

## Unit I

- (1) Nature and concept of plant disease, impact of plant disease pathological terms and definitions.
- (2) History and progress of plant pathology.
- (3) Agents of infectious disease: Fungi Bacteria Mycoplasma and Viruses.
- (4) Classification of plant disease.
- (5) Symptoms of plant disease
- (6) Methods of studying plant disease

## Unit II

- (1) Phenomenon of infection prepenetration, penetration and development of pathogen inside the host.
- (2) Role of enzyme, Toxins and hormones in pathogenesis.
- (3) Defense mechanisms in plants: Structural defense, Biochemical defence.
- (4) Effect of infection on physiology of the host plant.

## Unit III

- (1) Genetics of Virulence in pathogen and of resistance in host plant, physiological specialization and its significance.
- (2) Effect of environment on pathogenesis.
- (3) Survival of plant pathogens.
- (4) Dispersal of plant pathogens.

## Unit IV

- (1) General principles of disease control.
- (2) Chemical methods for plant disease control.
- (3) Biological control.
- (4) Chemotherapy.
- (5) Breeding for disease resistance

## Unit V

- (1) 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.

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Session (सत्र) 2014–2015

## **M. Sc. Botany (Semester System)**

### **Fourth Semester**

#### **Course PG - 404: Molecular Biology and Biotechnology**

**85+15**

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

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Session (सत्र) 2014–2015

<b>Class / d{k</b>	<b>%</b>	<b>M.Sc.</b>
<b>Semester / l e{Vj</b>	<b>%</b>	<b>IV Semester</b>
<b>Subject / fo"k;</b>	<b>%</b>	<b>Botany</b>
<b>Title of Subject Group</b>	<b>%</b>	<b>Pollution Ecology</b>
<b>fo"k; l e{ dk 'k'kd</b>	<b>%</b>	<b>Course PG 404</b>
<b>Paper No. / i{ui = d{kd</b>	<b>%</b>	<b>Compulsory / vfuok; l ; k</b>
<b>Optional / odfYi d vfuok; l</b>	<b>%</b>	<b>Elective Paper</b>
<b>Max. Marks vf/kdre v{d</b>	<b>%</b>	<b>85+ 15</b>

## Particulars / fo{j .k

Unit-1	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-2	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-3	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-4	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-5	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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Session (सत्र) 2014–2015

## M. Sc. Botany (Semester System)

### Fourth Semester 2012-13

#### Course PG 404: Elective Paper II

#### ETHNOBOTANY

**85+ 15**

- UNIT I:
1. Definition, Concept, relevance and Scope of Ethno botany.
  2. Sub disciplines of Ethno botany.
  3. Indian work of Ethno botany.
  4. Relation between Economic botany and Ethno botany.
- UNIT II:
1. Sources of Data and methods of study of Ethno botany.
  2. The origin and utility of some vernacular plant names.
  3. Sacred groves: - Concept, classification, distributions of sacred groves in India, threats to sacred groves, significance.
  4. Plants in Mythology.
- UNIT III:
1. Wild edible plants used by ethnic people.
  2. Ethno religious plants used by tribals.
  3. Ethnobotany and its role in Conservation of native plant genetic resources.
  4. Ethnobotanical plants used in different veterinary disease.
- UNIT IV:
1. Ethnobotanical importance of *Butea monosperma*, *Madhuca indica*, *Azadiracta Indica*.
  2. Ethnobotanical importance – *Buchnanian lanzan*, *Diospyros melanoxylon*, *Nyctanthes arbortristis*.
  3. Ethnobotanical plants used in fish poisoning, musical instruments.
  4. Totem and Taboos and their role in Conservation.
- UNIT V:
1. Study of common Ethnobotanical plants and their parts used in the treatment fever cough, bronchial Asthma, Tuberculosis.
  2. Study of common ethnomedicinal plants used in the treatment of skin disease Leukoderma, Expulsion of worm, Leprosy.
  3. Study of common ethnomedicinal plants used in dysentery , digestive problem , Abdominal disorder, jaundice, pipes.
  4. Study of common Ethnomedicinal plants used in Rheumatism, Bone fracture, Heart disease, urino-genital problem.

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Session (सत्र) 2014–2015

## Scheme of Practical Examination 2014-15

### M.Sc. IV Sem. Botany (Practical – I)

(Based on PG 401 & 402)

**Time – 4 Hrs.**

**Max. Marks - 50**

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<b>1. Exercise based on Tissue culture</b>	<b>-</b>	<b>10</b>
<b>2. Practical based on Biotechnology</b>	<b>-</b>	<b>15</b>
<b>3. Spot 1 to 5</b>	<b>-</b>	<b>10</b>
<b>4. Viva-Voce</b>	<b>-</b>	<b>05</b>
<b>5. Sessionals and Record</b>	<b>-</b>	<b>10</b>

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**Total - 50**

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Session (सत्र) 2014–2015

**Scheme of Practical Examination 2014-15**

**M.Sc. IV Sem. Botany (Practical – II)**

**(Based on PG 403 & 404)**

**Time – 4 Hrs**

**Max. Marks - 50**

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

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**Total - 50**

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**Project (As per Higher Education Instructions) – 100 Marks**