

Department of Higher Education, Govt. of M.P.
 Post Graduate Semester wise Syllabus
 as recommended by Central Board of Studies and approved by the Governor of M.P.

राज्य शिक्षा विभाग, म.प्र., रायसेन
 राजभाषाकार सहायको के सिद्धे सेमेस्टर अनुसार पाठ्यक्रम
 केन्द्रीय अध्ययन बोर्डद्वारा अनुमोदित तथा म.प्र. के राज्यपाल द्वारा अनुमोदित

Session (सत्र) 2019-2020

Class/वर्ग	:	M.Sc.
Semester/सेमेस्टर	:	I Semester
Subject/विषय	:	Botany
Title of Subject Group/विषय समूह का शीर्षक	:	Biology & Diversity of Viruses, Bacteria and Fungi
Paper No./पत्र क्र. क्रमांक	:	101
Compulsory/अनिवार्य या Optional/वैकल्पिक अनिवार्य	:	Compulsory Paper
Maximum Marks/अधिकतम अंक	:	42 → CCE 8 = 50 40 + 10

Particulars/विवरण

Unit-1	Viruses : characteristics and ultra-structure of viruses, isolation and purification of viruses; chemical and replication, transmission of viruses. economic importance. Archaeobacteria and Eubacteria: General acc ultra-structure, nutrition and reproduction
Unit-2	Classification of bacteria and economic importance. Actinomycetes, Mycoplasma, Rickettsiae, Chlamy and their significance. Cyanobacteria - salient features and biological importance. Mycology : classific and general characters of fungi;
Unit-3	Mycology : Cell ultrastructure, unicellular and multicellular organization; cell wall composition; nutri (saprobic, biotrophic, symbiotic) reproduction (vegetative asexual, sexual), substrate relationship in f heterothallic; parasexuality, recent trends in classification.
Unit-4	Phylogeny of Fungi : General account of Mastigomycotina, Zygomycotina, Ascomycotina, Mycorrhiz; as bio-control agents.
Unit-5	Phylogeny of Fungi : general account of Basidiomycotina, Deuteromycotina; fungi in industry, medicine as food; fungal diseases in plants and humans.

Suggested Readings :

- Alexopoulos, C.L. Mims, C.W. and Blackwell, M., 1996: Introductory Mycology, John Wiley & Sons Inc.
- Clifton, A., 1938: Introduction to Bacteria, McGraw-Hills Book Co. New Delhi.
- Madigan, M.L., Martinko, J. M and Parker Jack; 1997: Brock Biology Of Microorganisms, (8th ed) Prentice Hall, N. J. U.S.A.
- Mundahn, C.L., 1978: Introduction to Plant Viruses, Clarendon & Co. Ltd. Delhi.
- Mehrotra, R.S. and Anja RS; 1998: An Introduction to Mycology, New Age Intermediate Press.
- Rangaswamy, G. and Mahadevan, A; 1999: Diseases of Crop Plants in India (4th edition) Prentice Hall India Ltd. New Delhi.
- Webster, J.; 1925: Introduction to Fungi Cambridge University Press. Dabey, RC. & Malleshwari, D.K.

A Text Book of Microbiology, S. Chaud Publishers, New Delhi

Handwritten signatures and dates: D. Arora, K. Patil, A. Arora, Dr. A. Vermani 9/9/2019, Dr. Abhis Agnihotri @Agrawal

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उच्च शिक्षा विभाग, म.प्र. सरकार
 स्नातकोत्तर कक्षाओं के द्वि-सेमेस्टर अनुसार पाठ्यक्रम
 केन्द्रीय अध्ययन मण्डल द्वारा अनुमोदित तथा म.प्र. के राज्यपाल द्वारा अनुमोदित

Session (सत्र) 2019-2020

Class/कक्षा	:	M.Sc.
Semester/सेमेस्टर	:	I Semester
Subject/विषय	:	Botany
Title of Subject Group/विषय समूह का शीर्षक	:	Biology & Diversity of Algae and Bryophytes
Paper No./पत्र का क्रमांक	:	107
Compulsory/अनिवार्य या Optional/वैकल्पिक अनिवार्य	:	Compulsory Paper
Maximum Marks/अधिकतम अंक	:	40 40 + CCE/DB = 50

Particulars/विवरण

Unit-1	Algae in diversified habitats; thallus organization; cell ultrastructure; reproduction; criteria for classification; algae, pigments, reserve foods, flagella; classification.
Unit-2	Salient features of Protochlorophyta, Charophyta, Chlorophyta, Xanthophyta and Bacillariophyta.
Unit-3	Salient features of Phaeophyta and Rhodophyta; algal blooms; algal biofertilizers, algae as food, feed in industrial uses.
Unit-4	Morphology, structure, reproduction and life history of bryophyte; distribution classification and gener accounts of Marchantiales, Jungermanniales and Anthocerotales.
Unit-5	General accounts of Sphagnales, Funariales and Polytrichales; ecological and economic importance Evolution and Phylogeny of Bryophytes.

Suggested Readings :

- Smith G.M. : Cryptogamic Botany Vol I (2nd edition). Tata McGraw-Hill Publishing Company Ltd. Bombay, New Delhi.
- Kumar H.D. 1988 : Introductory Phycology. Affiliated East-West Press Ltd. New Delhi.
- Kashyap 1972 : Live Worts of Western Himalayas and Punjab. Research Publication.
- Pari P. 1980 : Bryophyta-Morphology, Growth & Differentiation. Atma Ram & Sons, Delhi.
- Pantar N.S. 1991 : Bryophyta. Central Book Depot. Allahabad.
- Rai Udar 1970 : An Introduction to Bryophyta; Shashidhar Malviya Prakashan.

Dr. C. D. Alkiya ✓
 Dr. A. K. Palawat ✓
 Dr. Ela Tiwari ✓
 Dr. Anita Arjaria ✓
 Dr. P. Khare ✓
 Dr. Archana Verma ✓ 7/9/2019

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Department of Higher Education, Govt. of M.P.
 Post Graduate Semester wise Syllabus
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उच्च शिक्षा विभाग, म.प्र. शासन
 स्नातकोत्तर कक्षाओं के लिये सेमेस्टर अनुसार पाठ्यक्रम
 केन्द्रीय अध्ययन मण्डल द्वारा अनुमोदित तथा म.प्र. के राज्यपाल द्वारा अनुमोदित

Session (सत्र) 2019-2020

Class/कक्षा	:	M.Sc.
Semester/सेमेस्टर	:	I Semester
Subject/विषय	:	Botany
Title of Subject Group/विषय समूह का शीर्षक	:	Biology & Diversity of Pteridophyta and Gymnosperms
Paper No./पत्र क्रमांक	:	103
Compulsory/अनिवार्य या Optional/वैकल्पिक अनिवार्य	:	Compulsory Paper
Maximum Marks/अधिकतम अंक	:	40+ CCBP+ 50

40

Particulars/विवरण

Unit-1	Morphology, anatomy, reproduction and life history of Pteridophyta, classification, evolution of seed habit, heterospory and origin of seed habit. Introduction to Psilopsida & Sphenopsida.
Unit-2	Introduction to Pteropsida, evolution and Phylogeny of Pteridophyta. Introduction of Gymnosperms: the vesselless and fruitless seed plants; evolution of gymnosperms. Classification of gymnosperms.
Unit-3	Gymnosperms distribution in India. Economic importance of gymnosperms. General account of Pteridospermales, Cycadeoidales and Cordaitales.
Unit-4	Structure, reproduction and interrelationships of Cycadales, Ginkgoales and Coniferales.
Unit-5	Structure, reproduction and interrelationships of Ephedrales, Welwitschiales and Gnetales. Complexity of female gametophytes.

Suggested Readings :

- Sporne, K.R. 1991 : The Morphology of Pteridophytes.
- Parihar N.S. 1996 : Biology and Morphology of Pteridophytes, Central Book Depot, Allahabad.
- Arnold C.A. : An Introduction to Paleobotany; Tata Mc Graw-Hill Publishing Co. New Delhi.
- Rashid A. 1999 : An Introduction to Pteridophytes; Vikas Publishing House Pvt. Ltd.
- Hattangar, S.P. and Moitra, A, 1996 : Gymnosperms. New Age International Pvt. Ltd. New Delhi.
- Sporne K.R. 1991 : The Morphology of Gymnosperms; Hutchinson Univ. Library; London.
- Sinha A.C. & Mishra S.P. : Essentials of Paleobotany, Vikas Publishing House Pvt. Ltd. Delhi.

29/08/2020

Dr. C.D. Allia *allia*
 Dr. A. Verma *20/9/2019*
 Dr. A.K. Patra *20/9/2019*
 Dr. Ela Tiwari *20/9/2019*
 Dr. Anila Arjalia *20/9/2019*
 Dr. P. Khare *20/9/2019*

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Department of Higher Education, Govt. of M.P.
 Semester wise syllabus for Postgraduates
 As recommended by Central Board of Studies and
 Approved by H.E. the Governor of M.P
Session 2008-09 31.15.20

M. Sc. Botany (Semester System)

First Semester

Course PG 104: Plant Ecology

40

- 11/08/2020
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- UNIT I: Population Ecology: Ecology ^{of} ecosystem; Definitions, Organization and components, Population & Environment; Population ecology, density & distribution; Nataly, 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-strategists.
- UNIT II: Community organization: Concepts of community and continuum; Analysis of community analytical and synthetic characters, Community coefficients and index of diversity, interspecific association negative and positive associations; Concept ecological niche; Concepts of biodiversity; evolution and differentiation of species; allopatric & sympatric speciation; ecads and ecotypes.
- UNIT III: Ecosystem development and stability: Temporal changes cyclic and non cyclic Succession processes & types; Mechanism of succession facilitation, Tolerance & inhibition models; Concept of climax, Persistence resilience and resistance. Ecological perturbation natural and anthropogenic, Ecosystem restoration.
- UNIT IV: Fate of energy in ecosystems: Trophic organization and structure, Food chains webs, energy flow pathways, Ecological efficiencies consumption, assimilation and production trophic, Primary production methods of measurement, Global patterns Limiting factors.
- UNIT V: Fate of matter in ecosystems: Recycling pathways; 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.

Suggested Readings

- Smith, R.L. 1996. Ecology and Field Biology, Harper Collins, New York.
 Muller-Dombois, D. and Ellenberg, H. 1974. Aims and Methods of Vegetation Ecology, Wiley, New York.
 Begon, M., Harper, J.L. and Townsend, C.R. 1996. Ecology, Blackwell Science, Cambridge.
 Ludwig, J. and Reynolds, J.F. 1988. Statistical Ecology, John Wiley & Sons.
 Odum, E.P. 1971. Fundamentals of Ecology, Saunders, Philadelphia.
 Odum, E.P. 1983. Basic Ecology, Saunders, Philadelphia.
 Barbour, M.G., Burk, J.H. and Pitts, W.O. 1987. Terrestrial Plant Ecology, Cummings Publication Company, California.
 Kormondy, E.J. 1996. Concepts of Ecology, Prentice-Hall of India Pvt. Ltd., New Delhi.
 Chapman, J.L. and Reiss, M.J. 1988. Ecology: Principles and Applications, Cambridge University Press, Cambridge, U.K.
 Moldan, B. and Balharz, S. 1997. Sustainability Indicators, John Wiley & Sons, New York.
- 31/9/2019

Department of Higher Education ,Govt. of M.P.
 Semester Wise Syllabus for Postgraduates
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 Session 2008-09

M.sc. Botany (Semester System)

Paper - I

M.M.-35 40

Second Semester

Course PG 201: Plant Development & Reproduction

Major Features of plant development; differences between animal and plant development. Organization of shoot apical meristem (SAM); control of tissue differentiation, especially Xylem and phloem; secretory ducts and laticifers. Wood development in relation to environmental factors. Leaf growth and differentiation. Organization of root apical meristem (RAM); cell fates and lineages; vascular tissue differentiation; lateral roots; root hairs. Root - microbe interaction. Vegetative options and sexual reproduction; flower development; genetics of floral organ differentiation; homeotic mutants in Arabidopsis and Antirrhinum; sex determination. Structure of anthers, microsporogenesis, role of tapetum, pollen development and gene expression. Male sterility; pollen germination, pollen tube growth and guidance. Pollen storage, pollen allergy and pollen embryos. Ovule development, megasporogenesis; organization of embryo sac; structure of embryo sac cells. Floral characteristics; pollination mechanisms and vectors; breeding systems; structure of pistil; pollen stigma interactions; sporophytic and gametophytic self - incompatibility. Double fertilization. Endosperm development during early, maturation and desiccation stages; embryogenesis; storage proteins of endosperms and embryo. Polyembryoni, apomixis. Dynamics of fruit growth; biochemistry and molecular biology of fruit maturation.

Readings

1. S.S and Bhatnagar, S.P. 2000. The Embryology of Angiosperms (4th Revised and enlarged edition). Vikas Publishing house, New Delhi.
 2. J. 1985. An introduction to Plant Cell Development. Cambridge University Press, Cambridge.
 3. R. and Van der Pijl, L. 1979. The Principles of Pollination Ecology. Pergamon Press, Oxford.
 4. A. 1982. Plant Anatomy (3rd Edition). Pergamon Press, Oxford.
 5. D.E. 1994. Plant Growth and Development. A Molecular Approach. Academic Press, San Diego.
 6. S.H. 1998. Molecular Genetics of Plant Development, Cambridge University Press Cambridge.
 7. P. Tucker S.C. and Endress, P.K. 1988. Aspects of Floral Development. J. Cramer, Germany.
 8. R.E. 1990. Plant Development. The Cellular Basis. Univ Hyman, London.
 9. P. T.M. and Thompson, W.E. 1988. Molecular Plant Development. Prentice Hall, New Jersey.
 10. R.M. and Yeo, P. 1973. The Pollination of Flowers. William Collins Sons, London.
 11. S. Y. 1999. Development Biology of Flowering Plants. Springer - verlag.
 12. B.J. Kriedermann, P.E. and Jumbull, C.G.N. (eds) 1999. Plants in Action: Adaptation in Nature, Success in Cultivation, MacMillan Education, Sydney, Australia.

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 Session 2008-09

M.sc. Botany (Semester System)

Second Semester

Course PG 202: Morphology & Taxonomy of Angiosperms

Paper-II
 M.M. ~~35~~ 40

- UNIT I: Morphology of stamens and carpel's; carpel evolution. Morphology of inferior ovary; placentation types and their origin.
- UNIT II: The species concept : Taxonomic hierarchy; species, genus, family and other categories; principle used in assessing relationships, delimitation of taxa and attribution of rank. Salient features of international code of Botanical Nomenclature.
- UNIT III: Taxonomic evidence : morphology, anatomy, palynology, embryology, cytology, phytochemistry, genome analysis and nucleic acid hybridization. Relevance of taxonomy to conservation.
- UNIT IV: Taxonomic tools: Herbarium, floras, Description & major families and study of local flora. Local plant diversity and its socio -- economic importance.
- UNIT V: Systems of angiosperm classification : phenetic versus phylogenetic systems; cladistics in taxonomy; relative merits and demerits of major systems of classification. Endemism, hot spots, hottest hot spots; plant explorations; invasions and introductions.

Suggested Readings

Heywood & Moore, D.M; 1984 : CW Tent concept in Plant Taxonomy Academic Press.
 Cron, L.B.; 1957 : Plant classification, Heath & Co. Boston.
 Davis, P.R & Heywood, V.H 1973 : Principles of Angiosperms and Taxonomy, Robert E. Kreiger & Co. New York, USA.
 Jones, A.L; 1961 : Morphology of Angiosperms, Mc - Graw Hill , New York.
 Jeffrey, C ; 1968 : An Introduction to Plant Taxonomy J. & H. Churchill Limited.
 Lawrence G. H.M. ; 1951 : Taxonomy of Vascular Plants Macmillan, New York.
 Leitch V.N. ; 1984 : Taxonomy of Flowering Plants. San Francisco. Radford - AE. Dickinson, W.C.
 Massey J.R and Ben C.R: 1974 : VQ - llar Plant Systematics, Harper & Row, New York.

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 Session 2008-09

M.sc. Botany (Semester System)

Paper-III
 M.M. 35 40

Second Semester

Course PG 203: Utilization & Conservation of Plant Resources

29/08/2020

Biodiversity : Major Biomes of the world, Tropical rain & Seasonal Forests.
 Temperate rain & Seasonal forests. Boreal forests. Grasslands, Deserts ; Aquatic
 Ecosystems, wetlands, Lakes & Ponds Streams & Rivers, Marine & Estuarine habitats.
 Sustainable Development : Resource utilization; Status & Utilization of Biodiversity;
 Sustainable development and utilization of resources from forest, Grassland and aquatic
 habitats. Food forage, Fodder, Timber & Non - wood forest products; Threats to quantity
 & quality of Resources due to overexploitation.

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Strategies for 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, in
 vitro repositories, cryo - banks .

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Pollution & Climate Change : Air, Water and Soil Pollution , Kinds, Sources, Quality
 parameters, Effects on structure & function of ecosystems; Management of pollution;
 Bioremediation; Climate changes sources, Trends & role of greenhouse gases, Effect of
 global warming on climate, Ecosystem processes & Biodiversity; Ozone layer & Ozone
 hole.

Resource Monitoring : Remote sensing concepts & Tools, Satellite remote sensing basics
 sensors, Visual & Digital interpretation, EMR bands and their applications; Indian
 remote sensing program; Thematic mapping of resources; Application of remote sensing
 in Ecology & forestry.

Readings

B. and Billharz, S. 1997. Sustainability Indicators. John wiley & Sons, New York.
 M. 1985. Air Pollution and Plant Life. Wiley Interscience.
 V.H. and Watson. R.T. 1995. Global Biodiversity Assessment. Cambridge University Press.
 C.F. 1991. Biology of Freshwater Pollution. Longman.
 K. 1997. Understanding Environmental Pollution. Cambridge University Press.
 X.C. 1990. The Nature and Properties of Soils. MacMillan.
 Aya, K.S., Singh, P.H. and Dhillon, H.S. 1994. Tree Directory of Chandigarh. Lovedale
 Press, New Delhi.
 N.B. et al (Eds) 1998. Sustainable Management of Non - wood Forest Products.
 University Putra Malaysia. 434004 PM Serdang, Selangor, Malaysia.
 S. and Arora, R.K. 1991. Plant Genetic Resources Conservation and Management. IPGRI
 South Asia Office, C/o NBPGR, Pusa Campus, New Delhi.
 D. and Hall, C.W. (eds) 1989. Food and Natural Resources. Academic Press London - New York.

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 Session 2008-09

M.sc. Botany (Semester System)

Second Semester
 Course PG 204: Cell Biology of Plants

Paper-18
 M.M. - 55 40

Structure organization of the plant cell: specialized plant cell types. Structure and functions of cell wall, biogenesis; growth. Cytoskeleton: organization and role of microtubules and microfilaments; motor movements.
 Plasma membrane: Structure, models and functions; sites for ATPases; ion carriers, channels and pumps; receptors. Structure of plasmodesmata, role in movement of molecules; comparison with gap junctions.
 Chloroplast: Structure, genome organization, gene expression, nucleo-chloroplastic interactions; mitochondria: Structure, genome organization, biogenesis. Plant vacuoles: tonoplast membrane, ATPases, transporters, as storage organelle. Other cell organelles: gogli apparatus, lysosomes, endoplasmic reticulum.
 Nucleus: structure. Cell cycle: control mechanisms; role of cyclins and cyclin-dependent kinases, mechanisms of programmed cell death. Chromosome structure and packaging of DNA; nucleomatin and heterochromatin; karyotype analysis and evolution; banding patterns; specialized types of chromosomes.
 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.

Readings

1. 2000, Genes VII. Oxford University Press, New York.
 2. Bray, D. Lewis, J. Ratf, M. Roberts, K. and Watson, J.D. Molecular Biology of the Cell. Garland Publishing: Inc. New York.
 3. Alberts, B. Molecular and cellular Biology, Wadsworth Publishing Co., California, USA.
 4. Raven, P.H. 1998. Plant Biology, Wadsworth Publishing Co. California, USA.
 5. Foy, K.V. 2000 Methods in cell wall Cytochemistry, CRC Press, Boca Raton, Florida
 6. B.B. Griessem, W. and Jones, R.L. 2000. Biochemistry and Molecular Biology of Plants. American Society of Plant Physiologists, Maryland, USA
 7. 2000: Plant cell Vacuoles: An Introduction. CSIRO Publication, Collid 18W - Australia.

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Paper I

Department of Higher Education, Govt. of M.P.
 Post Graduate Semester wise Syllabus
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 उत्तर विद्या विभाग, म.प्र. सरकार
 मध्य प्रदेश सरकार के शिक्षा विभाग द्वारा अनुमोदित
 केंद्रीय बोर्ड के सिद्धी परीक्षा अंगुली अनुसार

Session (वर्ष) 2019-20 20.1.19 - 20

Class / कक्षा : M. Sc.

Semester / सेमेस्टर : III semester

Subject / विषय : Botany

Title of Subject Group : Plant Physiology

Paper No. / प्रश्नपत्र क्रमांक :

Compulsory / अनिवार्य या Optional / वैकल्पिक अनिवार्य : PG 301

Max. Marks अधिकतम अंक 4240 : Compulsory

: 15-50-10+10

Particulars / विवरण

Unit-1	Structure and functions of ATP. Plant water relations, mechanisms of water transport through xylem, root-microbe interactions in facilitating nutrient uptake. Membrane transport proteins.
Unit-2	Phloem transport, phloem loading and unloading, passive and active solute transport. Signal transduction; overview, receptors and proteins, phospholipids signaling, role of cyclic nucleotides, calcium-calmodulin cascade. Specific signaling mechanisms, for example, two-component sensor regulator system in bacteria and plants.
Unit-3	Plant growth regulators 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-4	Flowering process, photoperiodism and its significance, endogenous clock and its regulation. Floral induction and development. Phytochromes and cryptochromes, their photochemical and biochemical properties, Role of vernalization.
Unit-5	Stress physiology. Plant responses to biotic and abiotic stress. Water deficit and drought resistance. Salinity stress and resistance. Concepts of freezing, heat and oxidative stresses.

10/08/2020

Dr. Abhishek Verma

Suggested Laboratory Exercise based on P.G 301 :

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

Dr. Archana Verma

5/11/19

1. Dr. C. O. Athia *CA* 2. Archana Verma *AV*

3. Dr. A. K. Patil *AKP*

Dr. Abhishek Verma
@gwal

4. Dr. Ela Tiwari *ET*

5. Dr. Anila Arjuna *AA*

6. Dr. Pratima Khare *PK*

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 Post Graduate Semester wise Syllabus
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 उच्च शिक्षा विभाग, म.प्र. शासन
 मध्य प्रदेश सरकार के शिक्षा विभाग द्वारा अनुमोदित
 केंद्रीय अध्ययन समिति द्वारा अनुमोदित तथा म.प्र. के राज्यपाल द्वारा अनुमोदित

Session (सत्र) 2010-2011 2019-20

Class / कक्षा : M.Sc.
 Semester / सेमेस्टर : III semester
 Subject / विषय : Botany
 Title of Subject Group : Plant Biochemistry & Metabolism
 विषय समूह का शीर्षक :
 Paper No. / प्रश्नपत्र क्रमांक : PG 302
 Compulsory / अनिवार्य या Optional / वैकल्पिक अनिवार्य : Compulsory
 Max. Marks अधिकतम अंक ~~45+45+50~~ 40 + 10

Particulars / विवरण

Unit-1	Fundamentals of enzymology: allosteric mechanism, regulatory and active sites, Isozymes, kinetics of enzymatic catalysis, Michaelis-Menten equation and its significance, Mechanism of enzyme action.
Unit-2	Photochemistry and photosynthesis: General concepts, evolution of photosynthetic apparatus, photosynthetic pigments and light-harvesting complexes. Photoreduction of water, mechanism of electron and proton transport, Carbon assimilation, Calvin cycle, photorespiration and its significance, C ₃ -cycle, CAM pathway, physiological and ecological considerations.
Unit-3	Respiration and lipid metabolism: Overview of plant respiration, glycolysis, TCA cycle, electron transport and ATP synthesis, Oxidative pentose phosphate pathway, glyoxylate cycle, alternative oxidase system.
Unit-4	Structure and functions of lipids, fatty acid biosynthesis, structural lipids and storage lipids and their catabolism. Sulphate uptake, transport and assimilation.
Unit-5	Nitrogen fixation, nitrogen and sulphur metabolism: Overview, biological nitrogen fixation, nodule formation, Mechanism of uptake and reduction, ammonium assimilation.

PG/302 Unit-5

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 Phosphatase, 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.

Dr. C.D. Athig
 Dr. A.K. Patra
 Dr. Ela Tiwari
 Dr. Amita Arjuna
 Dr. Pradip Khare
 Dr. Pratana Verma
 Dr. Ashok

Department of Higher Education, Govt. of M.P.
 Post Graduate Semester wise Syllabus
 as recommended by Central Board of Secondary and approved by the Government of M.P.
 उत्तर विद्या विभाग, ग.वि. म.प्र.
 अनुसंधान विभाग के द्वारा तैयार किया गया पाठ्यक्रम
 केंद्रीय अख्यक-मन्त्रालय द्वारा अनुमोदित तथा म.प्र. के राज्यपाल द्वारा अनुमोदित

Session (03) 2019-2020

Class / कक्षा : M.Sc.
 Semester / सेमेस्टर : III semester
 Subject / विषय : Botany
 Title of Subject Group : Genetics & Cytogenetics
 विषय समूह का शीर्षक :
 Paper No. / प्रश्नपत्र क्रमांक : PG 103
 Compulsory / अनिवार्य या Optional / वैकल्पिक अधिवार्य : Compulsory
 Max. Marks अधिकतम अंक 42 40 45+45=90 100+10

Particulars / विवरण

Unit-1	Genetics of prokaryotes and eukaryotic, genetic recombination in prokaryotes, genetic transformation, conjugation and transduction in bacteria. Genetics of mitochondria and chloroplasts, cytoplasmic male sterility
Unit-2	Genetic recombination and genetic mapping in eukaryotes. Recombination, independent assortment and crossing-over, molecular mechanism of recombination. Chromosome mapping, linkage groups, genetic markers, construction of molecular maps, somatic cell genetics- an alternative approach to gene mapping
Unit-3	Mutations spontaneous and induced mutations, physical and chemical mutagens, molecular basis of gene mutations. Transposable elements in prokaryotes and eukaryotes. Mutations induced by transposons, DNA damage and repair mechanisms
Unit-4	Cytogenetics of numerical and structural changes of chromosomes. Euploidy, aneuploidy origin, meiosis and effect. Cytogenetics of deficiencies, duplication, inversions and translocation
Unit-5	Molecular Cytogenetics, Nuclear DNA content, c-value paradox, col curve and its significance, restriction mapping – concept and techniques, multigene families and their evolution. Transfer of whole genome, examples from wheat and <i>Brassica, Arabidopsis</i>

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Suggested Laboratory Exercise based on P.G. 103 :

1. Isolation of DNA & preparation of Y of curve
2. Demonstration of SEM & TEM
3. Isolation of Mitochondria and its marker enzyme, succinate dehydrogenase (SDH)
4. Demonstration of Mitosis/ Meiosis (chemical & allopurinol)

Dr. C. D. Atwiga
 Dr. A. K. Patil
 Dr. E. la. Tiwari
 Dr. Anita Aryanig
 Dr. Pratiksha K. [Signature]

Department of Higher Education, Govt. of M.P.
 Post Graduate Semester wise Syllabus
 as recommended by Central Board of Studies and approved by the Government of M.P.
 एवं उच्च शिक्षण विभाग द्वारा मंजूर
 एम. एड. स्तर पर प्रस्तावित एवं म. प्र. सरकार द्वारा मंजूर
 एम. एड. स्तर पर प्रस्तावित एवं म. प्र. सरकार द्वारा मंजूर

Session (III) 2019-2020

Class / कक्षा : M.Sc.
 Semester / सेमेस्टर : III semester
 Subject / विषय : Botany
 Title of Subject Group : Molecular Biology
 विषय समूह का शीर्षक :
 Paper No. / प्रश्नपत्र संख्या : PG 304
 Compulsory / अनिवार्य या Optional / वैकल्पिक अनिवार्य : Compulsory
 Max. Marks अधिकतम अंक : 35+10+15=60 40+10

Particulars / विवरण

Unit-1	DNA structure; A, B and Z forms; transcription; plant promoters and transcription factors; splicing; messenger RNA transport; ribosomal RNA biosynthesis
Unit-2	Gene structure and expression; genetic fine structure; cis-trans test; fine structure analysis of eukaryotes, introns and their significance; RNA splicing; regulation of gene expression in prokaryotes and eukaryotes.
Unit-3	Ribosomes: structure and site of protein synthesis, mechanism of translation, initiation, elongation and termination, structure and role of transfer RNA; protein sorting, targeting of proteins to organelles
Unit-4	Cell cycle and apoptosis, control mechanisms; role of cyclins and cyclin dependent kinases, cytokinesis and cell plate formation; mechanism of programmed cell death; DNA replication in prokaryotes and eukaryotes
Unit-5	Immunotechniques, in situ hybridization - concepts and techniques, physical mapping of genes on chromosomes. In situ hybridization to locate transcript in cell types; FISH, Flow cytometry.

Suggested Laboratory based on PG 304:

1. Isolation of genomic DNA from plant tissue using CTAB (cetyltrimethyl ammonium bromide) or any animal tissue.
2. Isolation of DNA & its quantitation by a spectrophotometric method.
3. Restriction digestion of plant DNA, its separation by Agarose gel electrophoresis and visualization by ethidium bromide staining.
4. Isolation of RNA and quantitation by a spectrophotometric method.
5. Separation of RNA by Agarose gel electrophoresis and visualization by Et. Br. staining.
6. Immunological techniques: Double antibody method, ELISA & western blotting.
7. Isolation of chloroplasts and SDS-PAGE; profile of proteins to demarcate the two subunits of Rubisco.

Other experiments based on theory paper.

- 1 - Dr. C.D. Atriya
- 2 - Dr. Archana Verma
- 3 - Dr. A.K. Pateng
- 4 - Dr. Elq Tiwari
- 5 - Dr. Anita Arjani
- 6 - Dr. Pratima Khare

Dr. Archana Verma

08/10/20

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Department of Higher Education, Govt. of M.P.
 Post Graduate Semester wise Syllabus
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उच्च शिक्षा विभाग, म.प्र. शासन
 स्नातकोत्तर कक्षाओं के लिये सेमेस्टर अनुसार पाठ्यक्रम
 केंद्रीय अध्ययन मण्डल द्वारा अनुमोदित तथा म. प्र. की राज्यपाल द्वारा अनुमोदित

Session (सत्र) 2010-2011
 Total 50

Semester / सेमेस्टर
 Subject / विषय
 Title of Subject Group
 प्रश्न संख्या का शीर्षक
 Paper No. / प्रश्नपत्र क्रमांक
 Compulsory / अनिवार्य या Optional / वैकल्पिक अनिवार्य
 Marks अधिकतम अंक

: M.Sc
 : IV semester
 : Botany
 : Plant Cell, Tissue & Organ Culture
 : PG 401 P I
 : Compulsory
 : ~~PG 401~~ + ECE 15 = 30 40

Particulars / विवरण

Unit-1	Plant cell and tissue culture: general introduction, history, scope, concept of cellular differentiation and totipotency.
Unit-2	Techniques of tissue culture. Organ culture - meristem, anther and embryo. In vitro fertilization.
Unit-3	Organogenesis and adventive embryogenesis; fundamental aspects of morphogenesis, somatic embryogenesis and androgenesis. Mechanisms, techniques and utility.
Unit-4	Somatic hybridization, protoplast isolation, fusion and culture, hybrid selection and regeneration; possibilities and achievements and limitations of protoplast research.
Unit-5	Application of plant tissue culture: clonal propagation; artificial seeds; production of hybrids, somaclones and somaclonal variation; production of secondary metabolites/natural products; cryopreservation and germplasm storage.

29/08/2020

Suggested Laboratory Exercise based on P.G 401 :

1. Sterilization techniques.
2. Preparation of culture medium.
3. Sterilization of medium.
4. To prepare tissue culture lab.
5. Sterilization of glassware.
6. Preparation of tissue culture medium.
7. Sterilization of Explants.
8. Study effect of plant growth hormones (PGR) on tissue culture.
9. To perform the techniques of micro propagation/ somatic embryogenesis /androgenesis.
10. To perform the techniques of organogenesis.
11. Study of applications of tissue culture.

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Department of Higher Education, Govt. of M.P.
Post Graduate Semester wise Syllabus
as recommended by Central Board of Studies and approved by the Governor of M.P.
एच्छ शिक्षा विभाग, म.प्र. शासन
स्नातकोत्तर स्तरावरी लेलिये सेमेस्टर अनुसार पाठ्यक्रम
केन्द्रीय अध्ययन मण्डल द्वारा अनुमोदित तथा म. प्र. के राज्यपाल द्वारा अनुमोदित
Session (सत्र) 2010-2011

1. Prashant
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: M.Sc.
: IV semester
: Botany
: Biotechnology & Genetic Engineering

: PG 402 P II
: Compulsory
: 35 + CCE-15-50-40

Particulars / विवरण

Biotechnology; basic concepts, principles and scope. Intellectual Property Rights - possible ecological risks and ethical concerns.
Basic concepts of Recombinant DNA technology; gene cloning - principles and techniques; construction of genomic/ cDNA libraries; choice of vectors; DNA synthesis and sequencing, polymerase chain reaction. DNA fingerprinting
Genetic engineering of plants, aims, strategies for development of transgenics (with suitable examples); <i>Agrobacterium</i> - the natural genetic engineer; T-DNA and transposon mediated gene tagging; chloroplast transformation and its utility.
Microbial genetic manipulation; bacterial transformation; selection of recombinants and transformants; genetic improvements of industrial microbes and nitrogen fixers; fermentation technology.
Genomics and Proteomics; genetic and physical mapping of genes; molecular markers for introgression of useful traits; artificial chromosomes; high throughput sequencing; genome projects; bioinformatics; functional genomics; microarrays; protein profiling and its significance.

M.D.S.

Prashant
Feb 2011

Laboratory Exercise based on P.G 402 :

- prepare biotechnology lab. Prashant 13/14/15
- demonstrate growth characteristics of E.coli using plating method. Prashant 13/14/15
- demonstrate growth characteristics of E.coli by turbidimetric method. Prashant 13/14/15
- demonstration of DNA sequencing by Sanger's dideoxy method. Prashant 13/14/15
- demonstration of DNA and preparation of 'Cot' curve. Prashant 13/14/15

Prashant

COZE
31/01/12

COZE
13/14/15

Prashant
9/8/12

NA

29/08/2010

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Department of Higher Education, Govt. of M.P.
 Post Graduate Semester wise Syllabus
 as recommended by Central Board of Studies and approved by the Governor of M.P.
 उच्च शिक्षा विभाग, म.प्र. शासन
 पनाकसोलाय पत्राची के सिधे सेमेस्टर अनुसार पाठ्यक्रम
 केंद्रीय उच्चशिक्षण मण्डल द्वारा अनुमोदित तथा म. प्र. के राज्यपाल द्वारा अनुमोदित

Session (सत्र) 2010-2011

- : M.Sc.
- : IV semester
- : Botany
- : Forest Biology, Forest Vegetation of India and Management of Forest Resources

III Sem.
 Elective Paper
 35 - CEE-15 - 30 - 40

कक्षा / कक्षा
 क्रमांक / सेमेस्टर
 विषय / विषय
 Title of Subject Group

पत्र संख्या का शीर्षक
 Paper No. / प्रश्नपत्र क्रमांक
 Compulsory / अनिवार्य या Optional / वैकल्पिक अनिवार्य
 Max. Marks अधिकतम अंक

Particulars / विवरण

Unit-1	Introduction:- Forest and National Development. Forest composition, Forests in our national policy, Forest influences. Forest produce, Important non-wood forest products (NWFP). Forest & erosion, Forest & Man, Ethno botany in relation to Forest.
Unit-2	Locality factors of the forests: Climate : temperature, forest clouds, monsoon in India. light and wind. Edaphic and Biotic factors, Forest fire and control. Distribution of Epiphytes and the factors controlling them.
Unit-3	Phytogeographical regions of India Classifications of forests, Floral types of Indian forest, grasslands of India. Classification of forests of M.P., grassland of M.P., Biosphere reserve of M.P. Forest vegetation of Pachmarhi and Baster area.
Unit-4	Role of FRI (Forest research institute). Functional processes with in forest: - 1. Energy and organic matter dynamics. 2. Minerals and nutrient turn over. 3. Diversity and their conservation Natural and artificial regeneration of Forest. Afforestation and impact of afforestation on global climate.
Unit-5	Social forestry, Farm Forestry, Wasteland reclamation theory, Forest growth and forest Resource management, Forest in National economy, Environmental Laws, UNEP, IUCN, ICRAF. Ecology of Sal and Teak. Wild life Management: Silviculture approach and the management of Forest, Principles of forest protection - protection against fire, Grazing and Human interferences.

PRACTICALS: Laboratory exercises corresponding to theory courses covering all Units.

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Department of Higher Education, Govt. of M.P.
 Post Graduate Semester wise Syllabus
 as recommended by Central Board of Studies and approved by the Governor of M.P.

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राज्य शिक्षा विभाग, मध्य प्रदेश
 स्नातकोत्तर वर्षाओं के लिये सेमेस्टर अनुसूचक पाठ्यक्रम
 केन्द्रीय आयोग मन्त्रालय द्वारा अनुमोदित तथा मध्य प्रदेश के राज्यपाल द्वारा अनुमोदित
 Session (सत्र) 2016-2017

Class/कक्षा	:	M.Sc.
Semester/सेमेस्टर	:	IV Semester
Subject/विषय	:	Botany
Title of Subject Group/विषय समूह का शीर्षक	:	Ethnobotany
Paper No./पत्र क्रमांक	:	404
Compulsory/अनिवार्य या Optional/वैकल्पिक अनिवार्य	:	Elective Paper
Maximum Marks/अधिकतम अंक	:	42+CCS 8 = 50 40

Particulars/विवरण

Definition and scope of Ethnobotany	Historical review and outline idea of archaioethnobotany. Ethnocoology, Ethnomedicines, Ethnopharmacology, Ethnobotany, Ethnolinguistics, Ethnoorthopaedics, Ethnopaediatrics.
Preservation of Genetic diversity, plants used in various systems of medicines, Ayurvedic, Unani and Homoeopathic system. Allopathic systems. Plants used by villagers and tribal people, Role of ethnobotany in the development of Society.	
Ethnobotanical importance of :	Aconium napellus, Allium cepa, Mentha arvensis, Allium sativum, Strichnos nux-vomica, Aloe vera, Ocimum sanctum, Atropa belladonna, Azadirachta indica, Piper nigrum, Butea monosperma, Pterocarpus ratanjium, Eugenia aromatica, Eugenia jambolana, Terminalia arjuna, Terminalia bellerica, Terminalia chebula, Hollarhena antidysenterica, Withania somnifera, Lawsonia inermis,
Plants in mythology, Taboos and Totems in relation to plants, folklore and folk tales, Wild life protection in tribal, plants domestication by the tribal, plants in similes and metaphors.	
Ethnobotanical importance of :	Casia fistula, Cannabis sativa, Ricinus communis, Emblica officinalis, Santalum album
Detailed study of the common plants and their parts used in the treatment of following diseases :	Expulsion of worms, Skin diseases, Bronchial inflammation & Asthma Tuberculosis, Urino - genital problems, Amoebic dysentery, Malaria, Rheumatism, Leprosy, Jaundice, Heart diseases, Piles, Leukoderma

PRACTICALS : Laboratory exercises corresponding to theory courses covering all Units.
 Identification and characters of Ethnomedicinal plant & their different plants used in ethnomedicine.
 Prepare an Herbarium of Ethnomedicinal plants.
 Duration tour in medical factories & garden of medical plants.

11/8/16
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