GOVT. M. H. COLLEGE OF HOME SCIENCES AND SCIENCE FOR WOMEN (AUTO.), JABALPUR (M.P.)

Department of Botany

Syllabus

POST GRADUATE

2023-24

RANI DURGAVATI VISHWAVIDYALAYA, JABALPUR

SYLLABUS PRESCRIBED FOR

THE EXAMINATION OF DEGREE OF THE MASTER OF SCIENCE IN BOTANY

Session 2023-2024

[UNDER SEMSTER EXAMINATION AT PG LEVEL ORDINANCE NO 79 & 156]

This brochure of the programme for the M.Sc. degree in Botany consists of three parts, viz., (A) Information from the relevant Ordinance(S)/Statutes. (B) Scheme of examination and (C) Course of Study.

(A) INFORMATION FROM THE RELEVANT ORDINANCE (S)/ STATUTES

1. DURATION OF THE COURSE

M.Sc. Botany will be a full time two-year programme to be covered in four semesters, each of six months duration. The 1 year of the programme will complete the I and II semesters, and the second year will complete the third and fourth semesters.

2. ADMISSION TO THE COURSE

The number of seats shall be in accordance with the directives by the university. A candidate, who after having secured the B.Sc. degree with at least 45% marks from a recognized university with a subject of Life Science, shall be eligible for admission to the course. The admission to the course will be on the basis of the merit and according to guidelines from the University and Government of Madhya Pradesh. After the term-end examination at the end of each semester, the student will be provisionally admitted to the next semester. Each semester will be followed by a break not exceeding 15 days.

3. TUTION AND OTHER FEES

The admitted candidate shall pay the course fee in addition to the tuition fee and such other fees as prescribed by the University.

4. PROGRAM OF THE STUDY

There will be four theory papers along with two practicals in each semester excepts for the 4th semester where every student will carry out and submit a dissertation. The syllabus for the theory and practical examination will be prescribed by the Board of Studies in Botany. R.D. University, Jabalpur.

5. INTERNAL ASSESSMENT (CONTINUOUS COMPREHENSIVE EVALUATION SYSTEM)

Written tests:- There will be a mid semester examination of one & half hour duration for each paper having fifteen marks. These tests will be conducted for each of the paper by the teachers conducting the course concerned, the result will be declared within a week from the date of the test.

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Students Participation in the course:

The student whose attendance is less than 75% will not be allowed to appear in the term end examination and he/she will be declared fail in that semester.

6. Term- End Examination: There shall be term (Semester) examination at the end of first, second & third semester. The semester examination will be held every year normally in December and June or on the dates declared in the academic calendar of the Department/University. A student seeking admission to a semester examination will submit through the Head of the Department his/her application on the prescribed form along with required examination fee, etc. to the Registrar of the University. According to the recommendation of standing committee dated 05 September, 2011 & approved by Executive Council dated 16 September, 2011 every student pursuing M.Sc. Botany course will appear in four respective theory papers and two practical examinations in all the semesters except for the UTD students for the UTD students in the fourth semesters. Every student will be allotted dissertation work in lieu of four theory papers. Allotment of the dissertation will be done by a committee comprising of the Dean of Faculty of Life Science. I lead of Department of Biological Science, one Professor and one Reader of the Department by rotation according to seniority. The students can be permitted to pursue their dissertation work out of the Department/University at the institution/Universities duly recognized by a statutory body. In such cases, there will be two supervisors, one from the parent department and another from the place where the student completes his/her dissertation work. The dissertation will be evaluated by the external examiner who has expertise in the concerned subject. For the purpose of the holding viva-vose, the supervisor will be the internal examiners along with the external examiner who has evaluated the dissertation. The scheme of marks for evaluating the various components of the dissertation will be followed as given in the syllabus.

7. Condition for a Pass : For passing the examination in each semester, a candidate must have secured a minimum of 34% marks in each theory paper and internal assessment and 40% marks in each practical and project/assignment/seminar separately. The students who do not pass a semester examination shall get an opportunity to appear in the subsequent examination of the semester in the paper in which they have failed. Provided, any student who fails in two consecutive semesters will not be given privileges of this class. Meanwhile, they will be allowed to keep term (ATKT) in the next semester. For passing in a semester examination, a candidate must also secure at least 40% marks of a semester.

A candidate shall be eligible for ATKT provided he/she obtains 34% mass in a least two theory paper individually, permitted to go to next semester. However, if a candidate fails in aggregate of marks can appear in any one of the theory papers to clear it with the given more than two chances to clear his ATKT in theory paper/practical. If he/she fails to fulfill this condition, he/she shall have to appear in the fall semester examination as a fresh. If a candidate who fails in not more than two papers (Theory/Practical/Internal Assessment/Project) in any one semester examination but clear all the remaining papers of the examination, he/she will be "Allowed to keep the term" ATKT and will be promoted to the next semester. If a candidate fails to clear more than two papers out of eight papers (four of first semester and four of second semester) then he/she shall be permitted to appear as a Ex-student. At any given time is semester, the

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student shall not be allowed to carry more than two papers as ATKT. The students at admitted in first semester and if they get ATKT in any two papers (Theory/Practical/Internal Assessment/Project) of first semester shall be entitled to appear in ATKT examination along with the regular examination of third semester.

- A candidate who fails or absent in internal assessment of any paper/project work will be treated as having ATKT in a paper, and he/she will be allowed to complete the same during the examination of concerned semesters.
- The students who have passes all the papers (Theory/ Practical/ Internal Assessment/ Project) of first and second semester will be entitled to admission in the forth semester.
- If a student failed in the examination of any semester and get minimum passing marks in Practical/ Internal Assessment/ Project, then he/she will be exempted from reappearing in Practical/ Internal Assessment /Project work in the next semester. The marks of Practical/Internal Assessment/Project work of such candidate will be carried forward in the next examination.
- There will be no provision for reevaluation. However the candidates can apply for Re-totaling in one subject per semester. No candidate shall be allowed to appear in the Semester Examination unless one has:
  - Attended at least 75% of the lectures and practical delivered.
  - Paid all the fee due.
  - Obtained "NO DUES" certificate from the concerned Department/institution.

8. RESULT

The result of the candidate will be declared on the basis of aggregate of marks obtained by him/her in all the semester examinations taken together. The division shall be awarded on the basis of marks obtained in Internal Assessment and University examination (Theory and Practical both) taken together.
60% or above – First Division
48% or above – Second Division
Above 40% but less than 48% Third Division

9. A candidate is required to complete the entire course of postgraduate degree within a maximum period of three years from the session of first admission necessarily.

10. Grace of one mark will be awarded for passing in each semester and for improvement division in the final semester by Vice Chancellor.

11. In matters of admission, attendance, examinations and in all other matter not provided in the ordinance, the course shall be governed by the provisions of the relevant ordinance of the same in the university so far as they are not incongruous with the provisions of this ordinance.

12. In case of any dispute/ambiguity, the ruling of the Vice-Chancellor shall be final and binding.

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(B) SCHEME OF EXAMINATION

FIRST SEMESTER

Number & Title of the course	Max. Marks	Min. Marks	Min. Aggr. Marks For Passing
(A) THEORY PAPERS			
I. Biology & Diversity of Virus, Bacteria and Algae	35	12	
II. Biology & Diversity of Bryophytes, Pteridophytes & Gymnosperms	35	12	
III Basic Ecology	35	12	
IV Biology & Diversity of Fungi	35	12	
(B) PRACTICALS I (based on Course I & II) II (based on Course III & IV)	50	20	
(C) INTERNAL ASSESSMENT	50	20	
CCE* 4 Written Test based on each course (each of 15 marks)	60	5 in each test	
Project/Assignment/Seminar	50	20	
TOTAL	350	.....	140

- Candidate has to pass in each test separately

SECOND SEMESTER

Number & Title of the course	Max. Marks	Min. Marks	Min. Aggr. Marks For Passing
(A) THEORY PAPERS			
V. Taxonomy of Angiosperms	35	12	
VI. Resource Utilization and Conservation	35	12	
VII Biochemistry	35	12	
VIII Biostatistics and Computer Application	35	12	
(B) PRACTICALS I (based on Course V & VI) II (based on Course VII & VIII)	50	20	
(C) INTERNAL ASSESSMENT	50	20	
CCE* 4 Written Test based on each course (each of 15 marks)	60	5 in each test	
Project/Assignment/Seminar	50	20	
TOTAL	350	.....	140

- Candidate has to pass in each test separately

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THIRD SEMESTER

Number & Title of the course	Max. Marks	Min. Marks	Min. Aggr. Marks For Passing
(A) THEORY PAPERS			
IX. Plant Physiology	35	12	
X. Genetics & Molecular Biology	35	12	
XI. Plant Reproduction & Development	35	12	
XII. Biotechnology	35	12	
(B) PRACTICALS I (based on Course XI & X) II (based on Course XI & XII)	50	20	
(C) INTERNAL ASSESSMENT	50	20	
CCE* 4 Written Test based on each course (each of 15 marks)	60	5 in each test	
Project/Assignment/Seminar	50	20	
TOTAL	350	.....	140

- Candidate has to pass in each test separately

FOURTH SEMESTER (FOR UTD)
DISSERTATION

DISSERTATION	Max. Marks	Min. Marks	Min. Aggr. Marks For Passing
(A) THEORY PAPERS			
(A) Valuation			
(i) Language & Presentation	50	80	
(ii) Review of Literature	50		
(iii) Methodology	50		
(iv) Analysis & interpretation of Result	50		
TOTAL	350	.....	140

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FOURTH SEMESTER

Number & Title of the course	Max. Marks	Min. Marks	Min. Aggr. Marks For Passing
(A) THEORY PAPERS			
XIII. Plant cell, tissue and organ culture	35	12	
XIV. Biotechnology and Genetic Engineering	35	12	
XV. A Ethnobotany	35	12	
XVI. B Plant Protection	35	12	
(B) PRACTICALS I (based on Course XIII & XIV) II (based on Course XV & XVI)	50	20	
(C) INTERNAL ASSESSMENT	50	20	
CCE* 4 Written Test based on each course (each of 15 marks)	60	5 in each test	
INTERNSHIP	100	40	
TOTAL	400	.....	140

- Candidate has to pass in each test separately

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FIRST – SEMESTER

COURSE NO. I: BIOLOGY & DIVERSITY OF VIRUSES, BACTERIA AND ALGAE

UNIT – I

Archaebacteria and Eubacteria: General account, Ultra structure, Nutrition and reproduction biology and economic importance, Cyanobacteria salient features and biological importance.

UNIT – II

Viruses, Characteristic and ultra structure of virions, Isolation and purification of viruses, Chemical nature, Replication, Transmission of viruses, Economic importance, Phytoplasma, General characteristics and role in causing plant diseases.

UNIT – III

Phycology, Algae in diversified habitat (terrestrial, fresh water, marine) Thallus organization, Cell ultrastructure, Reproduction (vegetative, asexual, sexual), Criteria for classification of algae, pigment, Reserve food, Flagella classification

UNIT – IV

Salient features of the following divisions: Chlorophyta, Charophyta, Xanthophyta, Bacillariophyta, Phaeophyta and Rhodophyta

UNIT – V

Role of algae in symbiotic associates, Fisheries, Algal blooms, Productivity of algae in fresh water and marine environment, Role of algae in soil fertility **Industrial application of Algae.**

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FIRST – SEMESTER

COURSE NO. II: BIOLOGICAL DIVERSITY OF BRYOPHYTES, PTERIDOPHYTES & GYMNOSPERMS

UNIT – I

General characters & Classification of Bryophytes, Comparative morphological & anatomical studies of Gametophytes and Sporophytes of Marchantiales, Jungermanniales, Calobryales, Anthocerotales, Sphagnales & Funariales, Economic importance of Bryophytes.

UNIT – II

General characters & Classification of Pteridophytes, Comparative, morphology, Anatomy and Reproduction in Psilophytales, Psilotales, Lycopodiales and Sellaginellales, Stelar system in Pteridophytes.

UNIT – III

Morphology, Anatomy and Reproduction in Equisetales, Ophioglossales, Osmundales & Salviniales.

UNIT – IV

Classification of Gymnosperms, Distribution of living Gymnosperm in India, Economic importance of Gymnosperms, Structure & Reproduction in Cycadales and Coniferales with special reference to Cycas, Pinus & Thuja.

UNIT – V

Structure & Reproduction in Ephedrales, Gnetales & Welwitschiales with special reference to Ephedra, Ginetum & Welwitschia.

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FIRST – SEMESTER

COURSE NO. III: BASIC ECOLOGY

UNIT – I

Ecology & ecosystem: Definitions, Organization and components, 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-strategists.

UNIT – II

Community organization: Concepts of community and continuum, Analysis of community analytical and synthetic characters, Community coefficients and indices of diversity, interspecific association negative and positive associations, Concept of ecological niche, Concepts of biodiversity.

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 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 tropihic, Primary production methods of measurement, Global patterns, Limiting factors:- Blackmen's law, Leibig's law and Sheferd's law of tolerance.

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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.

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FIRST – SEMESTER

COURSE NO. IV: BIOLOGY AND DIVERSITY OF FUNGI

UNIT – I

Status of fungi in the living world, General feature of fungi and fungus like organisms, Recent trends in the classification of fungi, Physiology and growth of fungi. Nutritional and environmental factors affecting growth, Saprotrophs, parasites of mutualistic symbionts. Physiology of reproduction in fungi, Phylogeny of fungi.

UNIT – II

Fungal diversity, Major taxonomic groups, structure, Reproduction, Life cycle and significance of the following representative;

I) Gymnomycota – Cellular slime moulds (*Dictyostelium),* Plasmodial slime moulds (myxomycetes)

II) Mastigomycota – Coelomomyces, Langenidium, Achlya, Phytophthora, Peronospora, Plasmodiophora.

III) Amastigomycota – Zygomycotina – Mucor, Syncephalastrum, Blakeslea, Cunninghamella, Entomorphthora.

UNIT – III

Fungal diversity contd, Structure, Reproduction, Life cycle and significance of the following representative;

I) Ascomycotina: *Taphrina, Emericella, Chaetomium, Morchella, Neurospora, Claviceps.*
II) Basidiomycotina: *Puccinia, Melampsora, Ustilago, Polyporus, Lycoperdon, Ganodema.*
III) Deutromycotina: *Fusarium, Cercospora, Curvulana, Beauveria, Microsporum, Phoma, Colletotrichum*

UNIT – IV

Fungal genetics, Life cycle and sexual process in fungi, structure and organization of fungal genomes (Mitochondrial genes, Plasmids of transposable elements, Virus and viral genes), Genetics variations in fungi nonsexual variations Haploidy, Heterokaryosis, Parasexuality, Sexual variations mating or Breeding systems Homothallisum and Heterothallisum, Mutation, Physiological specialization, Strain improvement.

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UNIT – V

Fungi and Biotechnology: Production of alcoholic beverages, Antibiotics, Organic acids, Ergot alkaloids, The cultivation of fungi for food mushrooms and Myco protein. Mycofoods, Role of fungi in agriculture and forestry, Mycorrhizae and their application, Mycopesticides, Mycotoxins, Conservation of fungal germplasm.

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SECOND – SEMESTER

COURSE NO. V: TAXONOMY OF ANGIOSPERMS

UNIT – I

Principles of Biodiversity & conservation, Concept of systematic , Identification & nomenclature with special reference to International code of Botanical nomenclature, taxonomic Category species, Genus & family, Angiosperm classification system, Bentham & Hooker & Hutchinson

UNIT – II

Herbarium, Herbarium Techniques, Role of botanical gardens, Documentation (Floras, Monographs, Journals, Manuals, Abstracts, Indices & Dictionaries), Keys for identification of plants single access and multi-access, Role of computers and database in identification

UNIT – III

Modern Taxonomy, Supportive evidence from Anatomy, Embryology, Palynology, Cytology, Photochemistry including secondary metabolites, Numerical OUT'S coding Cladistics.

UNIT – IV

Comparative study of Angiosperm families, Rannunculaceae & Magnoliaceae, Papaveraceae & Capparidaceae, Oxalidaceae & Meliaceae, Combretaceae & Lytheraceae Rubiaceae & Asteraceae, Convolvulaceae & Lamiaceae, Gramincae & Orchidaceae.

UNIT – V

Important and nature of plants & their products, Industrial plants, Shisham (*Dalbergia sisoo*), Sagon (*Tectona grandis*), Rubber plant (*Ficus elastic*), Cotton plant (*Gossypium hirsutum*), Semal (*Bombex ceiba*), Flax (*Gycine max*), Kattha (Acacia catechu), Neel (*Indiogera tinctoria*), Sindoor (*Melitotus alba*), Drug Plants, Ashwagandha (*Withania somnifera*), Sarpgandha (*Rauwolfia serpentine*), Adhusa (*Adhatoda vasica*), Amla (*Emblica officinalis*), Neem (*Azadirachta indica*), Punarnava (*Boerhaavia diffusa*), safed musli, Food plants, whaet (*Triticum*

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aestivum), Rice (*Orriza sativa*), Maize (*Zea mays*), Arhar (*Cajanus cajan*), Chana (*Cicer aurientinum)*, Onion (*Allium cepa*), Clove (*Piper longum*), Turmeric (*Curcuma domestica*), Mustard (*Brassica Compestris*), Groundnut (*Arachis hypogeal*), Ethnobotany, Plants used by tribals of M.P. Sitaphal, Champa, Bel, Ber, Sal, Achar, Palash, Kachnar, Siris, Arjun, Harra, Nahera, Mehndi, Mahua, Tendu, Latjira, Gular, Anar, Datura.

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SECOND – SEMESTER

COURSE NO. VI: RESOURCE UTILIZATION AND CONSERVATION

UNIT – I

Major Biomes of the world, Tropical rain & Seasonal Forests, Temperature rain & Seasonal forests, Boreal forests, Grasslands, Deserts, Aquatic Ecosystems wetlands, Lakes & Ponds Streams & Rivers, Marine & Estuarine habitats.

UNIT – II

Resource utilization, Status & Utilization of Biodiversity, Sustainable development resources from forest, Grassland and aquatic habitats, Food forage, Fodder, Timber & Non-wood forest products, Threats to quality & Quantity of Resources due to overexploitation

UNIT – III

Strategies for conservation of resources: Classification 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

UNIT – IV

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.

UNIT – V

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.

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SECOND – SEMESTER

COURSE NO. VII: BIOCHEMISTRY

UNIT – I

Structure of water and its solvent properties, Acid-bases, pH and buffer, Bi and polyprotic buffer, Free energy and spontaneity of reactions, ATP and other phosphorylated compound with their free energy of hydrolysis, Phosphoryl group transfer, Biological oxidation reductions reaction, Coupled reaction and oxidative phosphorylation, Inhibitors and uncouplers.

UNIT – II

Enzyme classification, Specificity, Active site, Enzyme kinetics, Michealis Menton equation, Determination of kinetic parameters, Bi-substrate reaction and their kinetics, Enzyme inhibition and kinetics, Allosteric enzyme, Kinetics and Allosteric regulation of phospho-fructo kinase.

UNIT – III

Structure and chemistry of macromolecules, Proteins, Carbohydrates and Lipids, Protein folding, Structure and chemistry of bimolecules such as antibiotics, Pigments, Vitamins as coenzymes, Lipid analysis by GLC and Mass Spectrometry, Oligosaccharide and Polysaccharide analysis.

UNIT – IV

Biosignaling molecular mechanism of signal transduction, gated ion channels, Nicotinic acetyl choline receptor, Receptor enzyme, The insulin receptor, G-proteins and cyclic AMP membrane transport, Biomembrane, Nutrient transport across membranes, Active and passive diffusion, Symport, Antiport and uniport, Na+K+pumps and their metabolic significant.

UNIT – V

Chromatographic technique, paper and TLC, Gel filtration, Ion exchange, Affinity, HPLC, SDS, PAGE, Isoelectric focusing, Western blotting, Protein sequencing, Mass spectrometry, MALDI, TOF, MS.

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SECOND – SEMESTER

COURSE NO. VIII: BIOSTATISTICS AND COMPUTER APPLICATIONS

UNIT – I

Importance and scope of statistics in experimentation, Measure of central tendency arithmetic, Geometric and harmonic means, Measure of dispersion variance, Standard deviation, Coefficient of variation, Confidence limits of population mean.

UNIT – II

Elements of probability, Statistical and Mathematical definitions, and Probability distribution function: Normal, Binomial and Poisson distribution.

UNIT – III

Tests of significance, Hypothesis and errors, 't' test , Population mean equals a specified value, Test of the equality of two means (Independent samples & Equal variances), Test of the equality of two means (Paired samples), 'F'- test, One way analysis of variance (sample sizes, Equal and Unequal).

UNIT – IV

Chi-square statistics, Test of goodness of fit and test of independence of factors, Simple correlation coefficient, Significance tests, linear regression equation and diagram regression coefficient, Standard error, Significance tests.

UNIT – V

History and development of computers, Hierarchy of Computers, Computer hardware components and functional structures, Computers software: system and application software.

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THIRD – SEMESTER

COURSE NO. IX: PLANT PHYSIOLOGY

UNIT – I

Mechanism of transport of water inorganic and organic substances, Source and sink relationship, Mineral nutrition & absorption, **Transpiration**.

UNIT – II

Photosynthesis in plants, Pigments, Photosystem I and II, Mechanism of quantum capture and energy transfer between photosystems, Reduction of CO2, C3, C4 and CAM metabolism, Photorespiration and its signification.

UNIT – III

Overview of plant respiration, Glycolysis, TCA cycle, Electron transport and ATP synthesis, Pentose phosphate pathway, Glycoxalate cycle

UNIT – IV

Plant hormone, Mode of action of auxins, Gibberellins, Cytokinin, Ethylene, Abscissic acid, Special features of secondary plant metabolites, Biosynthesis and functions of phenolic acids, Alkaloids

UNIT – V

Stress physiology, Water deficit and drougth resistance. Temperature stress, Salinity stress metal toxicity, Biological clock and its regulation, Photoperiodism and floral induction

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THIRD – SEMESTER

COURSE NO. X: GENETICS & MOLECULAR BIOLOGY

UNIT – I

Nucleic acid as genetic material (experimental proof) DNA structure A, B & Z forms, Chromosome structure & chromatin organization, Euchromatin & Hetercochromatin different models, Nuclear DNA content, C-value paradox, Cot curves, Restriction mapping, concept & techniques, *In-situ* hybridization.

UNIT – II

Spontaneous & induced mutations, Physical & chemical Mutagens types of mutations, Molecular mechanism of mutation, forward, back, Missense, Nonsense, Frameshift and Suppresser mutations, Mutation induced by transposons, Site directed mutagenesis, Mechanism of DNA damage & repair, Photorepair, Excision or dark repair

UNIT – III

Genetic of microorganisms, Transformation, Conjugation & transduction in bacteria, Conjugation mapping, Molecular mechanism of recombination, Role of Rec ABC&D, general & site specific recombination, Independent assortment, Linkage and crossing over.

UNIT – IV

DNA & RNA sequencing, Different methods, DNA replication, DNA polymerases, Topoisomerases, Ligases, Gene transcription, RNA polymerases, Promoters, Transcription factors, Mechanism of transcription, Chain initiation, Elongation & termination, Post transcriptional processing of RNA, Capping, Adenylation & splicing, Introns & Exons

UNIT – V

Translation of messenger RNA into proteins, Structure & role of t-RNA & ribosomes, Different factors (I, EFTs, RFs), Protein chain initiation, Elongation & termination, Inhibitors of protein synthesis, *In vitro* protein synthesis, Gene expression in prokaryotes, Operon concept, Inducer, Repressor, Co-repressor, e-AMP/CRP, co-induction & co-repression, Regulation of lac operon & Tryptophan operons, Attenuation Gene expression in qukaryotes, Britton and Davidsons, Gene battery model, HCP/NHCP Hormones

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THIRD – SEMESTER

COURSE NO. XI: PLANT REPRODUCTION AND DEVELOPMENT

UNIT – I

Organization of shoot apical meristem (SAM), Control of tissue differentiation especially xylem & Phloem, Secretary ducts & Lactifers ducts, Diagnostic features of woods.

UNIT – II

Leaf growth & differentiation, Determination of Phyllotaxy, Differentiation of Epidermis including Stomata, Trichomes & Mesophyll tissue

UNIT – III

Root development, Organization of root apical merstem (RAM), vascular tissue differentiation, Lateral roots, Root hairs, Root microbe's interactions

UNIT – IV

Male gametophyte development, Structure of anther, Microsporogenesis, Pollen germination, Pollination, Female gametophyte development, Ovule development, Megasporogenesis organization of embryo sac, Endosperm development, Storage protein of Endosperm & Embryo

UNIT – V

Reproduction, Vegetative & Sexual reproduction, Pollen Pistil interaction and Fertilization, Double fertilization, Seed germination & Seedling growth, Seed dormancy

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THIRD – SEMESTER

COURSE NO. XII: BIOTECHNOLOGY

UNIT – I

Biotechnology an Overview, Definition, Perspective and scope of biotechnological processes and products, Biotechnology and Ethics, Introduction, Medical and chemical Biotechnology, Agriculture and Food, Energy and environment and human, Bioethics, Facing problem and finding solutions, Regulating the use of biotechnology, Patenting biotechnology inventions.

UNIT – II

Genetic Engineering and gene cloning, Introduction of genetic engineering procedure, restriction endonuclease, cloning vehicle, Vectors for animals and plants, Insertion of DNA molecule in to a vector, Direct transformation, Isolation and cloning, Transformation and growth of cells, Selection and screening of particular recombinants, Genomic library, sequencing of DNA, Gene identification and mapping, Analysis of expression of cloned genes, Polymerase chain reaction, Monoclonal Antibodies.

UNIT – III

Plant cell and tissue cultures, culture techniques, Protoplast fusion, Direct gene transfer, Microinjection, Nuclear transplantation, Plasmid and mitochondrial genes, production of secondary metabolites by immobilized plant cell, Development of disease resistant, herbicide resistant, Salt & drought resistant plant varieties, Microbial Toxins, Introduction, Toxins gene isolation, Genetics engineering of B. *thuringiensis* strains, *Baculovirus* as biocontrol agents.

UNIT – IV

Culturing microorganisms for the production of biomass, Production of microbial (Bacterial, Cyanobacterial and Fungal) products, Batch culture, Continuous culture, Fed-batch culture, Mass culture, Use of culture system for the production of microbial products, Production of Cyanobacterial biomass for food, Feed and health care products, Improvement of microbial strains for industry, Agriculture, Immobilization of microbial cells and enzyme and its applications.

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UNIT – V

Strain improvement, bioreactor design, Reactor types, Application of immobilized cells and enzyme, improvement in bioreactor to control environment of process organism, use of microorganism in pollution control, Waste treatment, Bioremediation, Biological removal of eutrophic nutrients, Heavy metals, Toxic chemicals (herbicide, Insecticide and Fungicide and Other Toxicants) from waste water and industrial effluents, Utilization of waste water for the production of food and feed, Biodegradation, Bioleaching of metals, Application of microorganisms from environment.

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According to the recommendation taken by standing committee dated 05 September, 2011 & approved by Executive Council dated 18 September 2011 every student perusing M.Sc. Botany course will appear in four respective theory papers and two practical examination in all the semesters expect for the UTD students.

For the UTD students there will be dissertation work in lieu of four theory papers.

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FOURTH – SEMESTER

DISSERTATION

A. Valuation

(I) Language & Presentation
(II) Review of Literature
(III) Methodology
(IV) Analysis & interpretation of Result

B. Viva - Voce

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M.Sc. BOTANY

Session 2023 – 2024

FOURTH SEMESTER

COURSE NO XIII: PLANT CELL TISSUE AND ORGAN CULTURE

UNIT - I

Plant cell and tissue culture, general introduction, history, scope, concept of cellular differentiation and totipotency.

UNIT - II

Techniques of tissue culture, Organ culture – meristem, anther and embryo. In vitro fertilization.

UNIT - III

Organogenesis and adventives embryogenesis; fundamental aspects of morphogenesis, somatic embryogenesis and androgenesis. Mechanism techniques and utility.

UNIT - IV

Somatic hybridization, protoplast isolation, fusion and culture, hybrid selection and regeneration, possibilities and achievements and limitations of protoplast research.

UNIT - V

Application of plant tissue culture; clonal propagation, artificial seeds, production of hybrids, somaclones and somaclonal variation; production of secondary metabolites/ natural products; cryopreservative and germplasm storage.

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FOURTH SEMESTER

COURSE NO. XIV: BIOTECHNOLOGY: AND GENETIC ENGINEERING

UNIT – I

Biotechnology; basic concepts, principles and scope, intellectual property rights – possible ecological risks and ethical concerns.

UNIT – II

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.

UNIT – III

Genetic engineering of plants, aims, strategies for development of transgenics (with suitable examples); Agrobacterium – the natural genetic engineer; T-DNA and trnasposons mediated gene tagging; chloroplast transformation and its utility.

UNIT – IV

Microbial genetic manipulation; bacterial transformation; selection of recombinants and transformants; genetic improvements of industrial microbes and nitrogen fixers; fermentation technology.

UNIT – V

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; microaraays; protein profiling and its significanse.

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FOURTH SEMESTER

COURSE NO XV: A - ETHNOBOTANY

UNIT – I

Definition and scope of ethnobotany, historical review and outline idea of archaeoethnobotany, ethnoecology, ethnomedicines, ethnonarcotics, ethnopharmacology, ethanotaxonomy, ethnoscology, ethnomedicines, ethnocosmetics, ethnolingistics, ethnoorthopaedics, ethnopaediatrics.

UNIT – II

Preservation of genetic diversity, plants used in various systems of medicines, ayurvedic, Unani, and homeopathic system allopathic systems plants used by villagers and tribal people role of ethnobotany in the development of society.

UNIT – III

Ethnobotanical importance of aconitum napellus; allium cepa, menthe arvensis, allium sativum, nux vomica, aloe vera, ocimum sanctum, atorpa belladonna, azadirechta indica, piper nigrum, butea monospora, pterocarpus marsupium, eugenra aromatic, terminalia arjuna euginea jambolana, terminlia bellerica hollarhena antidysentrica, terminalia chebula, withania somnifera lawsonia inermis

UNIT – IV

Plants in mythology, taboos and totems in relation to plats, folkore and folk tales, wild life protection intribals, plants domestication by the tribal, plants in similes and metaphors. Ethnobotanical importance of : Cassia fistula, Cannabis sativa, Ricinus communi, Emblica officinalis, Santalum album.

UNIT – V

Detailed study of the common plants and their parts used in the treatment of following diseases : expulsion of worms, skin diseases, bronchial inflammation and asthma tuberculosis, urino genital problems, amoebic dysentery malaria, rheumatism, leprosy, jaundis, heart disease, piles, leukoderma.

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FOURTH SEMESTER

COURSE NO XV: B – PLANTS AND SOCIETY

UNIT – I

History of plants and development of society, role of plant6s in tracing human history, green revolution: - benefits and adverse consequences. Innovations for meeting world food demands, early domestication centers if major cultivated plants, plants in mythology, folklores, roles of ethnobotany in relation to development of society.

UNIT – II

Plants and human health, usage of plants in different systems of medicine allopathic, homeopathic, ayurvedic, herbal medicine and concept of herbal cosmetics. Plants as health hazards. Food spoilage, viral, bacterial and fungal diseases of human beings.

UNIT – III

Plants in enterprenural areas – A: techniques of cultivation and marketing of few chlorophytum, guggul, commiphera wightii, rauwolfia serpentine, plants and other users: agriculture and horticultrure.

UNIT – IV

Plants in enterprenural areas – B: use of plants in earning livelihood – such as bamboos, rattans, raw materials of papermakings, gums tannins, dyes, resins and fruits. Techniques of cultivation and marketing of – aromatic plants – lemon grass, plasma rosa, floriculture – rose and gladioli.

UNIT – V

Plants in enterprenural ares – C: techniques of cultivation and marketing of - mushroom cultivation , nursery management, vermiculture and vermicompost. Mass cultivation of few plants using tissue culture techniques. Bonsai techniques.

PRACTICALS - laboratory exercises coreesponding to theory course covering all units.

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FOURTH SEMESTER

COURSE NO. XVI: A – APPLIED MYCOLOGY

UNIT – I

General characteristics of fungi, taxonomic status and classification of fungi, fungi harmful to mankind, fungi as pathogen to plants, animal and human beings, spoilage of foodstuffs.

UNIT – II

Fungi as a food: detailed account of mushrooms and their cultivation, yeast and its related industries, single cell proteins and its production. The economic importance of the fructification of few edible fungi.

UNIT – III

Fungi as medicines: industrial production of :- ergot, ephedrine, steroids, vitamins, antibiotics.

UNIT – IV

Fungi in industries such as brewery, baking and dairy industries, fungi in enzyme production such as invertase, zymase, amylase, cellulose, fungi in production of organic acids: citric acid, gluconic acid, gallic acid, fumaric acid.

UNIT – V

Broad principles of fungal disease management, disease forecasting, regulatory and physical measure of fungal disease management – management of disease by cultural produces, organic amendments: biocontrol of fungal diseases, chemical measures of disease management, fungi in agriculture: as scavengers as biological control importance of mycorrhizae in soil fertility as growth hormones.

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IV SEMESTER

COURSE NO. XVI: B – PLANT PROTECTION

UNIT - I

History and development of Plant Protection Science, General idea about the following pests:

1. Insects as pests of Gram, Soyabean and Teak
2. Weeds: Parthenium, Waterhyacinth and Cuscuta
3. Remote sensing in plant protection

UNIT - II

Fungi as plant pathogens: General idea about causal organisms, Symptoms and disease cycle of following disease, collar rot , Damping off of seedling, Late blight of potato , Downy mildew of Grapes, Powdery mildew of Wheat, Smut of Wheat, Rust of Wheat, Wilt of Arhar, Anthracnose of Soyabean, Tikka disease of Groundnut, **Stem Gall of Coriander**. General idea about the problem of post harvest storage due to fungi and insect.

UNIT - III

General idea about causal organism, Symptoms and disease cycle of following diseases.

1. Bacterial disease, Citrus canker, Blight of paddy.
2. Viral diseases, Tobacco mosaic, Yellow mosaic of Bhindi, Bunchy top of Banana.
3. Mycoplasma Grossy shoot disease of Sugarcane, Little leaf of Brinjal.
4. Nematodes, Root knot of vegetables.

UNIT - IV

Chemical methods of plant protection types of chemical /formulation/application methods and problem in environment. Cultural methods: Sanitation, Crop rotation and seed materials, Use of resistance varieties, Legislative methods: Plant Quarantine.

UNIT – V

Biological Plant Protection: Use of biological pesticides from microbes (Fungi, Bacteria and Virus). Brief idea of management of Insects and Plant diseases (I.P.M.)

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24.7.23