Syllabus for Uchcha Madhyamic Paper II STET 2023

UNIT I Subject BOTANY 100 Marks

Unit-1 : General Biology & Microbiology

- An elementary study of origin of life, Evolution, Natural Selection, Darwinism and Neo-Darwinism.
- A comparative account of two kingdom, five kingdom and three domain classification systems
- Microbiology: Conceptual history of Microbiology.
- Techniques of isolation of micro- organisms and culture media preparation.
- Structure, growth and reproduction of Bacteria.
- Structure and reproduction of TMV and Bacteriophage.
- Industrial importance of bacteria.
- Role of microbes in nitrogen fixation.
- Structure, reproduction and economic importance of Cyanobacteria.

Unit-2 : Mycology and Plant Pathology

- General Study of structure, reproduction and classification of fungi.
- Structure and life History of following genera; Synchytrium, Albugo, Eryisphe, Peziza , Ustilago, Puccinia, and Alternaria.
- Role of Toxin and Enzymes in plant diseases. 2. Etiology, Symptoms and Control of the following plant diseases.
- (a) Late blight of Potato (b) Wart disease of Potato (c) White rust of Crucifers. (d) Powdery mildews (e) Loose Smut of wheat. (f) Brown Leaf Spot of Rice. (g) Rust of Wheat and Linseed. (h) Red Rot of Sugarcane. (i) Wilt of Pigeon Pea. (j) Citrus Canker. (k) Tobacco Mosaic Disease. (l) Little Leaf of Brinjal.
- Transmissions of Plant Viruses and Control measures.

Unit-3: Plant Diversity Algae - A general Study of the structure, reproduction and classification of Algae.

- Structure, Life History and evolutionary significance of following genera. Nostoc, Rivularia, Chlamydomonas, Volvox , Oedogonium, Chara, Vaucheria, Ectocarpus, Fucus, Batrachospermum, and Polysiphonia
- Lichens - A general account
- Bryophytes - General characteristics and classification of Bryophytes.
- A comparative study of the structures and life history of the following genera with particular reference to gametophytes and sporophytes. Marchantia, Pellia, Anthoceros, Sphagnum and Pogonatum.

Unit-4 : **Pteridophytes** General Characteristics and Classification , Stelar Evolution, Herterospory

- Structures and life history of the following genus: Psilotum, Lycopodium, Selaginella , Equisetum, Marsilea, Ophioglossum and Azolla
- Fossils: Rhynia, Lepidodendron and Calamities
- Gymnosperms- A Comparative and Evolutionary study of the morphological, anatomical and embryological features of gymnosperms with special reference to the following taxa-Living: Cycas, Pinus, Taxus and Gnetum
- Fossils: Lygenopteris and Cycadaeoidea.

Unit-5 :Taxonomy:

1. Introduction: Systematic, Taxonomy, Nomenclature, Classification and Phylogeny, Phenetics, Phyletic and Cladistics.

2. An elementary study of International Code of Botanical Nomenclature with particular references to the following - Naming of taxa, Nomenclatural types (Holotype, Isotype , Paratype, Syntype, lectotype and neotype) and Rule of priority.

3. A comparative study of the classification systems of : · Carolus Linnaeus. · G. Benthem & Hooker · Adolf Engler & Karl Prantl · John Hutchinson. 4. A study of diagnostic features and relationships of : Ranunculaceae, Annonaceae, Magnoliaceae, Cryophyllaceae, Tiliaceae, Euphorbiaceae, Curubitaceae, Rubiaceae, Apocynaceae, Asclepiadaceae, Boraginaceae, Scrophulariaceae, Acanthaceae, Lamiaceae, Amaranthaceae, Orchidaceae, Commelinaceae, Cyperaceae and Poaceae.

Unit-6: Anatomy

1. Mechanical tissues –their structure , distribution and function.. 2. Organisation of Tissue in relation to environment. 3. Anomalous secondary growth. 4. Periderm- Structure, origin and function. 5. Meristems structure and function. Various theories regarding organization of special meristems.

Unit-7: Embryology :

1. Microsporogenesis and male gametophyte.
2. Megasporogenesis and female gametophyte.
3. Fertilization.
4. Embroygeny.
5. Endosperm.
6. An elementary study of experimental embryology.

Unit-8: Economic Botany:

1. Cereals. 2. Pulses 3. Oil Seeds 4. Sugar and Starch Yielding plants 5. Fruits and Vegetables. 6. Spices and Condiments 7. Beverages, Narcotics, gums, resins and rubber 8. Essential Oil. 9. Fiber Yielding Plants 10. Timber Yielding Plants. 11. Medicinal Plants.

Unit-9 : Biodiversity and Environmental Biology: (Question Code – BQ (161 – 180)

- An introduction to the concept of Biodiversity. Loss of Biodiversity and conservation
- Eco system: Structure and function of ecosystem; General study of grassland, fresh water and forest ecosystem

Unit-10 : Cell Biology:

1. Conceptual history, cell theory, a comparative account of pro-and eukaryotic cells, characteristics of archaebacteria and mycoplasma.
2. Structure and function of cell organelles.
3. Cell wall and Cell membrane.
4. Ultrastructure of chromosomes.
5. Cell Division and its regulation.
6. Techniques in cell biology: ¨ Principle of light, phase contrast, fluorescence and electron microscopy, autoradiography and their application. ¨ Staining techniques: Acetocarmine and Feulgen

Unit-11 : Cytogenetics and Plant Breeding

1. Structure of the nucleus and chromosomes including Lampbrush Chromosomes, B Chromosomes, Polytene Chromosomes.
2. Cell Cycle, Mitosis and Meiosis.
3. Physical and Chemical Basis of Heredity.
4. Mendelian Inheritance.
5. Interaction of genes.
6. Polyploidy.
7. Chromosomal aberrations.
8. Linkage and Crossing Over.
9. Structure, Replication and expression of DNA, Genetic Code.
10. Mutation: Induction and biochemical basis.
11. One gene-One Polypeptide chain Hypothesis.
12. Extra nuclear Inheritance.

13. Chromosomal and genetic sex-determination mechanism and Sex-Linked inheritance.
14. Human Genetics.
15. Genetics of bacteria and their viruses with special reference to conjugation, transduction and transformation.
16. Cytogenetics in crop Improvement.
17. General Principles of breeding for crop improvement.
18. Centres of origin of cultivated plants.

Unit-12 : Ecology and environmental studies

- **Ecological energetic:** Ecological factors, food chains and food web; Energy flow models, energy pyramids and biomass,
- **Biogeochemical cycles:** Hydrological cycle and water harvesting, gaseous and sedimentary nutrient cycle
- **Community ecology:** Structure and organization, individualistic and organization nature of community, functional aspects of communities Ecological succession; Seral and climax communities, succession in terrestrial and aquatic ecosystem
- An elementary study of population ecology
- **Environmental Pollution and Public Health:** Environmental pollutants, air and water pollution, radioactive and noise pollution, pollution control measures
- Major vegetational belts of India
- An elementary study of aerobiology
- **An introduction to MAB programme, resource ecology, conservation, forestry, wild life management and aquaculture**

Unit-13 : Plant Physiology and Biochemistry

- Imbibition, Diffusion and Osmosis
- Active and Passive transport of water and solutes; Conduction of water and Phloem transport
- Mechanism of stomatal movement and factors controlling it
- **Photosynthesis:** Pigment system, Photophosphorylation, Calvin cycle and Hatch and Slack cycle
- **Respiration:** Glycolysis, Kreb's Cycle, oxidative phosphorylation
- **Phytohormones:** General account and role of Auxins, Gibberellins and Cytokinins
- **Physiology of Flowering:** Photoperiodism
- Growth and Differentiation
- Movements in plant
- Biological Nitrogen Fixation and its mechanism
- Micro and Macronutrients and their role in plant nutritio
- **Biochemical component of cell:** Carbohydrates, Proteins, Fat and Nucleic Acid
- **Enzymes:** Classification, Nomenclature, Physiochemical properties, co-factors and co-enzymes, Iso-enzymes, Kinetics of enzyme action, significance, factors affecting enzyme activity
- Secondary plant metabolites and their roles

Unit-14 : (Question Code

- **Transcription and Translation:** General principles and mechanism of Transcription and Translation in prokaryotes and eukaryotes
- **Gene Regulation:** Prokaryotic Gene Regulation (Operon Concept), an elementary study of Eukaryotic Gene Regulation.
- **Genetic Engineering:** Tools and techniques of genetic engineering; Restriction Enzymes and Ligase, Reverse Transcriptase; Strategy for creation of recombinant DNA and its transfer in host. Cloning Vectors; Plasmids and Phagemids, genomic library & cDNA library. PCR and DNA fingerprinting
- **Role of genetic Engineering in Human Welfare**

Unit-15 : Plant Biotechnology:

- An introduction to Tissue Culture, Principles and significance of tissue culture, Explant culture and protoplast culture.

- **Application of Plant Tissue culture:** Commercial Applications of Plant Tissue culture; Mass Propagation; Transgenic Plants.
- **Bioinformatics:** An elementary idea.

Syllabus for Art of Teaching and Other Skills STET 2023

Unit II Art of Teaching, Other skills Marks 50
(A) Art of Teaching Marks 30
(B) Other skills Marks 20

A. Art of Teaching

1. Teaching & Learning:- Meaning, Process & Characteristics.
2. Teaching Objectives and Instructional objectives: Meaning & Types, Blooms Taxonomy.
3. Teaching Methods: - Types and its Characteristics, Merit, and demerits of Methods.
4. Lesson Plan: - Types and Format & Various Model.
5. Microteaching & Instructional analysis.
6. Effective ecosystem of Classroom.
7. Textbook and library
8. Qualities of Teacher.
9. Evaluation & Assessment for learning.
10. Curriculum.
11. Factors affecting teaching and learning.
12. Teaching Aids and Hands on learning.

B. Other skills

1. General Knowledge,

2.Environmental Science

3. Mathematical aptitude,

4.logical Reasoning