

INDIRA GANDHI NATIONAL TRIBAL UNIVERSITY, AMARKANTAK
Recommended course for B.Sc. Hon. Botany

| Course No. | Papers | Marks |
|---------------------|--|-------------|
| SEMESTER I | | |
| BBT01 | Computer application | 50 |
| BBT 02 | Biology and diversity of cryptogams (algae and bryophytes) | 50 |
| BBP 01 | Practical | 50 |
| SEMESTER II | | |
| BBT 03 | Professional communication skills | 50 |
| BBT 04 | Cytology, Genetics and Evolution. | 50 |
| BBP 02 | Practical | 50 |
| SEMESTER III | | |
| BBT 05 | Fungi, microbes and plant pathology | 50 |
| BBT 06 | Morphology and plant anatomy | 50 |
| BBP03 | Practical | 50 |
| SEMESTER IV | | |
| BBT 07 | Pteridophytes, Gymnosperms and Paleobotany. | 50 |
| BBT 08 | Taxonomy of angiosperms and classification | 50 |
| BBP 04 | Practical | 50 |
| SEMESTER V | | |
| BBT 09 | Plant physiology, biochemistry and metabolism | 50 |
| BBT 10 | Plant ecology and phytogeography | 50 |
| BBT 11 | Reproductive biology of angiosperms plant | 50 |
| BBT 12 | Biostatistics and Bioinformatics | 50 |
| BBT 13 | Molecular biology and genetic engineering | 50 |
| BBT 14 | Instrumentation and modern techniques | 50 |
| BBP 05 | Practical | 50 |
| BBP 06 | Practical | 50 |
| BBP 07 | Practical | 50 |
| SEMESTER VI | | |
| BBT 15 | Intellectual property rights and bioethics | 50 |
| BBT 16 | Ethnobotany and traditional knowledge | 50 |
| BBT 17 | Applied botany and entrepreneurship development | 50 |
| BBT 18 | Forest ecology | 50 |
| BBT 19 | Plant biotechnology | 50 |
| BBT 20 | Environmental botany and conservation | 50 |
| BBP 08 | Practical | 50 |
| BBP 09 | Practical | 50 |
| BBP 10 | Practical | 50 |
| GRAND TOTAL | | 1500 |

- ***All Practical to be done based on Corresponding Theory Paper**

BBT01 COMPUTER APPLICATIONS

Unit 1.

Introduction to computer i.e. structure and functions of different component with special reference to storage devices such as pendrive, portable (external) hard disk.

Unit 2

Application of computer System; Software loading and formatting, M.S. word, M.S. Excel, M. S. Power Point, Protection of data from virus using antivirus.

PDF Converter, Photoshop, Scanning of document, Hindi: various types of font, types of printers, printing of documents.

Unit 3

Creation of E-mail ID, Internet: Types, Broadband, Data card devices-modem.

Introduction to various search engines: Google, Scires.com.

Unit 4

Scientific significance of teleconferencing, library search through nicnet. Draw of histogram graph, pie-diagram, application of animation in botany and data analysis.

BBT 02- BIOLOGY AND DIVERSITY OF CRYPTOGAMS (ALGAE AND BRYOPHYTES)

Unit 1

Algae: A general introduction to algae, including their vegetative structure, reproduction, ecology and economic importance. A board classification of algae.

Unit 2

A study of reproduction and life cycle of the following genera:

Cyanophyceac: *Oscillatoria*, *Nostoc*; *Spirulina*, Chlorophyceae: *Volvox*; *Oedogonium*, Xanthophyceae: *Vaucheria*; Phaeophyceae: *Ectocarpus*, (*Sargassum* for practicals only Rhodophyceae: *Polysiphonia*).

Unit 3

Bryophyta: A general accounts of bryophytes and their economic importance.

Unit 4

The life histories of the following genera: Hepaticopsida: *Riccia*, *Marchantia*; Anthocerotopsida: *Anthoceros*; Bryopsida: *Sphagnum*, *Funaria*.

BBT 03 PROFESSIONAL COMMUNICATION SKILLS

Unit 1

Grammatical Focus- Grammatical & Structural aspects covering Partys of Speech, Tense, Voice, Clause, Preposition, Degrees of Comparison, Synonyms & Antonyms, etc; Identifying & Analysing Grammatical Errors including errors in Spelling & Punctuation. Reading- Vocabulary Building; Comprehension; Interpretation; Summarising. Writing- Information Plagiarism and the need to avoid it...

Unit 2

Letter Writing – Formal, Informal; Accepting & Declining Invitations; Precise Writing, Effective Writing- Business Correspondences (Letter, Fax, e-mail) for- Making Enquiries, Placing Orders, Asking & Giving Information, Registering Complaints, Handling Complaints; Drafting notices; Drafting Advertisements; Job Applications. **Unit**

Unit 3

Speaking- Interactive Communication like Introducing Self, Greetings, Conversations, etc; Business Etiquettes; Debate; Role Play; Presentations

Unit 4

Pronunciation- appropriate stress.

Listening- Understanding – Spoken English, Formal English; Exercises

BBT04 – CYTOLOGY, GENETICS AND EVOLUTION

Unit 1

Microscopy: principles and applications of simple and compound Microscope. phase contrast, fluorescence, scanning and transmission electron microscopy. Ultra Structure of Prokaryotic and Eukaryotic cell

Unit 2

Plasma Membrane (Fluid Mosaic model.), Chloroplast, Mitochondria, Nucleus, Endoplasmic Reticulum, Golgi apparatus, Lysosome, Peroxisome, Ribosome.

Unit 3

Cell Cycle. Cell Division (Mitosis, Meiosis). Structure of chromosome –Prokaryotic and Eukaryotic Chromosome. Nucleosome model, euchromatin and heterochromatin, karyotype. Special types of Chromosomes (Polytene and Lampbrush Chromosome.) Sex determination. Theories of organic evolution (Darwinism, Lamarkism,)

Unit 4

Mendel's experiment, monohybrid, dihybrid and trihybrid crosses, laws of dominance, laws of segregation, law of independent assortment. Test and Back cross. Interaction of genes: Duplicate genes, Incomplete dominance, Lethal genes and Epistatic genes.

BBT05 FUNGI, MICROBES AND PLANT PATHOLOGY

Unit 1

A general introduction to fungi including structure, reproduction, importance and classification. The life histories of the following genera: Lower fungi: *Albugo*, *Phytophthora*, *Mucor*.

Unit 2

Higher fungi: Ascomycetes, *Saccharomyces*, *Sphaerotheca*, *Morchella* Basidiomycetes: *Ustilago*, *Puccinia*, *Agaricus* Fungi imperfecti: *Cercospora*; Lichens: Occurrence, general structure and reproduction with special reference to *parmelia*, economic importance of lichens in general.

Unit 3

Bacteria: Structure, reproduction and economic importance. Viruses: Nature, structure, transmission, multiplication and economic importance.

Unit 4

Plant pathology: Definition and scope; disease and disease inciting organism; symptoms of viral, Fungal and bacterial diseases of plants. Principles of defence mechanism and control. The study of following plant diseases: (Tabacco Mosaic ,citrus canker, late blight of potato)

BBT 06: MORPHOLOGY AND PLANT ANATOMY

Unit 1

Board outlines of morphology and anatomy of vegetative and reproductive organs of angiosperms.

Unit 2

Cell wall structure, tissues and tissues systems, Morphology & anatomy of root and stem.

Unit 3

An account of normal primary structure and secondary growth in herbaceous and woody plants. Annual rings.

Unit 4

Anomalous secondary growth as exemplified by stems of *Boerhaavia*, *Chenopodium*, *pyrostegia* (Bignonia) and Anatomy of leaf. Leaf abscission. General morphology of flower and floral parts,

BBT07 PTERIDOPHYTA, GYMNOSPERM AND PALAEOBOTONY

Unit 1.

Palaeobotany: An elementary knowledge of Palaeobotany, Geological era. Process of fossilization, types of fossils form genera and reconstruction of fossil plants. Birbal Sahni Institute of palaeobotany, Lucknow, contribution of Prof. Birbal Sahni and D.D. Pant.

Unit 2.

Pteridophyta: A general accounts of the pteridophytes with special reference to life history of the following genera: Psilophyta: *Rhynia*; Lycophyta: *Lycopodium*, *Selaginella*; Athrophyta: *Equisetum*; Filicophyta: *Marsilea*

Unit 3.

Gymnosperms: Classification & general accounts of the Gymnosperms. Distribution of gymnosperms

Unit 4.

Life history of the following genera: *Cycas* and *Pinus*.

BBT 08 TAXONOMY OF ANGIOSPERMS AND CLASSIFICATION

Unit 1

History of Plant taxonomy with special reference to India. Botanical nomenclature and kinds of classification.

Unit 2

A detailed classification of Bentham's and Hooker, Engler and Prantal and Hutchinson's system with their merits and demerits.

Unit 3

A detailed account of following families: Ranunculaceae, Brassicaceae, Papavaraceae, Malvaceae, Fabaceae, , Rubiaceae, Asteraceae, Asclepiadiaceae, Cucurbitaceae, Acanthaceae, Solanaceae, Convolvulaceae, Lamiaceae, Amaranthaceae, Euphorbiaceae, Orchidaceae, Poaceae.

Unit 4

Herbarium techniques; Organization of Botanical survey of India; important Floras of India; Role of botanical Garden

BBT 09 PLANT PHYSIOLOGY, BIOCHEMISTRY AND METABOLISM

Unit 1

Plant-water relations: Importance of water to Plant life. Physiological ;Properties of water, Different bio-physio-Chemical phenomenon: definition, phenomenon; Importance of permeability, diffusion, osmosis (exo and endosmosis);Plasmolysis, imbibition. Transpiration: Definition, types, structure of stomata. Mechanism of opening and closing of stomata. (Starch- sugar, k + pump theory).

Unit 2

Essential macro and micro elements and their role in plants (deficiency, Symptoms, disease and functions); Photosynthesis , C3 & C4 pathways, Respiration, Growth and growth hormones, Vernalization and Devernalization.

Unit 3

Elementary biochemistry: Introduction, different organic constituents of the Cell , Functions of carbohydrates (mono /oligo / polysaccharides) starch, Cellulose. Nitrogen metabolism:

Unit 4

Proteins : Classification, function and Solubility, amino acids- classification and structure, essential amino acids, structure of protein- primary, secondary, tertiary; Enzymes : Introduction- nomenclature and classification, mode of action (lock and key, induced fit), Concept of holoenzymes, apoenzymes, coenzymes and cofactors.

BBT 10 PLANT ECOLOGY AND PHYTOGEOGRAPHY

Unit 1

Scope of Plant Ecology; levels of organization (individuals, populations, ecosystems); Autecology and Synecology, Ecological factors (Climatic, biotic and edaphic.) ecological adaptation,(Hydrophytes, Xerophytes and Halophytes).

Unit 2

Population differentiation (ecotypes and ecads) population growth curves (S and J shaped). Competition (intraspecific and interspecific). Ecological succession (Hydrosere ,Xerosere , Mesosere).Community concepts.

Unit 3

Ecosystem components and types; structural and functional attributes of ecosystem, productivity concepts. Bio-geochemical cycles of nitrogen, carbon, phosphorus and sulphur.

Unit 4

Concept of sustainable management, wasteland development, vegetation types of India (forest and grassland) Phytogeography: definition and scope, Phytogeographical regions of India.

BBT11- REPRODUCTIVE BIOLOGY OF ANGIOSPERMS

Unit 1

Morphology of flower; Anatomical features of floral components, Microsporogenesis: formation of male gametophytes. Megasporogenesis- Development of embryo sac

Unit 2

Types of embryo sac. Dispersal of pollen grain; pollination mechanism;

Unit 3

Pollen types- structure and methods of study; pollen- pistil interaction; pollen allergy. Types of pollination. Double fertilization and triple fusion.

Unit 4

Endosperm- Types of endosperms and development of embryo; Development of seeds.

BBT 12 BIOSTATISTICS AND BIOINFORMATICS

Unit 1

Biostatistics- Concept and scope, sampling methods, central tendencies: Mean, Median, Mode and their properties. Measure of dispersion, Deviation, standard deviation, Coefficient of variation, Regression.

Unit 2

Frequency Distribution, normal distribution, probability concept, Graphical distribution of Data, histogram & pie chart. Testing of hypothesis, Chi-square test, t-test, ANNOVA test, SPSS- tool for analysis of testing.

Unit 3

Objectives and scopes of bioinformatics, Programming a techniques Databases, Sequence data bases, sequence analysis of protein and nucleic acids, FASTA, BLAST.

Unit 4:

Simple molecular modeling, Advance data bases.

BBT 13 MOLECULAR BIOLOGY AND GENETIC ENGINEERING

Unit 1

Structure of DNA/RNA as genetic material, nature of genetic material, Watson & Cricks model, A, B and Z form of DNA. Replication of genetic material (in prokaryotes)

Unit 2

RNA structure and function, transcription mRNA, &RNA, t-RNA, reverse transcription, translation of protein synthesis, regulation of protein synthesis; modification of protein.

Unit 3

Plasmids as cloning vectors, transduction; through bacteriophages. – transposition, and non-homologous recombination.

Unit 4

Recombinant DNA techniques and cloning; restriction endonucleases, cloning bacteria genes, PCR, Genomic and c-DNA Library.

BBT 14 – INSTRUMENTATION AND MODERN TECHNIQUES.

Unit 1

General principles of analytical techniques, buffers; electro analytical methods, (potentiometer and conduct metric); photometry, methods of biochemical metabolites.

Unit 2

Microscopy principle and application of bright field, phase contrast, fluorescence DIC microscopy, SEM, TEM, Atomic force microscopy, Histological techniques.

Unit 3

Spectroscopy – Principles and practice, UV, VIS spectrophotometry, Atomic spectroscopy, centrifugation- principles and separation of organelles.

Unit 4

Electrophoresis – principles. Techniques, vertical gel electrophoresis (native and SDS-PAGE-IEF and 2D electrophoresis) Chromatography- GLC and HPLC

BBT15 INTELLECTUAL PROPERTY RIGHTS AND BIOETHICS

Unit 1

Definition of IPR and their types such as patents, copy rights (plants, utility and design) trade marks, geographical indicators and Trade secret etc. Kinds of property.

Unit 2

Indian patent Act, conditions for patenting, provisional and complete specification International and national laws with special reference to patents. IPRs including traditional knowledge and culture and CBD

Unit 3

National policy statement, environment and development, National Environment Policy 2006: an overview ;Legislative framework of environmental protection, historical perspectives and Indian constitutional provisions.

Unit 4

Organization of patent offices in India with significance WIPO (world intellectual property organization), Role of worldwide academy of WIPO, Procedure for obtaining patent copy right and trade mark. kind of patent classification, patenting criteria ,career in IPR website of important patent office.

BBT: 16 ETHNOBOTANY AND TRADITIONAL KNOWLEDGE

Unit 1

Ethnobotany: definition, concept, history and scope, ethnobotany as an interdisciplinary science. Major and minor ethnic groups or tribals of India and their life styles. collection of ethnic information.

Unit 2

Importance of medicinal plants, role human health and healthcare, plant parts and primary metabolites, tribal medicine- methods of disease diagnosis and treatment.

Unit 3

Folk medicine and secondary metabolites (Alkaloids, saponins, steroides) forest products and its applications (Pharmacology aspects)

Unit 4

Traditional knowledge of regional medicinal plants cultivation practices and conservation of TK, database of medicinal plants.

BBT17 APPLIED BOTANY AND ENTERPERNURSHIP DEVELOPMENT

Unit 1

Role of plants in human civilization , agro botanical concepts , green revolution and its consequences , role of plants in cultural diversity.

Unit 2

Usage of plants in different system of healthcare (ayurved unani, homoeopathic, herbal) herbal cosmetics, toxic plants, food spoilage, plant and health hazards (viral, bacterial and fungal diseases of human beings).

Unit 3

use of plants in entrepreneurship development, cultivation techniques of ethno medicinal plants, marketing strategies for ethno medicinal plants.

Unit 4

Techniques and cultivation of aromatic plants, mushroom cultivation, nursery management, vermicompost and sericulture, bonsai techniques, floriculture management.

BBT18 FOREST ECOLOGY

Unit 1

Forests as ecosystems, forest as renewable resources; Importance of forests in national development, forest influences; deforestation and its effects; National Forest Policy; basic methods and study of forest vegetation with special reference to Amarkantak area.

Unit 2

Basis of forest classification and Forest Types of India; Natural and artificial regeneration of forest, aforestation and NWFP, Social forestry. Ethnobotany in relation to forest.

Unit 3

Structure and functioning of selected forest ecosystems: tropical rain forest, tropical deciduous forest, temperate coniferous forest and temperate hardwood forest; energy dynamics of forests; forest phenology.

Unit 4

Conservation strategies for forest vegetation, National parks and biosphere reserves with special reference to Amarkantak biosphere reserve; ecology of silviculture and management of forest ;Forest wildlife management.

BBT19 PLANT BIOTECHNOLOGY

Unit 1

Definition, history, scope and application of plant biotechnology; laboratory setup and instruments.

Unit 2

Totipotency, cytodifferentiation and Plant micro-propagation, regeneration and handling processes.

Unit 3

Application of tissue culture. Protoplast culture, somatic embryogenesis, haploid culture, artificial seeds.

Unit 4

Transgenic plants; somaclonal variation, cybrids, role of biotechnology in crop improvement.

BBT 20 ENVIRONMENTAL BOTANY AND CONSERVATION

Unit 1

Environment – Definition, scope and importance, Lithosphere, Hydrosphere, Biosphere
Vegetation types- Habitat and Niche concept.

Unit 2

Natural resources, renewable and non-renewable resources, water resources- utilization and signification of ground water, floods, drought, and Environmental impact assessment.

Unit 3

Concepts of Biodiversity and its Significance; mega diversity centers; hot-spots of biodiversity; threats to biodiversity; endangered and endemic species of India; Biodiversity conservation (*in-situ and ex-situ*).

Unit 4

Recent changes in Environmental factors, causes and anthropological interference
Remedial measures for conservation of natural vegetation and forest products

