***Details of Courses of Study***

**SIDO-KANHU MURMU UNIVERSITY, DUMKA**

**TEACHING PLAN (SEMETER WISE) FOR CHOICE BASED CREDIT SYSTEM IN UNDERGRADUATE**

**BOTANY PROGRAMME (MAJOR)**

**SEMESTER – I**

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| --- | --- | --- | --- |
| **Paper** | **Subject type** | **Topics** | **Total marks** |
| **BOT101M** | **Core 1** | **Microbiology** |  |
| **BOT102M** | **Core 2** | **Algae & Fungi** |  |
| **Practical** | **Practical Based on Paper** **BOT101M & BOT102M** |  |

**SEMESTER – I I**

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| **Paper** | **Subject type** | **Topics** | **Total marks** |
| **BOT201M** | **Core 3** | **Bryophytes & Pteridophytes** |  |
| **BOT202M** | **Core 4** | **Paleobotany & Gymnosperm** |  |
| **Practical** | **Practical Based on Paper** **BOT201M & BOT202M** |  |

**SEMESTER – III**

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| **Paper** | **Subject type** | **Topics** | **Total marks** |
| **BOT301M** | **Core 5** | **Morphology and Systematic of Angiosperms** |  |
| **BOT302M** | **Core 6** | **Histology & Anatomy** |  |
| **BOT303M** | **Core 7** | **Plant Pathology** |  |
| **Practical** | **Practical Based on Paper** **BOT301M, BOT302M & BOT303** |  |

**SEMESTER – IV**

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| **Paper** | **Subject type** | **Topics** | **Total marks** |
| **BOT401M** | **Core 8** | **Embryology & Economic Botany** |  |
| **BOT402M** | **Core 9** | **Cell Biology** |  |
| **BOT403M** | **Core 10** | **Physiology and Metabolism** |  |
| **Practical** | **Practical Based on Paper** **BOT401M, BOT402M & BOT403** |  |

**SEMESTER – V**

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| --- | --- | --- | --- |
| **Paper** | **Subject type** | **Topics** | **Total marks** |
| **BOT501M** | **Core 11** | **Molecular Biology** |  |
| **BOT502M** | **Core 12** | **Genetics & Plant Breeding** |  |
| **Practical** | **Practical Based on Paper** **BOT501M & BOT502M** |  |

**SEMESTER – VI**

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| --- | --- | --- | --- |
| **Paper** | **Subject type** | **Topics** | **Total marks** |
| **BOT601M** | **Core 13** | **Biochemistry & Biotechnology** |  |
| **BOT602M** | **Core 14** | **Ecology & Environmental Biology** |  |
| **Practical** | **Practical Based on Paper** **BOT601M & BOT602M** |  |

**SEMESTER – I**

**BOT101M – Microbiology**

**Methods of Microbiology:** Staining, Sterilization, Isolation, Culture and Culture media.

**Viruses:** General account of TMV and Bacteriophage.

**Mycoplasma:** Structure and reproduction.

**Bacteria:** General characters, classification, cell structure, reproduction and economic importance.

**Cyanobacteria:** General characters, classification, cell structure, reproduction and life history of *Nostoc, Oscillatoria and Rivularia.*

**BOT102M – Algae and Fungi**

**Algae:** General characters, classification, economic importance and life history of *Oedogonium, Chara, Vaucheria, Sargassum* and *Polysiphonia.*

**Fungi:** General characters, classification, economic importance and life history of *Phytophthora, Peziza, Puccinia, Argicus* and *Colletotrichum.*

**Practical – (Based on Paper BOT101M and BOT102M)**

**SEMESTER – II**

**BOT201M – Bryophytes and Pteridophytes**

**Bryophytes:** General account, classification, progressive sterilization of sporogeneous tissue, economic importance and life history of *Marchantia, Anthoceros, Sphagnum* and *Polytrichium.*

**Pteridophytes:** General account, anatomy, stellar evolution, heterospory and seed habit and life history of *Psilotum, Selaginella, Equisetum, Marsilia* and *Pteris.*

**BOT202M – Paleobotany & Gymnosperms**

**Fossil:** Types, process of fossilization, importance of fossils, geographical time scale, major sites of fossils in Jharkhand. General account and life history of *Rhynia, Calamites, Lepidodendron, Pentoxylum* and *Williamsonia.*

**Gymnosperm:** General account, anatomy, reproduction and comparative account of *Cycas, Pinus, Taxus* and *Gnetum.*

**Practical – (Based on Paper BOT201M and BOT202M)**

**SEMESTER – III**

**BOT301M – Morphology & Systematic of Angiosperms**

**Morphology:** Types of Root, Stem, Leaves, Inflorescence, Flower, Pollination and Fruit. Dispersal of fruit and seed.

**Systematic of Angiosperms:**

**Introduction:** Aims and Objectives of Plant taxonomy.

**Systematic in practice:** Herbarium – Importance, their preparation, role of herbaria.

**Botanical nomenclature:** Binomial nomenclature; principles and rules; typification; principle of priority and its limitations.

**System of classification:** Bentham and Hooker’s system, Hutchinson system and Takhtajan’s system.

**Modern trends in Plant taxonomy:** Taxonomy in relation to Embryology, Cytology (Cytotaxonomy), Chemotaxonomy and Numerical taxonomy.

**Study of important families:** *Ranunculaceae, Acanthaceae, Apocynaceae, Verbenaceae, Rubiaceae, Lamiaceae, Euphorbiaceae, Poaceae* and *Cyperaceae.*

**BOT302M – Histology & Anatomy**

**Tissue:** Meristematic, simple, complex and mechanical.

**Tissue System:** Dermal, ground and vascular tissue system.

**Primary structure:** Stem and Root of Dicotylendons and Monocotylendons. Leaf- Dorsiventral and Isobilateral.

**Cambium:** Origin, structure and function.

**Periderm:** Origin, structure and function.

**Secondary growth:** Anamolous secondary growth in *Achyranthus, Boerhaavia* and *Dracaena.*

**BOT303M – Plant Pathology**

**Disease development:** Pathogenesis and Host-Parasite relationship.

**Plant disease epidemiology:** Transmission and spread of plant pathogens, disease cycles and epidemics.

**Defense mechanisms:** Structural and Biochemical defense.

**Plant disease management:** Chemical, Biological and Cultural methods.

**Plant Diseases:** A general account of late blight of potato, Early blight of potato, Citrus Canker, Red rot of sugarcane, Loose smut of wheat, Rust of wheat, Bacterial blight of rice, TMV, Leaf curl of papaya, Yellow vain mosaic of Bhindi and Little leaf of Brinjal.

**Practical – (Based on Paper BOT301M, BOT302M & BOT303M)**

**SEMESTER – IV**

**BOT401M – Embryology & Economic Botany**

**Embryology**

**Sporogenesis:** Microsporogenesis and Megasporogenesis.

**Gametogenesis:** Male and Female gametophyte.

**Fertilization:** Fertilization and double fertilization.

**Embryogenesis:** Embryo development in Dicot and Monocot.

**Endosperm:** Types, structure and function, polyembryony.

**Economic Botany**

**Food plants:** A general account of Cereals (Wheat, Rice & Maize), Pulses (Pigeon pea, Gram, Black Gram, Green Gram & Lentil)

**Oil yielding sources:** Edible (Mustard, Sunflower, Sesame & Soya bean) and Non edible (Castor, Karanj, Eucalyptus & Lemongrass).

**Plant fibers:** A general account of common fiber plants (Cotton, Jute, Bamboos, Flax and Patson).

**Timber:** A general account (Sal, Teak, Sissoo, Siris & Gambhar).

**Medicinal plants:** A brief account of common medicinal Plants of Jharkhand (Ashwagandha, Sarpgandha, Kalmegh, Centella, Arjuna, Adhatoda, Tulsi, Nux-vomica, Triphala & Chitrak).

**BOT402M – Cell Biology**

**Cellular organization:** Structure and function of Plasma membrane, Cell wall, Nucleus, Chloroplast, Mitochondria, Golgi complex, Endoplasmic reticulum and Ribosome.

**Cell Division:** Mitosis and Meiosis.

**Chromosome:** Morphology, structure, nucleosome model, chemical composition, salivary lampbrush and β-chromosome.

**BOT403M – Physiology & Metabolism**

**Physiology**

**Plant – Water relation:** Diffusion and osmosis; water potential and chemical potential; absorption of water; Ascent of sap; transpiration and its significance; mechanism of stomatal movement.

**Mineral nutrition:** Role of macro and micro nutrients in plants. Translocation of solutes, mechanism of mineral salt absorption.

**Metabolism**

**Photosynthesis:** Photochemical reactions; Photophosphorylation; Calvin cycle; C4 cycle and Photorespiration.

**Respiration:** Glycosis; TCA cycle; Oxidative Phosphorylation; Pentose Phosphate Pathway.

**Nitrogen metabolism:** Biological nitrogen fixation; reduction of nitrate into ammonia.

**Growth and development:** General aspects of growth; Physiology of Photoperiodism and vernalization.

**Physiology of seed dormancy and germination:** Role and mechanism of action of the Phytohormones; Auxin, Cytokinins and Gibberellins.

**Practical (Based on Paper BOT401M, BOT402M & BOT403M**

**SEMESTER – V**

**BOT501M – Molecular Biology**

**Gene:** Organization of gene in prokaryotes and eukaryotes. Genetic code, transcription, translation, regulation of genes in prokaryotes, operon concept, interrupted genes in eukaryotes and RNA splicing.

**Recombinant DNA technology:** Restriction endonuclease; plasmid; technique of RDT, gene mapping and DNA finger printing especially RELP, RAPD and PCR, Chromosome walking; northern and southern analysis.

**Chromatography:** TLC, GLC, HPLC, Spectroscopy.

**BOT502M – Genetics & Plant Breeding**

**Genetics**

**Mendelism:** Mendel’s law of inheritance, back cross and test cross.

**Interaction of genes:** Complementary; supplementary; duplicate and epistatic factors.

**Linkage and recombination:** Coupling and repulsion; two and three point test crosses with their significance in chromosome mapping; theories, mechanism and significance of recombination.

**Determination of sex:** Mechanism of sex determination in Plants; sex linked inheritance in *Drosophila* and man.

**Maternal influence of inheritance:** Cytoplasmic inheritance in *Mirabilis,* snail and yeast.

**Gene mutation:** Molecular basis of gene mutation; frame shift mutation and substitution mutation; spontaneous and induced mutation; mutagens – type and mode of action.

**Structural changes in chromosomes:** Origin, types and effects of duplications, deletions, inversions and translocations.

**Numerical changes in chromosomes:** Origin, types and effects of auto and allopolyploidy, origin and meiosis of aneuploidy.

**Plant Breeding**

**Plant breeding:** Vegetative and sexual.

**Methods of plant improvement:** Introduction and acclimatization, selection – pure line and mass selection, hybridization in self and cross pollinated crops, hybrid, vigour, role of polyploidy and mutation in speciation.

**Practical (Based on Paper BOT501M & BOT 502M)**

**SEMESTER –VI**

**BOT601M – Biochemistry & Biotechnology**

**Biochemistry**

**Carbohydrate:** Classification; structure of some representative examples of monosaccharide’s disaccharides and polysaccharides.

**Lipid:** Saturated and unsaturated fatty acids; fatty acid biosynthesis; oxidation of fatty acids; storage and mobilization of fatty acids and lipids.

**Nucleic acids:** Composition of nucleic acids; DNA structure and replication. Different forms of RNA and their role.

**Enzymes:** Characteristic, types, classification and mode of action.

**Amino acid and protein metabolism:** Structure, characteristic and classification of amino acids; protein and non-protein amino acids; amino acid biosynthesis; structure of proteins; protein biosynthesis and its regulation.

**Biotechnology**

**Plant Biotechnology:** Cellular differentiation and totipotency; organogenesis and embryogenesis; protoplast isolation and culture; somatic hybridization; clonal propagation; genetic engineering of plants. Role of biotechnology in crop improvement (with suitable examples)

**BOT601M – Ecology & Environmental Biology**

**Ecology**

**Ecological adaption:** Hydrophytes and xerophytes.

**Population:** Concept, density and pattern, population growth and population interactions.

**Community:** Community characteristics and their measurement; species diversity; (alpha, beta and gamma).

**Ecosystem:** Structure, function and components of ecosystem; Ecological Pyramids; Energy and its flow in ecosystem; Diversity of ecosystem; Aquatic (fresh water); terrestrial (forest/grassland); Biogeochemical cycles.

**Environmental Biology**

**Phytogeography:** Introduction; endemism, an account of vegetation of India.

**Ecological management:** renewable and non-renewable natural resources and their management.

**Biodiversity and their Conservation:** Definition, types, significance and conservation of biodiversity; IUCN threats of categories.

**Impact of human activities:** Pollution- Air, Water and Soil pollution; prevention and control of pollution; global warming and ozone depletion.

**Bioremediation:** Environmental monitoring and impact assessment, important legislations related to environmental management.

**Practical (Based on Paper BOT601M & BOT602M)**

***Details of Courses of Study***

**SIDO-KANHU MURMU UNIVERSITY, DUMKA**

**TEACHING PLAN (SEMETER WISE) FOR CHOICE BASED CREDIT SYSTEM IN UNDERGRADUATE**

**BOTANY PROGRAMME (ALLIED)**

**Generic Elective**

**SEMESTER – I**

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| --- | --- | --- | --- |
| **Paper** | **Subject type** | **Topics** | **Total marks** |
| **BOT 101A** | **Core**  | **Microbiology & Plant Pathology, Algae, Fungi, Bryophyta, Pteridophyta, Gymnosperm, Angiosperm, Anatomy and Embryology** | **75** |
| **Practical** | **Practical Based on Paper BOT 101A** | **25** |

**SEMESTER – I I**

|  |  |  |  |
| --- | --- | --- | --- |
| **Paper** | **Subject type** | **Topics** | **Total marks** |
| **BOT 201A** | **Core**  | **Cell Biology, Genetics, Physiology, Metabolism, Ecology, Environmental Biology and Economic Botany** | **75** |
| **Practical** | **Practical Based on Paper BOT 201A** | **25** |

**SEMESTER – I**

**BOT 101A – Microbiology & Plant Pathology, Algae, Fungi, Bryophyta, Pteridophyta, Gymnosperm, Angiosperm, Anatomy and Embryology**

**Full Marks- 75**

**Microbiology: Viruses-** General account; nature and structure of TMV.

**Bacteria-** Structure, reproduction and economic importance.

**Plant Pathology:** Elementary idea of Plant Pathology; Citrus Canker and Loose smut of wheat.

**Algae:** General characters, economic importance and life history of *Nostoc & Oedogonium.*

**Fungi:** General characters, economic importance and life history of *Phytophthora* and *Puccinia.*

**Bryophytes:** General characters and life cycle of *Marchentia* and *Polytrichum.*

**Pteridophytes:** General characters and life cycle of *Selaginella* and *Pteris.*

**Gymnosperm:** General account and life cycle of *Cycas* and *Pinus.*

**Angiosperm:** Binomial nomenclature, Classification-Bentham and Hooker & Hutchinson. Family description – Ranunculaceae, Apocynaceae, Lamiaceae, Euphorbiaceae and Poaceae.

**Anatomy:** Meristem and Secondary growth.

**Embryology:** Micro and Mega sporogenesis, Male and female gametophyte.

**Practical – (Based on Paper BOT 101A) Full marks- 25**

**SEMESTER – II**

**BOT 201A – Cell Biology, Genetics, Physiology, Metabolism, Ecology,**

**Environmental Biology and Economic Botany**

**Full Marks- 75**

**Cell Biology:** Plasma membrane, Chloroplast, Mitochondria, DNA, Mitosis, Meiosis.

**Genetics:** Mendel’s law of inheritance, Interaction of gene- complimentary and supplementary gene.

**Physiology:** Diffusion, Osmosis, Absorption of water and Transpiration.

**Metabolism:** Photosynthesis; light reaction & Calvin cycle. Respiration- Glycolysis & Krebs cycle.

**Phytohormones:** Auxin and Gibberellins.

**Ecology:** Ecosystem- Aquatic and Forest, Adaption- Hydrophytes and Xerophytes.

**Environmental Biology:** Pollution; Air and Water. Strategies of conservation of Biodiversity- In-sity and Ex-situ.

**Economic Botany: Food Plant-** Wheat and Rice. **Pulses-** Arhar, Gram and Lenti. **Timber-** Teak, Mudhuca and Sal, **Medicinal Plant-** Kalmegh, Centella, Tulsi, Adhatoda and Ashwagandha.

**Practical – (Based on Paper BOT 201A) Full marks- 25**

***Details of Courses of Study***

**SUPPORTIVE PAPER (Open Course) BOTANY(DSE-1)**

**BOT-SP-MORPHOLOGY OF ANGIOSPERMIC PLANTS**

**Time – Three hours**

**Full Marks- 100**

**Total teaching Hours - 48**

***Morphology and Angiospermic Plants*-**

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| --- | --- | --- |
| 1. | Habit and Habitat | 06 |
| 2. | The Root: Definition, type, modification and function. | 06 |
| 3. | The Stem: Definition, type, modification and function. | 06 |
| 4. | The Leaf: Definition, parts, venation, types, phylotaxy, modification and function. | 06 |
| 5. | The Inflorescence: Definition, different types. | 06 |
| 6. | The Flower: Definition, position, parts and aestivation. | 06 |
| 7. | The Fruit: Definition, parts and types. | 06 |
| 8. | The Seed: Definition, Structure of dicotyledonous and Monocotyledonous seed. | 06 |

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**BOT-SP-COMMERCIAL PLANT PRODUCTS(DSE-2)**

**Time – Three hours**

**Full Marks- 100**

**Total teaching Hours - 48**

***Morphology and Angiospermic Plants*-**

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| --- | --- | --- |
| 1. | Cereals: Cultivation and uses of common cereals of the locality | 08 |
| 2. | Pulses: Cultivation and uses of common pulses of the locality | 06 |
| 3. | Oil yielding: Cultivation and uses of common oil yielding plants of the locality. | 06 |
| 4. | Timber yielding: Uses of common Timber yielding plants of the locality. | 08 |
| 5. | Fiber: Uses | 06 |
| 6. | Medicinal and aromatic plants: Uses of common Medicinal and aromatic plants of the locality. | 08 |
| 7. | General concept of plant uses: Shade and religious. | 06 |

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**BOT-SP-ENVIRONMENTAL BIOLOGY(DSE-3)**

**Time – Three hours**

**Full Marks- 100**

**Total teaching Hours - 48**

***Environmental Biology*-**

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| --- | --- | --- |
| 1. | Environment: General concept and impact on Human beings. | 03 |
| 2. | Pollution: General concept and impact on Human beings. | 03 |
| 3. | Air, Water, Soil and noise: Kinds, sources, effect and control measures. | 14 |
| 4. | Climate changes: Green House Effects, Ozone layer and Ozone hole. | 14 |
| 5. | Energy resources: Convential and non-convential. | 14 |

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**BOT-SP-ETHNOBOTANY AND MEDICINAL PLANTS(DSE-4)**

**Time – Three hours**

**Full Marks- 100**

**Total teaching Hours - 48**

***Ethnobotany and medicinal plants*-**

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| --- | --- | --- |
| 1. | Definition, scope and method of study | 08 |
| 2. | Important tribes and ethnic groups of Jharkhand (Their distribution, habit and language) | 08 |
| 3. | Preliminary knowledge about ethnobotany of Santals and Paharia. | 08 |
| 4. | Herbarium and its role. | 08 |
| 5. | Beyond Inventorying. | 08 |
| 6. | Studies of some important medicinal plants of Jharkhand. | 08 |

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**Department of Botany**

**M.G.College, Ranishwar**

**Program outcome/ Specific outcome/ Course outcome**

**CC-I:-** The students learn about micro biology T.M.V. Viruses, Micro plasma, Bacteria, etc. And also get knowledge about its advantage and disadvantage.

**CC-II:-** The students learn about general characters, classification, economics importance and life history of Algae and Fungi.

**CC-III:-** The students acquire basic concept about general characters, classification morphology, economic importance, reproduction of Bryophytes and Pteridophyts.

**CC-IV:-** The students learn about general characters of morphology, reproduction in Gymnosperm & fossil plants.

**CC-V:-** The students become competent in understanding about morphology of root stem, leaf and dispersal of fruit and seeds & systematic positions of angiosperm.

**CC-VI:-** The students learn about internal structure of plants take knowledge about Cell, Tissue also the students should be able to account for the connection between the function of the tissue and its morphology.

**CC-VII:-** The students become familiarise with concept of plant disease, epidemiology, Biochemical defence mechanism, plant disease management etc.

**CC-VIII:-** The students acquire skill in understanding about embryology eg. Sporogenesis gametogenesis, Fertilization etc. and also about economic Botany.

**CC-IX:-** The students became competent in gathering information about cell biology.

**CC-X:-** The students acquire knowledge about Physiology and metabolism . Mineral nutrition, Photo synthesis, Respiration, Nitro metabolism, etc.

**SEC:-** Life skill and personality development.

**CC-XI:-** The students being taught about molecular Biology example- Gene, Recombinant DNA technology, chromatography etc.

**CC-XII:-** The students became competent in gathering information about genetics and plant breeding.

**CC-XIII:-** The students absorb conceptual knowledge in understanding about Bio Chemistry and take information about plant Biotechnology.

**CC-XIV:-** The students became familiarize with concept of ecology and environment biology.

**SEC-I**

**GE-I:-** The student acquire basic concept about general character and basic knowledge of Microbiology, Bacteria, Plant pathology, Algae, Fungi, Bryophyte, Pteridophyta, Gymnosperm, Angiosperm etc.

**SEC-II**

The students familiarize with basic concept about Cell Biology Genetics, Physiology, Metabolism Ecology, Environment, Environment biology, economic Botany etc

**DSE-I**

The students become competent in gathering knowledge about Morphology of Angiospermic Plants.

**DSE-II**

The students assimilate profuse knowledge about commercial plant product.

**DSE-III**

The students became proficient in understanding about Environmental Biology.

**SSE-IV:-** The students acquire skill about Ethnobotany and medicinal plants.