B.Sc., BOTANY, III Year, CBCS Syllabus

Telangana State Council of Higher Education, Govt. of Telangana B.Sc., CBCS Common Core Syllabi for all Universities in Telangana

PROPOSED SCHEME FOR CHOICE BASED CREDIT SYSTEM IN B.Sc. BOTANY.

THIRD YEAR **SEMESTER-V**

Code	Course Title	Course Type	HPW	Credits
BS 501	**SEC-III: Nursery and Gardening**	**SEC-3**	**2**	**2**
BS 502	**GE-I: Economic Botany**	**GE-1**	**2T**	**2**
BS 503	**Optional-I: BOTANY-V** **Cell Biology and Genetics**	**DSC-1E**	**3T+2P=5**	**3+1=4**
BS 504	Optional – II	DSC-2E	3T+2P=5	3+1=4
BS 505	Optional – III	DSC-3E	3T+2P=5	3+1=4
BS 506	**Elective-A: Ecology and Biodiversity /** **Elective-B: Horticulture**	**DSE-1E** **DSE-2E**	**3T+2P=5**	**3+1=4**

SEMESTER-VI

Code	Course Title	Course Type	HPW	Credits
BS 601	SEC-IV: Mushroom Culture Technology	SEC-4	2	2
BS 602	GE-II: Biodiversity and Human Welfare	GE-2	2T	2
BS 603	**Optional – I: Botany-VI** **Plant Physiology**	**DSC-1F**	**3T+2P=5**	**3+1=4**
BS 604	Optional – II	DSC-2F	3T+2P=5	3+1=4
BS 605	Optional – III	DSC-3F	3T+2P=5	3+1=4
BS 606	**Elective-C: Tissue Culture and Biotechnology /** **Elective-D: Seed Technology**	**DSE-3E** **DSE-4E**	**3T+2P=5**	**3+1=4**

AECC: Ability Enhancement Compulsory Course, SEC: Skill Enhancement Course, GE: Generic Elective, DSC: Discipline Specific Course, DSE : Discipline Specific Elective.

B.Sc. Botany- III Year
Semester-V : Paper-V

Cell Biology and Genetics

Credits-3

DSC-1E (3 hrs/week) Core **45 hours**

Theory Syllabus

Unit - I:

1. Principles of Microscopy: Light Microscope and Electron Microscope. (2 h)
2. Plant cell envelops: Ultra structure of cell wall, molecular organization of cell membranes. (3 h)
3. Nucleus: Ultra structure, Nucleic acids - Structure of DNA, types and functions of RNA. (4 h)
4. Chromosomes: Morphology, organization of DNA in a chromosome, Euchromatin and Heterochromatin, Karyotype. Special types of chromosomes: Lampbrush and Polytene chromosomes. (3 h)
5. Extra nuclear genome: Mitochondrial DNA and Plastid DNA, Plasmids. (3 h)

Unit - II:

6. Cell division: Cell and its regulation; mitosis, meiosis and their significance (3h)
7. Mendelism: Laws of inheritance. Genetic interactions - Epistasis, Complementary, Supplementary and inhibitory genes. (5h)
8. Linkage: A brief account and theories of Linkage. Crossing over: Mechanism and theories of crossing over. (4 h)
9. Genetic maps: Construction of genetic maps with Two point and Three point test cross data. (3h)

Unit - III:

10. Mutations: Chromosomal aberrations - structural and numerical changes; Gene mutations, Transposable elements. (4h)
11. Gene Organization- Structure of gene, Genetic code, Process of DNA Replication with Polymerase enzyme. (5h)
12. Mechanism of transcription in Prokaryotes and Eukaryotes. (4h)
13. Regulation of gene expression in prokaryotes (Lac and Trp. Operons). (2h)

References:

1. Sharma, A. K. and A. Sharma. 1999. Plant Chromosomes: Analysis, Manipulation and Engineering. Harward Academic Publishers, Australia.
2. Shukla, R. S. and P. S. Chandel. 2007. Cytogenetics, Evolution, Biostatistics and Plant Breeding. S.Chand & Company Ltd., New Delhi.
3. Singh, H. R. 2005. Environmental Biology. S. Chand & Company Ltd., New Delhi.
4. Snustad, D. P. and M. J. Simmons. 2000. Principles of Genetics. John Wiley & Sons, Inc., U S A.
5. Strickberger, M. W. 1990. Genetics (3rd Ed.). Macmillan Publishing Company.
6. Verma, P. S. and V. K. Agrawal. 2004. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S. Chand & Company Ltd., New Delhi.

B.Sc Botany- III Year
Semester-V : Paper-V

Cell Biology and Genetics

Credits-1

DSC-1E (2 hrs/week) **30 hours**

Practical Syllabus

1. Demonstration of cytochemical methods: Fixation of plant material and nuclear staining for mitotic and meiotic studies. (4 h)
2. Study of various stages of mitosis using cytological preparation of Onion root tips. (4 h)
3. Study of various stages of meiosis using cytological preparation of Onion flower buds. (2 h)
4. Solving genetic problems related to monohybrid, dihybrid ratio incomplete dominance and interaction of genes (minimum of six problems in each topic). (8 h)
5. Construction of linkage maps; two and three point test cross. (4 h)
6. Study of ultra structure of cell organelles using photographers.
   Chloroplast, Mitochondria, Nucleus, Ribosomes, Endoplasmic reticulum, and Golgi complex. (4 h)
7. Study of Special types of Chromosomes (Polytene chromosome and Lampbrush chromosomes- Permanent slide) (4 h)

B.Sc. Botany- III Year
Semester-V - Paper-V

Cell Biology and Genetics

Practical Model Question Paper

Time : 2 1/2 hrs **Max. marks : 25**

1. Prepare a cytological slide of given material A and identify & describe any two stages with well labeled diagrams. (8 marks)
2. Solve genetic problems B related to dihybrid ratio or incomplete dominance (6marks)
3. Solve the genetic problem C related to interaction of genes. (5 Marks)
4. Slides (2x2=4 marks)
   C-Cell organelles
   D-Chromosomes (Polytene Chromosome)
5. Record (2 marks)

B.Sc (CBCS) Botany-III Year
Semester-V: Elective-I

Ecology & Biodiversity

Credits-3

DSE-1E (3 hrs./week) **(45 hours)**

Theory Syllabus

UNIT - I

1. Concept and components of Ecosystem. Energy flow, food chains, food webs, ecological pyramids, Biogeochemical cycles - Carbon Cycle (4h)
2. Definition of Environment: Atmosphere (Troposphere, Stratosphere , Mesosphere , Ionosphere), Hydrosphere, Lithosphere & Biosphere. (3h)
3. Plants and environment: Ecological factors - Climatic (Light and Temperature) and biotic. Ecological adaptations of plants. (5h)
4. Edaphic Factors: Soil- Formation- Weathering, mode of formation-residual;Transported: Colluvial, Alluvial, Glacial & Eolian. Soil erosion & Conservation. (4h)

UNIT - II

5. Population ecology: Natality, Mortality, Growth curves, Ecotypes & Ecads. (4h)
6. Community ecology: Frequency, density cover, Life forms &Biological spectrum. (4h)
7. Community Dynamics: Succession - Serial stages, Modification of physical environment, Climax formation with reference to Hydrosere and Xerosere. (4h)
8. Production ecology: Concepts of productivity - Primary and Secondary Productivity. (4h)

UNIT- III

9. Biodiversity: Concepts, Convention of Biodiversity - Earth Summit (Copenhagan). (4h)
10. Biodiversity- Levels, threats and value (3h)
11. Hot spots of India - North Eastern Himalayas, Western Ghats; Endemism. (3h)
    IUCN categories, RED data book
12. Principles of conservation – *Insitu* and *Exsitu*. Role of organizations in the conservation of Biodiversity - WWF and NBPGR. (3h)

References:

1. Bharucha, E. 2005. Textbook of Environmental Studies for Undergraduate Courses. Universities Press (India) Private Limited, Hyderabad.
2. Khitoliya, R. K. 2007. Environmental Pollution – Management and Control for Sustainable Development. S. Chand & Company Ltd., New Delhi.
3. Michael, S. 1996. Ecology. Oxford University Press, London.
4. Mishra. D. D. 2008. Fundamental Concepts in Environmental Studies. S. Chand & Company Ltd.,New Delhi.
5. Odum, E. P. 1983. Basics of Ecology. Saunder's International Students Edition, Philadelphia.
6. Sharma, P. D. 1989. Elements of Ecology. Rastogi Publications, Meerut.
7. Verma, P. S. and V. K. Agrawal. 2006. Genetics. S. Chand & Company Ltd., New Delhi

B.Sc (CBCS) Botany-III Year
Semester-V : Elective-I

Ecology & Biodiversity

Practical Syllabus **30 hours**

1. Study of plant communities by Quadrat Method (8h)
2. Estimation of carbonates and bicarbonates in the given water sample. (4h)
3. Determination of soil texture (composition of clay, sand silt etc.) and pH. (2h)
4. Study of morphological and anatomical characteristics of plant communities using locally available plant species: Hydrophytes (*Eichhornia*, *Hydrilla, Pistia, Nymphaea, Vallisneria*), Xerophytes: (*Asparagus,Opuntia*, *Euphorbia melii*), (*Casuarina*, *Calotropis*) . (8h)
5. Value of biodiversity (8h)

    a) Medicinal value: *Catharanthus, Tinospora* and *Emblica*
    b) Timber Value: *Acacia, Tectona* and *Azardirachta*
    c) Aesthetic Value: *Mangifera, Ficus, Ocimun*
    d) Assessment of local biodiversity.

B.Sc (CBCS) Botany-III Year
Semester-V : Elective-I

Time: 2 1/2 hrs # Ecology & Biodiversity **Max. marks : 25**

Practical Model Question Paper

1. Calculate the frequency and density of the given Quadrate	6M
2. Estimate the amount of Carbonates/Bicarbonates present in the given water sample.	4M
3. Comment on the specimens A, B & C	(3x2=6M)
4. Identify the given slides D & E (Hydrophytes & Xerophytes)	(2x2=4M)
5. Biodiversity: Identification and Biodiversity value (Medicinal/Timber/Aesthetic).	3M
5. Record	(2M)

B.Sc (CBCS) BOTANY: III YEAR
Semester-V : Elective-II

Horticulture

DSE-1E (3 hrs./week) Credits-3 **(45 hours)**

Theory Syllabus

UNIT - I

1. Definition, branches, scope and economic importance of horticultural crops (4h)
2. Classification of horticultural crops based on -Climatic requirements, Season of growth, (6h)
3. Manures: Definition, importance of manures FYM (compost), oil cakes, green manure, Organic manures and vermi-compost. (5h)

UNIT - II

4. Natural Propagation : By seeds, Vegetative Structures like Bulbs, Tubers, Corms, Rhizomes, Root stock, runners, Offsets and suckers . (4h)
5. Artificial Propagation: Cutting, Layering, Grafting and Budding (4h)
6. Application of the following plant growth regulators in horticulture - Auxins**,** Gibberellins, Cytokinins, Ethylene and Brassinosteroids. (4h)
7. Green house technology- definition, types, layout, construction, irrigation systems, care and attention, hardening of plants. (4h)

UNIT - III

8. Adaphic and environmental parameters for horticultural crops, Selection of site, planning, training, pruning and Cropping system; Garden implements and their uses. (5h)
9. Management: Nutrition, Water, Pest and Weed Management. (4h)
10. Bonsai and Landscaping techniques. (5h)

References:

1. Bhattacharjee.S.K. 2006. Amenity Horticulture, Biotechnology and Post harvest technology. Pointer publishers. Jaipur
2. Chadha, K.L. 2001, Handbook of Horticulture, ICAR, New Delhi.
3. Chandra, R. and M. Mishra. 2003. Micropropagation of horticultural crops. International Book Distributing Co., Lucknow.
4. Chattopadhyaya, P.K.2001. A text book on Pomology (Fundamentals of fruit growing) Kalyani Publication, New Delhi
5. Christopher, E.P. 2001. Introductory Horticulture, Biotech Books, New Delhi
6. Edmond, J.B. T.L.Senn, F.S. Andrews and P.G.Halfacre, 1975. Fundamentals of Horticulture, Tata MC. Graw Hill Publishing Co.New Delhi
7. George Acquaah, 2002, Horticulture-principles and practices. Prentice-Half of India pvt. Ltd., New Delhi.
8. Hartman, H.T. and Kester, D.E. 1986. Plant propagation – Principles and Practices – Prentice Hall of India Ltd., New Delhi.
9. Jacob John. P. 2008. A hand book of post harvest management of fruits and vegetables. Daya publishers.
10. Jitendra Singh. 2006. Basic Horticulture. Kalyani Publishers, New Delhi.
11. Rajan, S. and B.L. Markose. 2007. Propagation of horticultural crops. New India Publishing, New Delhi.
12. Shanmugavelu, K.G., N. Kumar and K.V. Peter. 2005. Production technology of spices and plantation crops. Agrobios, Jodhpur.
13. Singh, D.K. 2008. Hi-tech horticulture. Agrotech publishers, Udaipur
14. Singh, N.P. 2005. Basic concepts of fruit science. International Book Distributing Co., Lucknow.
15. Surendra Prasad and U. Kumar. 1999. Principles of horticulture, Agro-botanica, Bikaner, India.
16. Sureshkumar, P. Sagar and Manish Kanwat. 2009. Post harvest physiology and quality management of fruits and vegetables. Agrotech publishers, Udaipur
17. Utpal Banerjee. 2008. Horticulture. Mangal Deep publishers
18. Vijaikumar UmRao. 2008. Horticulture terms – Definitions and Terminology. IBD publishers, Dehradun
19. Adams, C.R. and M. P. Early. 2004. Principles of horticulture. Butterworth –Heinemam, Oxford University Press.
20. Bansil. P.C. 2008. Horticulture in India. CBS Publishers and Distributors, New Delhi.
21. Kumar, N.1997. Introduction to Horticulture, Rajalakshmi Publication, Nagercoil.

B.Sc (CBCS) BOTANY: III YEAR
Semester-V : Elective II

Horticulture

Practical Syllabus

(30 hours)

1. Garden tools and implements. (2h)
2. Identification and economic values of any two of tropical and subtropical vegetable, fruit, flower and ornamental crops. (2h)
3. Propagation practices by seed, Vegetative propagation (Rhizome, bulb, corm), cutting, layering, budding, grafting with two examples. (6h)
4. Seed propagation- seed treatments, sowing and seedling production. (4h)
5. Nursery practices, transplanting, field preparation, sowing/planting, use of herbicides, top dressing of fertilizers and use of growth regulators. (4h)
6. Nursery containers, media, potting and repotting of plants, hardening of plants in nursery, shade regulation in nursery, plant protection in nursery plants (Demonstration) (4h)
7. Packing nursery plants for local and long distance markets. (Demonstration) (2h)
8. Making of organic-compost. (6h)

B.Sc. (CBCS) BOTANY: III YEAR
Semester-V : Elective-II

Horticulture

Time: 2 1/2 hrs **Practical Model Paper** **Max. marks : 25**

1. Major Experiment A (8marks)
   Air Layering
   (OR)
   Grafting
2. Minor Experiment B (6marks)
   Identification, Nutritive and economic value of vegetable or fruit.
   (OR)
   Making of organic compost-Flow chart.
3. Spotters (3x3=9marks)

   C. Vegetative propagative organ
   D. Horticulture- Garden tools
   E. Types of Bonsai / Growth hormones
4. Record (2marks)

B.Sc. III Year
Semester-V

Economic Botany

GE-1E (2 hrs/week) Credits-2 Generic Elective-I 30 hours

Theory Syllabus

Unit-I:

1. **Cultivated Plants:** Concept of origin, their importance.
2. **Vegetables:** Nutritional and Commercial values of Root crops, leafy and fruit vegetables.
3. **Cereals:** Rice, Wheat and maize -Origin, morphology and uses
4. **Pulses:** General account with special reference to Gram and soybean
5. **Millets:** Nutrient significance of Sorghum, Finger millet, Pearl millet, Foxtail millet.

U nit-2:

6. **Spices:** General account with special reference to clove and black pepper.
7. **Fruits and nuts:** Commercial and nutritional value of South Indian fruits**.** Cashew nut, Almond and Walnut.
8. **Beverages:** Tea & Coffee - morphology, processing, uses.
9. **Oils and Fats:** General description with special reference to groundnut and sunflower
10. **Fiber Yielding Plants:** General description with special reference to Cotton (Botanical name, family, part used, morphology and uses)

Suggested Readings

1. Kochhar, S.L. (2011). Economic Botany in the Tropics, MacMillan Publishers India Ltd., New Delhi. 4th edition.
2. B.P. Pandey (2007). Economic Botany, S. Chand & Company Ltd. New Delhi. 17/e.

B.Sc. III Year
Semester-V
Skill Enhancement Course

SEC-3 (2 hrs/week) (Credits 2) Lectures: 30

Nursery and Gardening

Unit-I

1. Nursery: definition, objectives and scope and building up of infrastructure for nursery, planning and seasonal activities - Planting - direct seeding and transplants. **(4h)**
2. Seed: Structure and types - Seed dormancy; causes and methods of breaking dormancy - Seed storage: Seed banks, factors affecting seed viability, genetic erosion - Seed production technology - seed testing and certification. **(6h)**
3. Vegetative propagation: air-layering, cutting, selection of cutting, collecting season, treatment of cutting, rooting medium and planting of cuttings - Hardening of plants - green house - mist chamber, shed root, shade house and glass house. **(6h)**

Unit-II

4. Gardening: definition, objectives and scope - different types of gardening - landscape and home gardening - parks and its components - plant materials and design - computer applications in landscaping - Gardening operations: soil laying, manuring, watering, management of pests and diseases and harvesting. **(8h)**
5. Sowing/raising of seeds and seedlings - Transplanting of seedlings - Study of cultivation of different vegetables: cabbage, brinjal, lady's finger, onion, garlic, tomatoes, and carrots - Storage and marketing procedures. **(6h)**

Suggested Readings

1. Bose T.K. & Mukherjee, D., 1972, Gardening in India, Oxford & IBH Publishing Co., New Delhi.
2. Sandhu, M.K., 1989, Plant Propagation, Wile Eastern Ltd., Bangalore, Madras.
3. Kumar, N., 1997, Introduction to Horticulture, Rajalakshmi Publications, Nagercoil.
4. Edmond Musser & Andres, Fundamentals of Horticulture, McGraw Hill Book Co., New Delhi.
5. Agrawal, P.K. 1993, Hand Book of Seed Technology, Dept. of Agriculture and Cooperation, National Seed Corporation Ltd., New Delhi.
6. Janick Jules. 1979. Horticultural Science. (3rd Ed.), W.H. Freeman and Co., San Francisco, USA.

B.Sc. (CBCS) Botany: III Year
Semester-VI : Paper-VI

Plant Physiology

DSC-1F (3hrs./week) Core **Credits-3**

Theory Syllabus

(45 hours)

UNIT - I

1. Plant-Water Relations*:* Importance of water to plant life, physical properties of water, diffusion, imbibition, osmosis; water, osmotic and pressure potentials; absorption, transport of water, Ascent of sap; Transpiration; Stomatal structure and movements. (7h)
2. Mineral Nutrition*:* Essential macro and micro mineral nutrients and their role; symptoms of mineral deficiency. (3h)
3. Translocation of organic substances: Mechanism of phloem transport. (2h)
4. Enzymes: Nomenclature, Characteristics, Classification, Mechanism and regulation of enzyme action, factors regulating enzyme activity. (3h)

UNIT- II

5. Photosynthetic pigments, absorption and action spectra; Red drop and Emerson enhancement effect; concept of two photosystems; mechanism of photosynthetic electron transport and evolution of oxygen; Factors effecting Photosynthesis, Photophosphorylation. (6h)
6. Carbon assimilation pathways: C3, C4 and CAM. (4h)
7. Nitrogen Metabolism*:* Biological nitrogen fixation, nitrate reduction, ammonia assimilation, (GS-GOGAT, transamination) (4h)

UNIT - III

8. Respiration: Aerobic and Anaerobic; Glycolysis, Krebs cycle; electron transport system, mechanism of oxidative phosphorylation, pentose phosphate pathway. (5h)
9. Growth and Development: Physiological effects of phytohormones–Auxins, gibberellins, cytokinins, ABA, ethylene and Brassinosteroids (5h)
10. Physiology of flowering and photoperiodism. Role of Phytochrome in flowering. (3h)
11. Stress physiology: Concept of water, salt and temperature stresses and plant responses. (3h)

References:

1. Hopkins, W. G. 1995. Introduction to Plant Physiology. John Wiley & Sons Inc., New York, USA
2. Jain, J.L., S. Jain and Nitin Jain. 2008. Fundamentals of Biochemistry. S. Chand & Company Ltd., New Delhi.
3. Pandey, B. P. 2007. Botany for Degree Students: Plant Physiology, Biochemistry, Biotechnology, Ecology and Utilization of Plants. S. Chand & Company Ltd., New Delhi.
4. Salisbury, F. B. and C. W. Ross. 1992. Plant Physiology. 4th edn. (India Edition), Wordsworth, Thomson Learning Inc.,USA.
5. Taiz, L. and E. Zeiger. 1998. Plant Physiology (2nd Ed.). Sinauer Associates, Inc., Publishers, Massachusetts, USA.
6. Dutta A.C. 2016. Botany for Degree Students. Oxford University Press.

B.Sc (CBCS) Botany: III Year
Semester-VI : Paper-VI

Plant Physiology

Practical Syllabus

(30 hours)

1. Determination of osmotic potential of vacuolar sap by Plasmolytic method using leaves of *Rheodiscolor* / *Tradescantia*. (4h)
2. Determination of rate of transpiration using Cobalt chloride method (2h)
3. Determination of stomatal frequency using leaf epidermal peelings / impressions (4h)
4. Determination of catalase activity using potato tubers by titration method (4h)
5. Separation of chloroplast pigments using paper chromatography technique (8h)
6. Estimation of protein by Biurette method (4h)
7. Mineral deficiency- Detail study of Micronutrients and Macro nutrients (2h)
8. Identification of C_3, C_4 and CAM plants (2h)

B.Sc (CBCS) Botany: III Year

Semester-VI - Paper-VI

Plant Physiology

Practical Model paper

Time : $2^{1/2}$ hrs **Max. marks: 25**

I. Major Experiment: (10 marks)

1. Determination of Osmotic potential of vascular sap- plasmolytic method.
2. Determination of Catalase activity – Potato, tubers by titration method.
3. Separation of Chloroplast pigments by paper chromatography.
4. Estimation of proteins by Biuret Method.

II. Minor Experiment: (7 marks)

1. Determination of Stomatal frequency using leaf epidermal peel/impressions.
2. Determination of Rate of transpiration by Cobalt chloride method.

III. Identify and Comment on: A, B & C (3x2=6 Marks)

1. Micronutrient Deficiency
2. Macronutrients Deficiency
3. C3, C4 and CAM plants.

IV. Record (2marks)

B.Sc (CBCS) Botany-III Year
Semester-VI : Elective-III

Tissue Culture and Biotechnology

DSE-1F (3 hrs./week) **Theory Syllabus** **Credits-3**

(45 hours)

UNIT - I

1. Tissue culture: Introduction, sterilization procedures, explants, culture media - composition and preparation; Micropropagation. (4h)
2. Organ culture: Vegetative Organs-Root, Shoot, Leaf culture (3h)
   Reproductive Organs-Anther, Ovary, Ovule, Embryo culture
3. Callus culture, Cell and Protoplast culture (4h)
4. Somatic hybrids and Cybrids. (4h)

UNIT- II

5. Applications of tissue culture: Production of pathogen free plants and somaclonal variants, production of stress resistance plants, secondary metabolites and synthetic seeds. (6h)
6. Induction of hairy roots and its applications in production of secondary metabolites. (2h)
7. Biotechnology: Introduction, history, scope and applications. (3h)
8. rDNA technology: Basic aspect of of gene cloning, Enzymes used in gene cloning-Restriction enzymes, Ligases, Polymerases. (4h)

UNIT- III

9. Gene cloning-Vectors – cloning vehicles (Plasmid , Cosmids, Bacteriophages , & Phasmids) application of r DNA technology. (5h)
10. Gene Libraries: Genomic Libraries, cDNA Libraries, Polymerase chain reaction and its applications. (4h)
11. Method of gene transfer in plants (*Agrobacterium* and Microprojectile) (4h)
12. Production of transgenic plants and application of transgenic in crop improvement: Bt-cotton and Brinjal. (2h)

References:

1. Balasubramanian, D., C. F. A. Bryce, K. Dharmalingam, J. Green and K. Jayaraman. 2004.
2. Biotechnology. Universities Press (India) Private Limited, Hyderabad.
3. Channarayappa. 2007. Molecular Biotechnology – Principles and Practices. Universities Press
4. (India) Private Limited, Hyderabad.
5. Chawala, H. S. 2002. Introduction to Plant Biotechnology. Oxford & IBH Publishing Company,
6. New Delhi.
7. Dubey, R. C. 2001. A Textbook of Biotechnology. S. Chand & Company Ltd., New Delhi
8. Edmond, J. B., T. L. Senn, F. S. Adrews and R. J. Halfacre. 1977..
9. Jha, T.B. and B. Ghosh. 2005. Plant Tissue Culture – Basic and Applied. Universities Press (India)
10. Private Limited, Hyderabad..
11. Ramawat, K. G. 2008. Plant Biotechnology. S. Chand & Company Ltd., New Delhi.
12. Salisbury, F. B. and C. W. Ross. 1992. Plant Physiology. 4th edn. (India Edition), Wordsworth,
13. Thomson Learning Inc., USA..

B.Sc (CBCS) Botany-III Year
Semester-VI : Elective-III

Tissue Culture and Biotechnology

Practical Syllabus

30 Hours

Major Experiments

1. Isolation of plant DNA. (Tomato) (4h)
2. Production of synthetic seeds /Encapsulation of embryo (2h)
3. Preparation of plant tissue culture medium. (4h)

Minor Experiments

4. Callus induction (2h)
5. Demonstration of Micropropagation/ multiple shoots (4h)
6. Anther culture (2h)
7. PCR –Demonstration (2h)
8. Study of biotechnology products: Samples of antibiotics and vaccines (4h)
9. Photographs of Gene transfer methods. (2h)
10. Instruments used in Biotechnology lab- Autoclave, Laminar air flow, Hot air oven and Incubator. (4h)

B.Sc (CBCS) Botany-III Year
Semester-VI : Elective III

Tissue Culture and Biotechnology

Time: 2 1/2 hrs **Max. marks : 25**

Practical Model Paper

1. Major Experiment (9 marks)
   Isolation of DNA
   (OR)
   Production of synthetic seeds /Encapsulation of embryo
2. Minor Experiment (5 marks)
   Callus/ Micropropagation/Multiple shoots
3. Spotters (3x3=9 marks)
   A. Vaccines
   B. Antibiotics
   C. Gene transfer methods/ instruments
4. Record (2 marks)

B.Sc (CBCS) BOTANY: III YEAR

Semester-VI : Elective IV

Seed Technology

DSE- 1F (3 hrs./week) **Credits-3**

Theory Syllabus **(45 hours)**

UNIT- I

1. Seed development in cultivated plants, seed quality concept, importance of genetic purity of seed. Hybrid seed production and Heterosis. (4h)
2. Principles of hybrid seed production-Cross pollination, Emasculation, role of pollinators and their management. (5h)
3. Collection and storage of pollen for artificial pollination. (3h)
4. Seed: Structure and types. Seed dormancy: causes and methods of breaking dormancy. (4h)

UNIT-II

5. Cultural practices and harvesting of Seed: Isolation, Sowing, Cultural practices, harvesting and threshing of the following crops: a) Rice b) Cotton c) Sunflower (4h)
6. Physico and Bio-chemical changes during seed storage. (3h)
7. Seed Treatment to control seed borne disease –General account (3h)
8. Seed production technology; seed testing- Procedures of seed testing, seed testing laboratories and importance of seed testing. (4h)

UNIT-III

9. Seed viability, factors affecting seed viability and genetic erosion. (4h)
10. Seed storage: Long term and short term storage. Orthodox and recalcitrant seeds. Packing of seeds – Principles, practices, bagging and labelling. (4h)
12. Seed banks- National, International and Millennium seed banks. (3h)
11. Seed certification- History, Seed certification agency, Indian minimum, general and specific seed certification standard. (4h)

References:

1. Agrawal, P. K. 1993. Hand Book of Seed Technology. Dept. of Agriculture and Cooperation. National Seed Corporation Ltd., New Delhi

2. Balasubramanian, D., C. F. A. Bryce, K. Dharmalingam, J. Green and K. Jayaraman. 2004. Biotechnology. Universities Press (India) Private Limited, Hyderabad.

3. Bedell, Y. E. Seed Science and Technology. Indian Forest Species. Allied Publishers Limited, New Delhi.

4. Channarayappa. 2007. Molecular Biotechnology – Principles and Practices. Universities Press (India) Private Limited, Hyderabad.

5. Chawala, H. S. 2002. Introduction to Plant Biotechnology. Oxford & IBH Publishing Company, New Delhi.

6. Dubey, R. C. 2001. A Textbook of Biotechnology. S. Chand & Company Ltd., New Delhi

7. Edmond, J. B., T. L. Senn, F. S. Adrews and R. J. Halfacre. 1977..

8. Hartman, H. T. and D. E. Kestler. 1976. Plant Propagation: Principles and Practices. Prentice & Hall of India, New Delhi.

9. Jha, T.B. and B. Ghosh. 2005. Plant Tissue Culture – Basic and Applied. Universities Press (India) Private Limited, Hyderabad..

10. Ramawat, K. G. 2008. Plant Biotechnology. S. Chand & Company Ltd., New Delhi.

11. Salisbury, F. B. and C. W. Ross. 1992. Plant Physiology. 4th edn. (India Edition), Wordsworth, Thomson Learning Inc., USA..

12. Tiwari, G. N. and R. K. Goal. Green House Technology – Fundamentals, Design, Modelling and Application. Narosa Publishing House, New Delhi.

13. Tunwar, N. S. and S. V. Singh. 1988. Indian Minimum Seed Certification Standards. The Central Seed Certification Board, Govt. of India, New Delhi.

B.Sc. (CBCS) BOTANY: III YEAR

Semester-VI : Elective IV

Seed Technology

Practical syllabus

(30 hours)

Major Experiment

1. Testing of seed viability using 2, 3, 5-triphenyl tetrazolium chloride (TTC). (2h)

2. Estimation of amylase activity of germinating seeds (Qualitatively). (2h)

3. Demonstration of seed dressing using fungicides to control seed borne diseases. (2h)

4. Demonstration of seed dressing using Biofertilizers (BGA) to enrich nutrient supply. (2h)

Minor Experiments

5. Emasculation, bagging of flower for hybrid seed production. (4h)

6. Dissection of Dicot embryo (bean) and Monocot embryo (maize). (4h)

7. Pollen viability test using Evan's blue staining. (*Hibiscus*). (2h)

8. Harvesting and Importance of following seeds: (4h)

a) Rice
b) Maize
c) Cotton
d) Groundnut and
e) Sunflower.

9. Methods to break Seed dormancy (2h)

10. Study visits to research institutes, seed tests and certification laboratories and places seed banks. (6h)

B.Sc (CBCS) BOTANY: III YEAR

Semester-VI : Elective-IV

Seed Technology

Practical Model paper

Time: 2 1/2 hrs **Max. marks : 25**

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1. Major Experiment. (9marks)
   a) Estimation of amylase activity in germinating seeds.
   (OR)
   b) Seed viability test by triphenyl tetrazolium chloride (TTC)
2. Minor Experiment. (5marks)
   a) Dissection of Dicot / Monocot embryo
   (OR)
   b) Methods to break Seed dormancy / Seed dressing.

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3. Spotters (3x3=9marks)
   A. Emasculation / Bagging
   B. Germination of sedds.
   C. Importance of following seeds: rice, cotton and sunflower.
4. Record (2marks)

B.Sc. III Year
Semester-VI
Plant Biodiversity and Human Welfare

GE-2E (2 hrs/week) Credits-2 Generic Elective-II 30 hours

Theory Syllabus

Unit-I:

1. **Plant diversity and its scope**- Genetic diversity, Species diversity, Plant diversity at The ecosystem level, Agro-biodiversity and cultivated plant taxa, wild taxa. Values and uses of Biodiversity: Ethical and aesthetic values, Precautionary principle, Methodologies for valuation, Uses of plants, Uses of microbes.
2. **Loss of Biodiversity:** Loss of genetic diversity, Loss of species diversity, Loss of ecosystem diversity, Loss of agro-biodiversity, Projected scenario for biodiversity loss,
3. **Conservation of Biodiversity:** Conservation of genetic diversity, species diversity and ecosystem diversity, *In situ* and *ex situ* conservation, Social approaches to conservation, Biodiversity awareness programmes, Sustainable development.

Unit-II:

4. **Role of plants in relation to Human Welfare**; a) Importance of forestry their utilization and commercial aspects. b) Avenue trees. c) Ornamental plants of India. d) Alcoholic beverages through ages. Wood and its uses.
5. **Fruits and nuts**: Important fruit crops their commercial importance.
6. **Management of Plant Biodiversity:** Organizations associated with biodiversity management-Methodology for execution-IUCN, UNEP, UNESCO, WWF, NBPGR; Biodiversity legislation and conservations, Biodiversity information management and communication.

Suggested Readings

1. Krishnamurthy, K.V. (2004). An Advanced Text Book of Biodiversity - Principles and Practices. Oxford and IBH Publications Co. Pvt. Ltd. New Delhi

B.Sc. II Year
Semester-VI
Skill Enhancement Course

SEC-4 (2 hrs/week) (Credits 2) Lectures: 30

Mushroom Culture Technology

UNIT-I

1. Introduction & history. Nutritional and medicinal value of edible mushrooms; Poisonous mushrooms. Types of edible mushrooms available in India - *Volvariella volvacea, Pleurotus citrinopileatus, Agaricus bisporus*. (5h)

2. Cultivation Technology. Infrastructure; substrates (locally available) Polythene bag, vessels, Inoculation hook, inoculation loop, low cost stove, sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag. Pure culture: Medium, sterilization, preparation of spawn, multiplication. Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves. (10h)

3. Factors affecting the mushroom bed preparation - Low cost technology, Composting technology in mushroom production. (2h)

UNIT-II

4. Storage and nutrition : Short-term storage (Refrigeration - upto 24 hours) Long term Storage (canning, pickels, papads), drying, storage in salt solutions. Nutrition - Proteins - amino acids, mineral elements nutrition - Carbohydrates, Crude fibre content - Vitamins. (8h)

5. Food Preparation: Types of foods prepared from mushroom. Research Centres - National level and Regional level. Cost benefit ratio - Marketing in India and abroad, Export Value. (5h)

Suggested Readings

1. Marimuthu, T. Krishnamoorthy, A.S. Sivaprakasam, K. and Jayarajan. R (1991) Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
2. Swaminathan, M. (1990) Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018.
3. Tewari, Pankaj Kapoor, S.C., (1988). Mushroom cultivation, Mittal Publications, Delhi.
4. Nita Bahl (1984-1988) Hand book of Mushrooms, II Edition, Vol. I & Vol. II.