

**GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE DURG**  
**Syllabus and Marking Scheme for B.Sc. Part III**

**Session :2020-2021**

Paper No.	Title of the Paper	Marks Allotted in Theory	
		Max	Min
I (Course Code- BBO05)	Plant physiology, biochemistry and biotechnology	50	17
II (Course Code- BBO06)	Ecology and utilization of plant	50	17
III	Lab course/ Practical	50	17
	<b>Total</b>	<b>150</b>	

<b>02 Theory papers</b>	-	<b>100</b>
<b>01 Practical</b>	-	<b>50</b>
<b>Total Marks</b>	-	<b>150</b>

**Name and Signatures of Members Board of Studies**

S. No.	Category	Name of Nominated Members	Signature
1.	Chairperson	<b>Dr. Ranjana Shrivastava</b>	
2.	Members	1. Prof. Smt. Gayatri Pandey	
		2. Dr. K. I. Toppo	
		3. Dr. G. S. Thakur	
		4. Dr. Shriram Kunjam	
		5. Dr. Satish Kumar Sen	
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6.	Ex Meritorious Student PG	Ratnakar Upadhyay	
7.	Subject expert from other Department	Dr. Anil Shrivastava (Govt. V.Y.T.PG. Autonomous College Durg C.G.)	

**GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE DURG**  
**B.Sc. – Part III**  
**BOTANY**  
**SESSION-2020-2021**  
**PAPER-I(Course Code- BBO05)**  
**PLANT PHYSIOLOGY, BIOCHEMISTRY AND BIOTECHNOLOGY**

**M.M. 50**

**Min. 17**

**UNIT-I**

**Plant-water relations:**

- Importance of water to plant life, physical properties of water, diffusion and osmosis, absorption, transport of water and transpiration physiology of stomata.
- Mineral nutrition: Essential macro and micro-elements and their role; mineral uptake; deficiency and toxicity symptoms.

**UNIT-II**

**Transport of organic substances**

- Mechanism of phloem transport ; source-sink relationship ; factors affecting translocation
- Basic of enzymology Discovery and nomenclature, characteristics of enzymes, concept of holoenzyme apozyme, coenzyme and cofactors, regulation of enzyme activity, mechanism of action.
- Photosynthesis Significance; historical aspects, photosynthetic pigments, action spectra and enhancement effects; concept of two photosystems, Z-scheme, photo-phosphorylation, Calvin cycle, C4 pathway, CAM plants, photorespiration.

**UNIT-III**

**Respiration:**

- ATP - the biological energy currency. aerobic and anaerobic respiration, Krebs cycle, electron transport mechanism (chemi-osmotic theory), redox potential, oxidative phosphorylation; pentose phosphate pathway.
- Nitrogen and lipid metabolism: Biology of nitrogen fixation .importance of nitrate reductase and its regulations ; ammonium assimilation ; structure and function of lipids, fatty acid biosynthesis , Beta-oxidation , saturated and unsaturated fatty acids, storage and mobilization of fatty acids.

**UNIT-IV**

**Growth and development –**

- Definitions , phases of growth and development, kinetics of growth, seed dormancy, seed germination and factors of their regulation, plant movements ; the concept of photoperiodism , physiology of flowering , florigen concept, biological clocks ;
- Physiology of senescence, fruit ripening . plant hormones auxins, gibberellins, cytokinins, abscisic acid and ethylene, history of their discovery, biosynthesis and mechanism of action , photomorphogenesis , phytochromes and cryptochromes, their discovery, physiological role and mechanism action.

## UNIT-V

- Genetic engineering: Tools and techniques of recombinant DNA technology, cloning vectors , genomic and cDNA library ; transposable elements ; techniques of gene mapping and chromosome walking.
- Biotechnology : Functional definition , basic aspects of plant tissue culture , cellartotipotency, differentiation and morphogenesis ; biology of Agrobacterium , vectors for gene delivery and marker genes ; salient achievements in crop biotechnology

### **COURSE OUTCOME**

- Understand the biochemical nature of cell.
- Know the chemical nature of biomolecules.
- Understand the different types of interaction in Biomolecules.
- Structure and general features of enzymes.
- Concept of enzyme activity and enzyme inhibition.
- Learn about the movement of sap and absorption of water in plant body.
- Understand the movement.
- Understand lipid metabolism in plants.
- Know about photosynthesis and respiration in plants .
- Know about nitrogen metabolism and its importance.
- Understand the fundamentals of Recombinant DNA technology .
- Know about the genetic engineering.
- Understand the principle and basic protocol used for plant tissue culture.

## **Question Paper Format and Distribution of Marks for Under Graduate Examination**

1. There shall be three sections (Section A, B, and C) in each theory paper.
2. Section A shall contain very short answer type questions (One or two line answer) or objective type questions (fill in the blank). (**not multiple choice questions**)
3. Section B shall contain short answer type questions with the limit of 150 words.
4. Section C shall contain long answer/ descriptive type questions. The students are required to answer precisely and the answer should not exceed the limit of 350 words.
5. The students are required to study the content mentioned in the curriculum exhaustively.

### **EVALUATION PATTERN**

- **Theory 50 marks**
- **Practical 50 marks**

<b>Question Type</b>	<b>MM 50 (Marks X No.of Q.)</b>
<b>A (Very short Ans.)</b>	<b>1X10 = 10</b>
<b>B (Short Ans.)</b>	<b>3X5 = 15</b>
<b>C (Long Ans.)</b>	<b>5X5 = 25</b>

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**GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE DURG**

**B.Sc. Part-III**

**BOTANY**

**SESSION-2020-2021**

**PAPER-II(Course Code- BBO06)**

**ECOLOGY AND UTILIZATION OF PLANTS**

**M.M. 50**

**Min. 17**

**UNIT-I**

- Plants and environment: Atmosphere (gaseous composition), water (properties of water cycle), light (global radiation, photosynthetically active radiation), temperature, soil (development, soil profiles, physico-chemical properties), and biota.
- Morphological, anatomical and physiological responses of plants to water (hydrophytes and xerophytes), temperature (thermoperiodicity), light (photoperiodism, heliophytes and sciophytes) and salinity.

**UNIT-II**

- Community Ecology: Community characteristics, frequency, density, cover, life forms biological spectrum; ecological succession.
- Ecosystems: Structure, abiotic and biotic components; food chain, food web, ecological pyramids, energy flow; biogeochemical cycles of carbon, nitrogen and phosphorus.

**UNIT-III**

- Population ecology: Growth curves; ecotypes; ecads.
- Biogeographical regions of India
- Vegetation types of India Forests and grasslands.

**UNIT-IV**

- Utilization of Plants,
- Food plants: Rice, wheat, maize, potato, sugarcane.
- Fibres Cotton and jute.
- Vegetables Groundnut, mustard and coconut.
- General account of sources of firewood, timber and bamboos.

**UNIT-V**

- Spices General account
- Medicinal plants General account
- Beverages Tea and coffee.
- Rubber

### **Suggested Laboratory Exercises (Physiology)**

1. To study the permeability of plasma membranes using different concentrations of organic solvents,
2. To study the effect of temperature on permeability of plasma membrane.
3. To prepare the standard curve of protein and determine the protein content in unknown samples.
4. To study the enzyme activity of catalase and peroxidase as influenced by pH and temperature.
5. Comparison of the rate of respiration of various plant parts.
6. Separation of chloroplast pigment by solvents method.
7. Determining the osmotic potential of vacuolar sap by plasmolytic method.
8. Determining the water potential of any tuber.
9. Separation of amino acids in a mixture by paper chromatography and their identification by comparison with standards.
10. Bioassay of auxin, cytokinin, GA, ABA and ethylene using appropriate plant material
11. Demonstration of the technique of micropropagation by using different explants, e.g. axillary buds, shoot meristems.
12. Demonstration of the technique of anther culture.
13. Isolation of protoplasts from different tissues using commercially available enzymes.
14. Demonstration of root and shoot formation from the apical and basal portion of stem segments in liquid medium containing different hormones.

### **Suggested Laboratory Exercises (Ecology)**

1. To determine minimum number of quadrats required for reliable estimate of biomass in grasslands.
2. To study the frequency of herbaceous species in grassland and to compare the frequency distribution with Raunkiaer's Standard frequency diagram.
3. To estimate importance value index for grassland species on the basis of relative frequency, relative density and relative biomass in protected and grazed grassland.
4. To measure the vegetation cover of grassland through point frame method.
5. To measure the aboveground plant biomass in a grassland.
6. To determine Kemp's constant for dicot and monocot leaves and to estimate the leaf area index of a grassland community.
7. To determine diversity indices (richness, Simpson, Shannon-Wiener) in grazed and protected grassland.

8. To estimate bulk density and porosity of grassland and woodland soils.
9. To determine moisture content and water holding capacity of grassland and woodland soil.
10. To study the vegetation structure through profile diagram.
11. To estimate transparency, pH and temperature of different water bodies.
12. To measure dissolved oxygen content in polluted and unpolluted water samples.
13. To estimate salinity of different water samples.
14. To determine the percent leaf area injury of different leaf samples collected around polluted sites.
15. To estimate dust holding capacity of the leaves of different plant species.

### **PRACTICAL Suggested Laboratory Exercises** (for Utilization of Plants)

1. Food Plants: Study of the morphology, structure and simple microchemical tests of the food storing tissues in rice, wheat, maize, potato and sugarcane, Microscopic examination of starch in these plants (excepting sugarcane)
2. Fibres: Study of cotton flowers, sectioning of the cotton ovules/developing seeds to trace the origin and development of cotton fibers. Microscopic study of cotton and test for cellulose, Sectioning and staining of jute stem to show the location and development of fibers. Microscopic structure. Test for lignocellulose.
3. Vegetable oils: Study of hand sections of groundnut, mustard and coconut and staining of oil droplets by Sudan III and Sudan Black.
4. Field visits: To study sources of firewood (10 plants), timber-yielding trees (10 trees) and bamboos. A list to be prepared mentioning special features.
5. Spices: Examine black pepper, cloves, cinnamon (hand sections) and opened fruits of cardamom and describe them briefly.
6. Preparation of an illustrated inventory of 10 medicinal plants used in indigenous systems of medicine or allopathy : Write their botanical and common names, parts used and disease/disorders for which they are prescribed.
7. Beverages: Cut Sections of boiled coffee beans and tea leaves to study the characteristic structural features.
8. Rubber: Collect illustrative materials of *Hevea brasiliensis* ; morphology of the plant and tapping practices, history of rubber. List the many uses of rubber.

### **COURSE OUTCOME**

- Understand about plants and environment
- Become familiar with community ecology and ecosystem
- Become acquainted with population ecology bio-geographical regions & vegetation type of India
- Will get knowledge about medicinal plants, fiber, vegetables, oil, spices, rubber yielding plants.

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**B.Sc. Part-III**  
**BOTANY**  
**SESSION-2020-2021**  
**PRACTICAL SCHEME**

**Time : 4 Hrs.**

**Marks : 50**

01. Physiology	08
02 Ecology	08
03 Utilization of Plants	05
04 Biochemistry / Biotechnology	05
05 Spotting (1-5 spots)	10
06. Project work	04
07 Viva Voce	05
08. Sessional	05

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