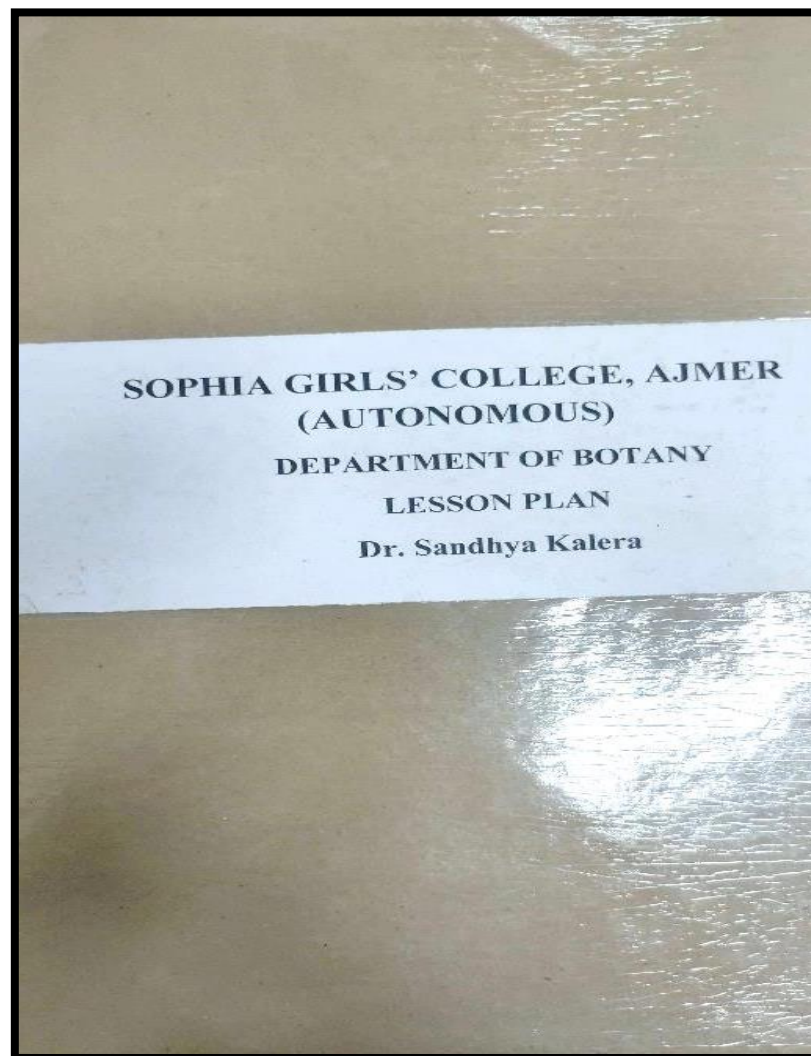
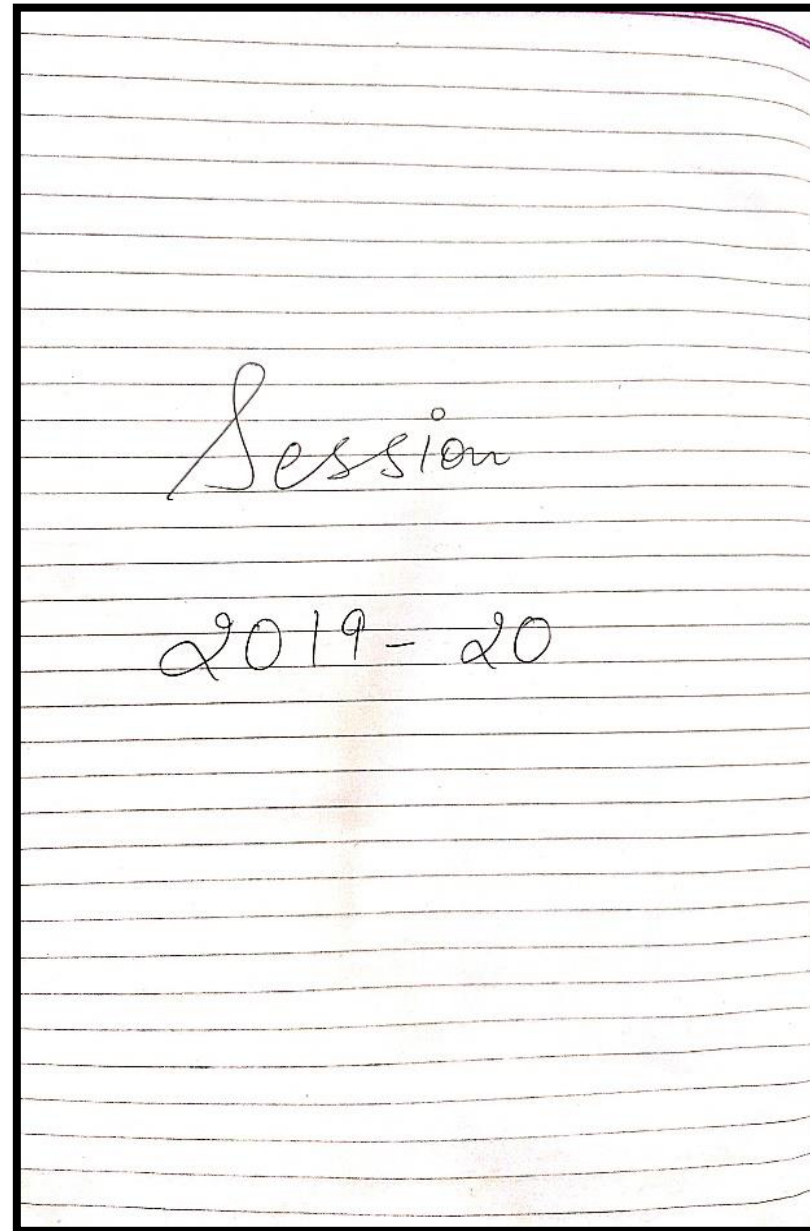




## **SOPHIA GIRLS' COLLEGE(AUTONOMOUS), AJMER**







2019-20

**SOPHIA GIRL'S COLLEGE, AJMER (AUTONOMOUS)**  
**B.Sc. I (SEMESTER I)**  
**MICROBIOLOGY AND PLANT PATHOLOGY (PAPER II) (BOT 102)**

Max. Marks : 75 (50Ext; 25 Int)

Min. Marks: 30(20 Ext;10 Int)

Credit: 03

**COURSE PLAN**


SEM I Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
JULY	UNIT I Classification of living world (Whittakar's five kingdom classification)	Classification, Prokaryotes, Eukaryotes, Cell structure	Lecture, Group discussion, MCQ	Relate the structure and nature of micro-organisms	<u>Knowledge Based</u> -What is the basis of Whittakars five kingdom classification? -Draw a prokaryotic cell.	Knowledge--60 Understanding-30 Higher Order-10
	<b>Bacteria-</b> structure, reproduction (Binary fission, transformation, conjugation & transduction). Gram staining, economic and biological importance	Prokaryotic cell structure, Reproduction, Gram positive and Gram negative Bacteria, Economic importance of bacteria	Lecture, Diagrams, Demonstration, Open book questions, Assignment		<u>Understanding Based</u> -Outline the procedure of gram staining. -Summarize the characteristics of Archaeobacteria.	
	<b>General features of:</b> Rickettsias, Archaeobacteria and Actinomycetes	Comparison of different groups of bacteria	Group discussion, Lecture, Quiz		<u>Higher Order Thinking Skills Based</u> -Elaborate multiplication in virus.	
AUGUST	UNIT II <b>Virus-</b> Structure, multiplication and transmission of virus (TMV)	Capsid, Lysis, Lysogeny, Bacteriophage	Diagrams, Pictures, Lecture, Group discussion	Understand the etiology and epidemiology of plant		



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	& Bacteriophage)			diseases	-Appraise the economic importance of bacteria.	
	<b>Mycoplasma</b> - structure and economic importance. Phytoplasma, Little leaf of brinjal	Pleomorphic, Disease symptoms, Pathogenic aspect of mycoplasma	Diagrams, Pictures, Lecture, quiz			
	A general account of diseases caused by plant pathogens: Bacterial diseases- Citrus canker, Tundu disease of wheat Viral disease- Tobacco mosaic	Causal organism, Disease symptoms, Control measures	Diagrams, Pictures, Specimens, Lecture			
SEPTEMBER-NOVEMBER	UNIT III Host parasite interaction, Important symptoms of plant diseases caused by fungi	Host, Parasite, Necrosis, Hypertrophy, Rust, Mildew	Assignment Diagrams, Pictures, Specimens, Lecture	Predict the control measures to minimize the adverse effect of pathogens on commercial crops		
	Disease cycle and control of: Fungal diseases- White rust of crucifers, Green ear disease of bajra, Loose Smut of wheat, Red rot of sugarcane, Tikka disease of groundnut	Etiology, Epidemiology, Control measures	Diagrams, Pictures, Specimens, Lecture			

  
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2019-20

**B.Sc. II ( SEMESTER III)**  
**ANATOMY OF ANGIOSPERMS (PAPER I) (BOT-301)**

Max. Marks : 75 (50Ext; 25 Int)

Min. Marks: 30(20 Ext;10 Int)

Credit: 03

**COURSE PLAN**

SEM III Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
JULY	UNIT I The basic body plan of a flowering plant – Modular type of growth	Meristem, node, internode, leaf primordium, metamer, module	Diagrams, Group discussion, Demonstration, Lecture, Quiz		<u>Knowledge Based</u> -Define periderm. -List the theories of shoot apical meristem organisation.	Knowledge--50 Understanding-35 Higher Order-15
	<b>The shoot system:</b> Shoot apical meristem and its histological organization, Structure of primary shoot in monocotyledons and dicotyledons.	Theories of apical meristem, dermal tissue, ground tissue, vascular tissue	Diagrams, Section cutting, Lecture, Compare and contrast	Anticipate plant structure at microscopic level with the major goals of understanding the structure common to all vascular plants	<u>Understanding Based</u> -What is the importance of cambium? -Examine the structure and function of xylem.	
	<b>The root system:</b> Root apical meristem, Differentiation of primary and secondary tissues and their roles, Structural modification for storage, respiration, reproduction and for interaction with microbes	Theories of apical meristem, dermal tissue, ground tissue, vascular tissue, storage root, aerial root, mycorrhiza, root nodule	Diagrams, Section cutting, Lecture, Compare and contrast Assignment		<u>Higher Order Thinking Skills Based</u> -Compare a dicot and a monocot stem. -Predict the	
AUGUST	UNIT II Cambium and its functions, Formation of secondary xylem, A general account of wood in relation to conduction of water	Secondary growth, structure and function of xylem	Diagrams, Section cutting, Lecture	Explain the developmental		

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	and minerals			processes that leads to mature anatomy and anomalous growth in plants	consequences of anomalous growth in <i>Salvadora</i> stem.	
	Characteristics of growth rings, Sap wood and heart wood, Secondary phloem: structure and function,	Annual rings, elements of phloem	Diagrams, Section cutting, Lecture			
	Periderm. Anomalous growth: primary ( <i>Triticum</i> , <i>Nyctanthes</i> ) and secondary ( <i>Salvadora</i> , <i>Bignonia</i> , <i>Dracaena</i> )	Cork cambium, lenticels, cortical bundles, phloem islands	Diagrams, Section cutting, Lecture			
SEPTEMBER-NOVEMBER	UNIT III Leaf: Origin and development	Primordium, meristem,	Diagrams, Lecture	Relate the internal structure and adaptations to water stress		
	Internal structure in relation to photosynthesis and water loss	Mesophyll, stomata, monocot and dicot leaf	Diagrams, Section cutting, Lecture, Compare and contrast			
	Adaptations to water stress, Senescence and abscission	Xerophytes, abscission zone	Diagrams, Lecture			

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2019-20

**B.Sc. III (SEMESTER V)****PLANT PHYSIOLOGY AND METABOLISM (PAPER I) (BOT-501)**

Max. Marks : 75 (50Ext; 25 Int)

Min. Marks: 30(20 Ext;10 Int)

Credit: 03

**COURSE PLAN**

SEM V Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
JULY	<b>UNIT I</b> <b>Plant-water relations:</b> Importance of water to plant life, Physical properties of water, diffusion and osmosis, Absorption, transport of water, Transpiration: physiology of stomata	Hydrogen bond, cohesion, adhesion, DPD, osmosis, plasmolysis, transpiration	Diagrams, Lecture, Demonstration, Cooperative learning	Interpret the fundamental concepts of plant physiology and enzymology	<u>Knowledge Based</u> -Recall the girdling experiment. -Define transpiration.	Knowledge--40 Understanding-40 Higher Order-20
	<b>Transport of organic substances:</b> Mechanism of phloem transport, Source-sink relationship	Girdling, source, sink, hydrostatic pressure	Diagrams, Lecture, group discussion, Quiz		<u>Understanding Based</u> -What do you conclude by studying osmosis? -Summarize the role of ATP as biological energy currency.	
	<b>Basics of enzymology:</b> Nomenclature, Characteristics, Concept of holoenzyme, apoenzyme, coenzyme and cofactors, Mechanism of	Catalyst, specificity, classification, coenzyme, activation energy, $K_m$ value	Diagrams, Lecture, Demonstration, open book questions		<u>Higher Order Thinking Skills Based</u> -Explain pentose phosphate	

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	action, Michaelis-Menten equation and its significance, Regulation of enzyme activity				pathway. -Discuss nitrogen fixation.	
AUGUST	UNIT II <b>Photosynthesis:</b> Pigments, Light harvesting complexes, Absorption and action spectra, Enhancement effect, Concept of two photosystems, Z-scheme, Photophosphorylation,	Photosystem, red drop, Z-scheme, light reaction, cyclic and non cyclic ETC, synthesis of ATP	PPT, Diagrams, Lecture, Cooperative learning			
	Calvin cycle, C <sub>4</sub> pathway, CAM plants, Photorespiration	Dark reaction, reduction of CO <sub>2</sub> , C <sub>2</sub> cycle	PPT, Diagrams, Lecture, Compare and contrast	Compare photosynthesis and respiration		
	<b>Respiration:</b> ATP-the biological energy currency, Aerobic and anaerobic respiration, Krebs's cycle, Electron transport mechanism (chemi-osmotic theory), Oxidative phosphorylation, Pentose phosphate pathway	Glycolysis, TCA cycle, phosphorylation, HMP pathway	Diagrams, Lecture, group discussion, Experiment			
SEPTEMBER-NOVEMBER	UNIT III <b>Mineral nutrition:</b> Essential macro- and micro-elements, their role, Deficiency and toxicity symptoms	Macro- and micro-elements, role in plants	Assignment, quiz, Open book assessment			
	<b>Nitrogen metabolism:</b> Biology of nitrogen fixation, Importance of nitrate reductase	Nitrate reduction, symbiotic N <sub>2</sub> fixation, diazotrophs, leghaemoglobin	Diagrams, Lecture	Explain the process of nitrogen and lipid metabolism		

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	and its regulation, Ammonia assimilation.	GOGAT pathway				
	<b>Lipid metabolism:</b> Structure and function of lipids, Fatty acid biosynthesis,  $\beta$ -oxidation, Storage and mobilization of fatty acids.	Lipids, fats, glyoxylate cycle	Diagrams, Lecture, PPT			

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2019-20

## SOPHIA GIRL'S COLLEGE, AJMER (AUTONOMOUS)

## B.Sc. I (SEMESTER II)

## CELL BIOLOGY (PAPER II) (BOT 202)

Max. Marks : 75 (50Ext; 25 Int)

Min. Marks: 30(20 Ext;10 Int)

Credit: 03

COURSE PLAN

SEM I Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
DECEMBER- JANUARY	UNIT I Structure of Prokaryotic and Eukaryotic cell	Prokaryotes, Eukaryotes, Cell structure	Group discussion, Lecture, Compare and contrast	Illustrate structure and function of cell and cell organelles	<u>Knowledge Based</u> -Which organelle has tonoplast? -List the types of DNA.	Knowledge--60 Understanding-30 Higher Order-10
	<b>The cell envelopes:</b> structure and function of Plasma membrane and Cell wall	Fluid mosaic model, layers of cell wall	Lecture, Diagrams, Quiz,		<u>Understanding Based</u> -Distinguish the structure of ER and Golgi apparatus. -What is the function of nucleus?	
	<b>Structure and function of cell organelles:</b> Golgi body, Endoplasmic reticulum, Peroxisome, Vacuole, Mitochondria, Chloroplast, Ribosome and Centriole	Processing and packaging of proteins, microbodies, respiration, photosynthesis	Group discussion, Lecture, Compare and contrast		<u>Higher Order Thinking Skills Based</u> -Examine the structural organization of chromosome. -How does cdk's influence cell cycle?	
FEBRUARY	UNIT II <b>Nucleus:</b> Structure and function of Nucleus and Nucleolus	Nuclear pore, nucleoplasm, chromatin, nuclear lamina	Diagrams, Pictures, Lecture, Cooperative learning	Describe chromosome organization and chromosome alterations		

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	<b>Chromosome organisation:</b> Structure, Euchromatin and Heterochromatin	Chromonema, chromomere, kinetochore, chromatid, telomere	Diagrams, Pictures, Lecture, Compare and contrast		
	<b>Chromosomal alterations:</b> Structural changes in Chromosomes (Deletion, Duplication, Translocation and Inversion), Numerical Changes in Chromosomes: [Aneuploidy (Monosomy, Nullisomy, Trisomy, and Tetrasomy), Euploidy (Monoploidy and Polyploidy)]	Deletion, Duplication, Translocation and Inversion, aneuploidy, euploidy	Diagrams, Lecture, Assignment		
<b>MARCH</b>	<b>UNIT III</b> <b>DNA:</b> Structure, Types (A, B, C and Z), Replication and DNA-protein interaction (Nucleosome Model)	Nucleoside, nucleotide, double helix, semi-conservative, histone core	PPT, Diagrams, Lecture	Correlate DNA structure, cell cycle and cell division	
	Genetic code, Satellite and Repetitive DNA	Triplet codon, properties of genetic code, repetitive DNA	Group discussion, Lecture, Quiz		
	<b>Cell cycle:</b> Steps, Regulation and control <b>Cell division:</b> Mitosis and Meiosis, Significance.	Interphase, G <sub>1</sub> , S, G <sub>2</sub> , M phase, CDKs, prophase, metaphase, anaphase, telophase	Group discussion, Lecture, Slide preparation		

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**B.Sc. II (SEMESTER IV)**  
**REPRODUCTION IN FLOWERING PLANTS (PAPER II) (BOT-402)**

Credit: 03

Max. Marks : 75 (50Ext; 25 Int)

Min. Marks: 30(20 Ext;10 Int)

**COURSE PLAN**

SEM III Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
DECEMBER- JANUARY	UNIT I Flower: Structure, Types of anther and pistil	Polyandrous, Monoadelphous, syngenesious, superior, inferior, unilocular	Diagrams, Group discussion, Field observations	Compare the structure and development of male and female gametophyte	<u>Knowledge Based</u> -Draw and label the structure of ovule. -Where does microsporogene sis occurs? <u>Understanding Based</u> -Interpret pollen pistil interaction. -Categorize methods of vegetative propagation.	Knowledge--50 Understanding-35 Higher Order-15
	Male gametophyte: Structure of anther, Microsporogenesis, Role of tapetum, Pollen germination and growth of pollen tube.	Monotheous, ditheous, microspore, pollen tetrads	Diagrams, Permanent slide Lecture, quiz		<u>Higher Order Thinking Skills Based</u> -Explain embryogenesis. -Elaborate seed dormancy.	
	Female gametophyte: Structure and types of ovule, Megasporeogenesis, Organisation of embryo sac	Orthotropous, anatropous, megaspore, polygonum type, synergids	Group discussion, Diagrams, Permanent slide, Lecture			
FEBRUARY	UNIT II Types of pollination, Pollen- pistil interaction	Self and cross pollination, herkogamy, heterostyly, ornithophilly, exine, stigma	Assignment, Diagrams, Lecture, Quiz	Illustrate reproduction in plants from pollination to embryogenesis		
	Self incompatibility, Double fertilization	GSI, SSI, recognition- rejection, syngamy, triple fusion	Diagrams, Lecture, group discussion			

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	Endosperm, Embryogenesis	Nuclear, cellular, helobial endosperm, proembryo	Diagrams, Lecture, Compare and contrast			
MARCH	UNIT III Methods of Vegetative propagation	Natural, artificial, cutting, layering, grafting	Assignment, group discussion	Understand the concept of latent life in plants		
	Latent life-Dormancy: Importance and types of seed dormancy, overcoming seed dormancy.	Primary and secondary dormancy, stratification, pre-chilling, ripening	Demonstration, Lecture, quiz			
	Parthenocarpy, Types of fruits	Caryopsis, capsule, lomentum, berry, drupe, cremocarp	Diagrams, Lecture, specimens			

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## B.Sc. III (SEMESTER VI)

## GENETICS AND BIOTECHNOLOGY OF PLANTS (PAPER II) (BOT-602)

Max. Marks : 75 (50Ext; 25 Int)

Min. Marks: 30(20 Ext;10 Int)

Credit: 03

COURSE PLAN

SEM V Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
DECEMBER- JANUARY	UNIT I <b>Genetic inheritance:</b> Mendelism, Laws of segregation and independent assortment	Gene, dominant, recessive, allele, inheritance	Lecture, numerical, group discussion	Deduce how genes function and how characters are inherited from one generation to the next	<u>Knowledge Based</u> -What is a promoter? -Relate linkage and crossing over.	Knowledge--40 Understanding--40 Higher Order--20
	Linkage and linkage mapping, Allelic and non-allelic interactions	Linked genes, test cross, back cross, genotype, phenotype	Lecture, numerical, Cooperative learning		<u>Understanding Based</u> -Identify the type of gene interaction with F <sub>2</sub> ratio 9:7. -Assess the method of DNA repair.	
	<b>Gene expression:</b> Transfer of genetic information- transcription, translation, Regulation of gene expression in prokaryotes and eukaryotes	Central dogma, initiation, elongation, termination, attenuation, anti- termination	Diagrams, Lecture, Compare and contrast		<u>Higher Order Thinking Skills Based</u> -What is the importance of marker and reporter genes?	
FEBRUARY	UNIT II <b>Genetic variations:</b> Mutations-spontaneous and induced, DNA repair	Mutagen, transition, transversion, base analogues, mismatch repair	Lecture, diagrams, Assignment	Analyze the biotechnological procedures for		
	<b>Genetic engineering:</b> Tools	rDNA, vector, marker	Lecture,			

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	and techniques of recombinant DNA technology, Cloning vectors, Genomic and cDNA library, Polymerase Chain Reaction	gene, plasmid, phage cDNA,	diagrams, Cooperative learning	modifying living organisms according to human purposes	-Elaborate translation in prokaryotes.	
MARCH	UNIT III <b>Biotechnology:</b> Definition, Basic aspects of plant tissue culture, Somatic hybridization- protoplast isolation, fusion and culture	Totipotency, culture, nutrient medium, sterilization, aseptic, protoplast, somatic hybrid, cybrid	Diagrams, Lecture, group discussion			
	Biology of <i>Agrobacterium</i> , Vectors for gene delivery and vectorless gene transfer	Ti plasmid, Ri plasmid, T-DNA, opines, electroporation, particle gun delivery	Diagrams, Lecture, group discussion			
	Marker and reporter genes, Salient achievements in crop biotechnology	Selectable and scorable marker, meristem culture, haploid culture, herbicide resistant	Lecture, assignment			

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