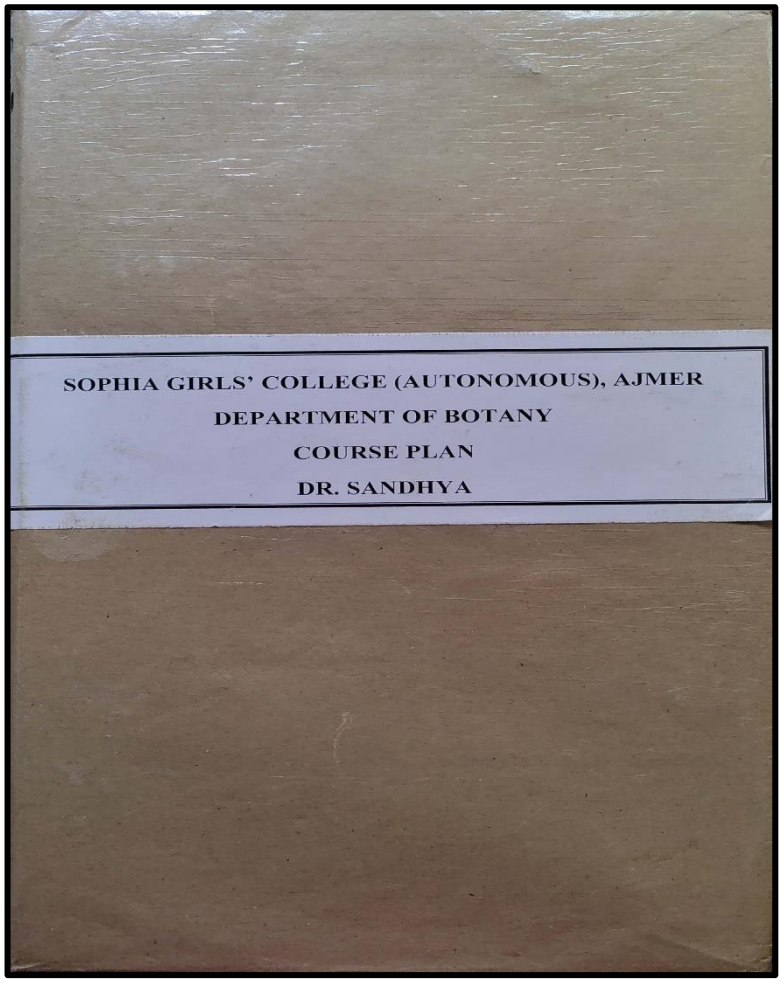
SOPHIA GIRLS' COLLEGE(AUTONOMOUS), AJMER



COURSE_PLAN_2022-23_DR_SANDHYA

SOPHIA GIRLS' 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 (%)
AUGUST	UNIT I **Classification of living world** (Whittakar's five kingdom classification)	Classification, Prokaryotes, Eukaryotes, Cell structure	Group discussion, PPT, Lecture	Relate the structure and nature of micro-organisms	*Knowledge Based* - Define etiology. - Name any 2 nitrogen fixing bacteria. *Understanding Based* -Identify the characteristics of protists. - Summarize the epidemiology of white rust disease. *Higher Order Thinking Skills Based* - Compare the symptoms rust, smut and blister. - Illustrate transformation in	Knowledge--60 Understanding-30 Higher Order-10
	Bacteria- 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	PPT, Lecture, Diagrams, Quiz, Demonstration			
	General features of: Rickettsias, Archaebacteria and Actinomycetes	Comparison of different groups of bacteria	Group discussion, Lecture, PPT, Quiz			
SEPTEMBER OCTOBER	UNIT II **Virus-** Structure, multiplication and transmission of virus (TMV	Capsid, Lysis, Lysogeny, Bacteriophage	Diagrams, Pictures, Lecture, PPT	Understand the etiology and epidemiology of plant		

	& Bacteriophage)			diseases	bacteria.	
	Mycoplasma- 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	Analysing visuals, Diagrams, Specimens, Lecture			
OCTOBER – NOVEMBER	UNIT III Host parasite interaction, Important symptoms of plant diseases caused by fungi	Host, Parasite, Necrosis, Hypertrophy, Rust, Mildew	PPT, Assignment Diagrams, 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	Analysing visuals, Diagrams, Pictures, Specimens, PPT			

Sandhya

Head
Department of Botany
Sophia Girls' College
(Autonomous), Ajmer

Sr. Pearl

PRINCIPAL
SOPHIA GIRLS' COLLEGE
(AUTONOMOUS)
AJMER

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 – AUGUST	UNIT I The basic body plan of a flowering plant – Modular type of growth	Meristem, node, internode, leaf primordium, metamer, module	Diagrams, Group discussion, Lecture	Anticipate plant structure at microscopic level with the major goals of understanding the structure common to all vascular plants	*Knowledge Based* - List the types of meristems. - Recall the ground tissue system in dicot stems. *Understanding Based* -What is the significance of mycorrhiza? - Compare the structure & function of tracheids and vessels. *Higher Order Thinking Skills Based* - Signify the role of roots in respiration. - Describe leaf abscission.	Knowledge--50 Understanding-35 Higher Order-15
	The shoot system: 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	Analysing visuals, Diagrams, Experiential learning, Lecture, Self-practice			
	The root system: 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	Analysing visuals, Diagrams, Experiential learning Assignment, Lecture, PPT			
AUGUST – SEPTEMBER	UNIT II Cambium and its functions, Formation of secondary xylem, A general account of wood in	Secondary growth, structure and function of xylem	Diagrams, Experiential learning, PPT, pdf Notes,	Explain the		

	relation to conduction of water and minerals		Lecture	developmental processes that leads to mature anatomy and anomalous growth in plants		
	Characteristics of growth rings, Sap wood and heart wood, Secondary phloem: structure and function,	Annual rings, elements of phloem	Experiential learning, PPT, Diagrams, Lecture			
	Periderm. Anomalous growth: primary (*Triticum, Nyctanthes*) and secondary (*Salvadora, Bignonia, Dracaena*)	Cork cambium, lenticels, cortical bundles, phloem islands	Experiential learning, PPT, Diagrams Lecture			
SEPTEMBER - NOVEMBER	UNIT III **Leaf:** Origin and development	Primordium, meristem,	PPT, 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	Experiential learning, PPT, Diagrams, Lecture			
	Adaptations to water stress, Senescence and abscission	Xerophytes, abscission zone	PPT, Diagrams Lecture			

Head
Department of Botany
Sophia Girls' College
(Autonomous), Ajmer

PRINCIPAL
SOPHIA GIRLS' COLLEGE
(AUTONOMOUS)
AJMER

B.Sc. III (SEMESTER V)

PLANT PHYSIOLOGY AND METABOLISM (PAPER I) (BOT-501 - A)

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 – AUGUST	UNIT I **Plant-water relations:** 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	Experiential learning, Lecture, Group discussion, PPT, YouTube videos	Interpret the fundamental concepts of plant physiology	*Knowledge Based* - What is suction pressure? - Define sap. *Understanding Based* -Explain glycolysis. -Give examples of diffusion. *Higher Order Thinking Skills Based* - Compare PS I & PS II. - Interpret the role of ATP in cells.	Knowledge--40 Understanding-40 Higher Order-20
	Transport of organic substances: Mechanism of phloem transport, Source-sink relationship	Girdling, source, sink, hydrostatic pressure	Diagrams, Lecture, Group discussion			
AUGUST. – SEPTEMBER	UNIT II **Photosynthesis:** 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, Experiential learning, YouTube videos			
	Calvin cycle, C_4 pathway,	Dark reaction,	PPT, Diagrams,			

	CAM plants, Photorespiration	reduction of CO_2, C_2 cycle	Lecture	Compare photosynthesis and respiration		
	Respiration: ATP-the biological energy currency, Aerobic and anaerobic respiration, Kreb's cycle, Electron transport mechanism (chemi-osmotic theory), Oxidative phosphorylation, Pentose phosphate pathway	Glycolysis, TCA cycle, phosphorylation, HMP pathway	PPT, Diagrams, Lecture, group discussion			
SEPTEMBER – NOVEMBER	UNIT III **Mineral nutrition:** Essential macro- and micro-elements, their role, Deficiency and toxicity symptoms	Macro- and micro-elements, role in plants	Assignment, quiz, YouTube Video	Explain the process of nitrogen and lipid metabolism		
	Nitrogen metabolism: Biology of nitrogen fixation, Importance of nitrate reductase and its regulation, Ammonia assimilation.	Nitrate reduction, symbiotic N_2 fixation, diazotrophs, leghaemoglobin, GOGAT pathway	Diagrams, Lecture, PPT			
	Lipid metabolism: Structure and function of lipids, Fatty acid biosynthesis, β-oxidation, Storage and mobilization of fatty acids.	Lipids, fats, glyoxylate cycle	Blended learning, Diagrams, Lecture, PPT			

Head
Department of Botany
Sophia Girls' College
(Autonomous), Ajmer

PRINCIPAL
SOPHIA GIRLS' COLLEGE
(AUTONOMOUS)
AJMER

B.Sc. III (SEMESTER V)

PLANT BIOCHEMISTRY (PAPER I) (BOT-501- B)

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 – AUGUST	**UNIT I** **Basics of enzymology:** Nomenclature, Classification, Characteristics, Concept of holoenzyme, apoenzyme, coenzyme and cofactors	Catalyst, specificity, classification, coenzyme,	PPT, Group discussion, Lecture, YouTube videos, CEC videos, MCQs	Understand the advanced concepts of enzymes as drivers of living systems including catalysis mechanisms and kinetics of enzymes as affected various types of inhibitors	*Knowledge Based* -What is inulin? -Define acid number. *Understanding Based* -Summarize the mechanism of enzyme action. -Explain storage polysaccharides. *Higher Order Thinking Skills Based* -Discuss GS-GOGAT system. -Describe the function of alkaloids in plants.	Knowledge--40 Understanding-40 Higher Order-20
	Mechanism of action, Enzyme kinetics, Michaelis-Menten equation and its significance, Lineweaver-Burk equation	Activation energy, K_m value	PPT, Pdf notes, Lecture, YouTube videos, MCQs			
	Regulation of enzyme activity, Enzyme inhibition	Allosteric enzymes, Competitive, non-competitive and uncompetitive inhibition	PPT, Pdf notes, Lecture, MCQs			
AUGUST – SEPTEMBER	UNIT II **Carbohydrates:** Classification, Structure and functions of monosaccharides (glucose, fructose); Disaccharides (sucrose,	Types of carbohydrates, Functions of polysaccharides	PPT, Pdf notes, Lecture, YouTube videos, Experiential learning	Relate the properties of macromolecules,		

	maltose, lactose), Oligosaccharides and polysaccharides (structural-cellulose, hemicelluloses, pectin, chitin, mucilage; storage – starch, inulin)			their cellular activities and biological responses		
	Proteins: Structure; primary, secondary, tertiary and quaternary, Simple and conjugated proteins, Synthesis of amino acids by reductive amination, GS-GOGAT system and transamination	Components and types of proteins, amino acid synthesis	PPT, Pdf notes, Lecture, YouTube videos, Experiential learning			
SEPTEMBER – NOVEMBER	UNIT III **Lipids:** Classification, Structure, Occurrence and biological functions of lipids, Nomenclature and properties of fatty acids and triglycerides, Saponification number, Acid number	Characteristics, structure and function of lipids,	PPT, Pdf notes, Lecture, YouTube videos, Experiential learning	Identify the characteristics and significance of secondary metabolites and lipids		
	Secondary metabolites: Structure and functions of secondary metabolites: Alkaloids and tannins, Flavonoids, Cardiac glycosides and Anthocyanins	Types and significance of secondary metabolites	PPT, Pdf notes, Lecture, YouTube videos, Experiential learning			

Head
Department of Botany
Sophia Girls' College
(Autonomous), Ajmer

PRINCIPAL
SOPHIA GIRLS' COLLEGE
(AUTONOMOUS)
AJMER

SOPHIA GIRLS' 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	Flipped classroom, Group discussion, Lecture	Illustrate structure and function of cell and cell organelles	*Knowledge Based* -Recall equatorial plate. -What is nullisomy? *Understanding Based* -Prepare a flow chart of stages of meiosis. -Differentiate centromere and kinetochore. *Higher Order Thinking Skills Based* -Assess the role of ER in Muscles. -Compare the types of DNA.	Knowledge--60 Understanding-30 Higher Order-10
	The cell envelopes: structure and function of Plasma membrane and Cell wall	Fluid mosaic model, layers of cell wall	Assignment, Blended learning, Lecture, Diagrams			
	Structure and function of cell organelles: Golgi body, Endoplasmic reticulum, Peroxisome, Vacuole, Mitochondria, Chloroplast, Ribosome and Centriole	Processing and packaging of proteins, microbodies, respiration, photosynthesis	Blended learning, Group discussion, PPT, Lecture, Quiz			
FEBRUARY	UNIT II **Nucleus:** Structure and function of Nucleus and Nucleolus	Nuclear pore, nucleoplasm, chromatin, nuclear lamina	Diagrams, Assignment, Practice questions	Describe chromosome organization and chromosome		

				alterations		
	Chromosome organisation: Structure, Euchromatin and Heterochromatin	Chromonema, chromomere, kinetochore, chromatid, telomere	Diagrams, PPT, Lecture, Blended learning			
	Chromosomal alterations: 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	PPT, Diagrams, Lecture, Assignment			
MARCH	UNIT III **DNA:** Structure, Types (A, B, C and Z), Replication and DNA-protein interaction (Nucleosome Model)	Nucleoside, nucleotide, double helix, semi-consevative, histone core	Flipped classroom, 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			
	Cell cycle: Steps, Regulation and control **Cell division:** Mitosis and Meiosis, Significance.	Interphase, G_1, S, G_2, M phase, CDKs, prophase, metaphase, anaphase, telophase	Flipped classroom, Lecture, Experiential learning			

Head
Department of Botany
Sophia Girls' College
(Autonomous), Ajmer

PRINCIPAL
SOPHIA GIRLS' COLLEGE
(AUTONOMOUS)
AJMER

B.Sc. II (SEMESTER IV)

REPRODUCTION IN FLOWERING PLANTS (PAPER II) (BOT-402)

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 (%)
DECEMBER-JANUARY	UNIT I **Flower:** Structure, Types of anthers and pistil	Polyandrous, Monoadelphous, syngenesious, superior, inferior, unilocular	Flipped classroom, Diagrams, Demonstration, Lecture	Compare the structure and development of male and female gametophyte	*Knowledge Based* -What is scarification? -Name the types of pollination. *Understanding Based* -Explain parthenocarpy. -Describe grafting. *Higher Order Thinking Skills Based* -Illustrate the types of dry fruits. -Summarize double fertilization.	Knowledge--50 Understanding-35 Higher Order-15
	Male gametophyte: Structure of anther, Microsporogenesis, Role of tapetum, Pollen germination and growth of pollen tube.	Monothecous, dithecous, microspore, pollen tetrads	Blended learning, Diagrams, Permanent slide Lecture			
	Female gametophyte: Structure and types of ovule, Megasporogenesis, 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	Flipped classroom, Assignment, Diagrams, Lecture	Illustrate reproduction in plants from pollination to embryogenesis		
	Self incompatibility, Double fertilization	GSI, SSI, recognition-rejection, syngamy, triple fusion	Blended learning, Diagrams, Lecture, group			

			discussion			
	Endosperm, Embryogenesis	Nuclear, cellular, helobial endosperm, proembryo	PPT, Diagrams, Lecture, quiz			
MARCH	UNIT III Methods of Vegetative propagation	Natural, artificial, cutting, layering, grafting	Blended learning, 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	PPT, Lecture, quiz			
	Parthenocarpy, Types of fruits	Caryopsis, capsule, lomentum, berry, drupe, cremocarp	PPT, Diagrams, Lecture, specimens			

Head
Department of Botany
Sophia Girls' College
(Autonomous), Ajmer

PRINCIPAL
SOPHIA GIRLS' COLLEGE
(AUTONOMOUS)
AJMER

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 **Genetic inheritance:** Mendelism, Laws of segregation and independent assortment	Gene, dominant, recessive, allele, inheritance	Flipped classroom, Lecture, numerical, group discussion	Deduce how genes function and how characters are inherited from one generation to the next	*Knowledge Based* -Name the tools of rDNA technology. -Write the full form of PCR. *Understanding Based* -Differentiate cDNA library & genomic library. -Describe attenuation. *Higher Order Thinking Skills Based* -Assess the importance of GM crops. -Explain somatic hybridization.	Knowledge--40 Understanding-40 Higher Order-20
	Linkage and linkage mapping, Allelic and non-allelic interactions	Linked genes, test cross, back cross, genotype, phenotype	PPT, Lecture, numerical			
	Gene expression: Transfer of genetic information-transcription, translation, Regulation of gene expression in prokaryotes and eukaryotes	Central dogma, initiation, elongation, termination, attenuation, anti-termination	Blended learning, YouTube videos, Lecture, group discussion			
FEBRUARY	UNIT II **Genetic variations:** Mutations-spontaneous and induced, DNA repair	Mutagen, transition, transversion, base analogues, mismatch repair	Assignment, PPT, Lecture, diagrams	Analyze the biotechnological procedures for modifying		
	Genetic engineering: Tools and techniques of recombinant	rDNA, vector, marker gene, plasmid, phage cDNA,	PPT, YouTube videos, Lecture, diagrams, group			

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

Head
Department of Botany
Sophia Girls' College
(Autonomous), Ajmer

Sr. Pearl
PRINCIPAL
SOPHIA GIRLS' COLLEGE
(AUTONOMOUS)
AJMER