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Affiliated to Kurukshetra University, Kurukshetra

Department Of Science

Lesson Plan (Session 2025-2026)

Class: B.Sc. Life Sciences

Semester: I

Name of the Course: Diversity of Microbes, Algae, Fungi and Archegoniates

Course Code :B23-BOT-101

Dates: 22 July, 2025 – 24 Nov., 2025

SYLLABUS

Maximum Marks: 100

Time: 3 hours

End Term Exam Marks: 50(T)+20(P)=70 Marks

Assessment: 20(T)+10(P)=30 Marks

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of short type question covering the entire syllabus in addition to that eight more questions will be set, two question from each unit. Students will be required to attempt in all. In addition to the compulsory question, student will have to attempt four more questions selecting one question from each unit.

Unit	Topics	Contact Hours
Unit: I	Bacteria: Structure, nutrition, reproduction and economic importance. Viruses: General account of Viruse including structure of TMV and Bacteriophages. Algae: General characters, Introductory classification; economic importance; and life cycle (excluding development) of Nostoc (Cyanophyceae).Volvox, (Chlorophyceae), Vaucheria (Xanthophyceae), Ectocarpus (Phaeophyceae) and Polysiphonia (Rhodophyceae). Fungi: General characters, Introductory classification; economic importance; and life-history of Phytophthora (Mastigomycotina), Penicillium (Ascomycotina), Puccinia (Basidiomycotina), Colletotrichum (Deuteromycotina).	11
Unit: II	General account of Lichens, types, ecological and economic importance. Bryophyta: Bryophytes: General characteristics, classification upto classes (Smith, 1935), alternation of generations, structure and reproduction (excluding development) of Marchantia (Hepaticopsida), Anthoceros (Anthocerotopsida), Funaria (Bryopsida), ecological and economic importance of bryophytes.	11
Unit: III	Pteridophyta: General characters, classification upto classes (A. R. Smith, 2006), structure and reproduction (excluding development) of Rhynia (Psilopsida): Structure and reproduction (excluding development) of Selaginella (Lycopsida), Equisetum (Sphenopsida) and Pteris (Pteropsida). heterospory and seed habit, stelar evolution; Ecological and economic importance.	11
Unit: IV	Gymnosperms: General characteristics, classification up to classes (Smith 1955), morphology, anatomy and reproduction of Cycas, Pinus, Ephedra (developmental details not to be included); Distribution and economic importance; General account of paleobotany and Geological time scale.	12
V	Viruses: EMs/Models of viruses: TMV, Line drawing/Photograph of Lytic and Lysogenic Cycles. Bacteria: Types of Bacteria from temporary/permanent slides/photographs; Binary Fission; Conjugation; Structure of root nodule. Cynobacteria& Algae: Study of vegetative and reproductive structures of Nostoc, Volvox, Vaucheria, Ectocarpus and Polysiphonia through temporary preparations and permanent slides. Fungi: Study of vegetative & reproductive structures of Phytophthora, Mucor, Puccinia, Penicillium & Colletotrichum: Asexual and sexual stages through temporary preparations and permanent slides. Lichens: Study of slides/photographs of lichens (crustose, foliose and fruticose). Marchantia- Morphology of thallus, W.M. rhizoids and scales, V.S. thallus with gemma cup, W.M. gemmae, V.S. antheridiophore, archegoniophore, L.S. sporophyte (temporary/permanent slides). Anthoceros- Morphology of thallus, W.M. rhizoids, V.S. thallus, VS Antheridia and Archegonia, L.S. sporophyte (temporary/permanent slides). Funaria- Morphology, W.M. leaf, rhizoids, operculum, peristome, annulus, spores, slides showing antheridial and archegonial heads, L.S. capsule (temporary /permanent slides). Selaginella- Morphology, W.M. leaf with ligule, T.S. stem, W.M. strobilus, W.M. microsporophyll and megasporophyll, L.S. strobilus (temporary/ permanent slide). Equisetum- Morphology, T.S. internode, L.S. strobilus, T.S. strobilus, W.M. sporangiophore, W.M. spores (wet and dry) (temporary slides); T.S. rhizome (permanent slide). Pteris- Morphology, T.S. rachis, V.S. sporophyll, W.M. sporangium, W.M. spores,	30

	<p>T.S. rhizome, W.M. prothallus with sex organs and young sporophyte (temporary/permanent slide). Cycas- Morphology (coralloid roots, bulbil, leaf, megasporophyll), T.S. coralloid root, T.S. rachis, V.S. leaflet, V.S. microsporophyll, W.M. microspores, L.S. ovule, T.S. root (temporary/ permanent slide). Pinus- Morphology (long and dwarf shoots, W.M. dwarf shoot, male cones and female cones), W.M. dwarfshoot, T.S. needle, T.S. stem, L.S./T.S. male cone, W.M. microsporophyll, W.M. microspores (temporary slides), L.S. female cone (temporary/ permanent slide). Ephedra- Morphology, T.S. internode, L.S./T.S. male and female strobili, W.M. spores (wet and dry), T.S. rhizome (temporary/permanent slide). Excursion Report: Report on excursion tours with photographs, collection and preservation specimens related to Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms.</p>	
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Text Books :

1. Vashishta, P.C., Sinha, A.K., Kumar, A., (2010). Pteridophyta, S. Chand. Delhi, India.
2. Vashishta, P.C., Sinha, A.K., Kumar, A., (2010). Gymnosperms, S. Chand. Delhi, India.
3. Dr. B. B. Arora, Modern's Botany

Course Outcomes

After completing this course, the learner will be able to:

1. Students will be able to understand the general characteristics of bacteria, actinobacteria, viruses and fungi.
2. Students will develop a conceptual understanding of Phycology.
3. Students will gain knowledge on the concepts of Bryology.
4. Basic understanding of the biology of pteridophytes will be developed by the students.
5. Students will gain the knowledge of practical aspects of microorganisms, algae, fungi, lichens, bryophytes, and pteridophytes.

Lesson Plan

SR. No	Date	Course Content	
		Theory (2)	Practical (2)
1	22 July -25July 2025	Bacteria: Structure, nutrition, reproduction and economic importance.	-----
2	28 July - 2 August	Viruses: General account of Viruse including structure of TMV and Bacteriophages.	EMs/Models of viruses: TMV, Line drawing/Photograph of Lytic and Lysogenic Cycles
3	4 August -8 August	Algae: General characters, Introductory classification; economic importance; and life cycle (excluding development) of Nostoc (Cyanophyceae).Volvox, (Chlorophyceae)	Types of Bacteria from temporary/permanent slides/photographs; Binary Fission; Conjugation; Structure of root nodule.
4	11 August - 14 August	Vaucheria (Xanthophyceae), Ectocarpus (Phaeophyceae) and Polysiphonia (Rhodophyceae). Fungi: General characters, Introductory classification; economic importance;	-----
5	18 August - 23August	Life-history of Phytophthora (Mastigomycotina), Penicillium(Ascomycotina), Puccinia (Basidiomycotina), Colletotrichum (Deuteromycotina).	Study of vegetative and reproductive structures of Nostoc, Volvox, Vaucheria, Ectocarpus and Polysiphonia through temporary preparations and permanent slides.
6	25 August -30 August	General account of Lichens, types, ecological and economic importance.	Study of vegetative & reproductive structures of Phytophthora, Mucor, Puccinia, Penicillium & Colletotrichum: Asexual and sexual stages through temporary preparations and permanent slides.
7	1 Sept. - 6 Sept.	Bryophyta: Bryophytes: General characteristics, classification upto classes (Smith, 1935), alternation of generations, structure and reproduction (excluding development) of Marchantia (Hepaticopsida)	Study of slides/photographs of lichens (crustose, foliose and fruticose)
8	8 Sept. - 13 Sept.	Anthoceros (Anthocerotopsida), Funaria (Bryopsida), ecological and economic importance of bryophytes.	Marchantia- Morphology of thallus, W.M. rhizoids and scales, V.S. thallus with gemma cup, W.M. gemmae, V.S. antheridiophore, archegoniophore, L.S. sporophyte (temporary/permanent slides).
9	15 Sept. - 20 Sept.	Pteridophyta: General characters, classification upto classes (A. R. Smith, 2006), structure and reproduction (excluding development) of Rhynia (Psilopsida)	Anthoceros- Morphology of thallus, W.M. rhizoids, V.S. thallus, VS Antheridia and Archegonia, L.S. sporophyte (temporary/permanent slides). Funaria- Morphology, W.M. leaf, rhizoids, operculum, peristome, annulus, spores, slides showing antheridial and archegonial heads, L.S. capsule (temporary /permanent slides).
10	22 Sept. - 27 Sept.	Structure andreproduction (excluding development) of Selaginella (Lycopsida), Equisetum (Sphenopsida) and Pteris (Pteropsida). heterospory and seed habit, stelar evolution	Selaginella- Morphology, W.M. leaf with ligule, T.S. stem, W.M. strobilus, W.M. microsporophyll and megasporophyll, L.S. strobilus (temporary/ permanent slide).
11	29 Sept.- 4 Oct.	Ecological and economic importance.Gymnosperms: General characteristics.	Equisetum- Morphology, T.S. internode, L.S. strobilus, T.S. strobilus, W.M. sporangiophore, W.M. spores (wet and dry) (temporary slides); T.S. rhizome (permanent slide). Pteris- Morphology, T.S. rachis, V.S. sporophyll, W.M. sporangium, W.M. spores, T.S. rhizome, W.M. prothallus with sex organs and young sporophyte (temporary/permanent slide).
12	6 Oct.- 11 Oct.	Classification up to classes (Smith 1955), morphology, anatomy and reproduction of Cycas (developmental details not to be included)	Pteris- Morphology, T.S. rachis, V.S. sporophyll, W.M. sporangium, W.M. spores, T.S. rhizome, W.M. prothallus with sex organs and young sporophyte (temporary/permanent slide).
13	13 Oct.- 18 Oct.	Classification up to classes (Smith 1955), morphology, anatomy and reproduction of Pinus, Ephedra	Cycas- Morphology (coralloid roots, bulbil, leaf, megasporophyll), T.S. coralloid root, T.S. rachis, V.S. leaflet, 30 34(1078) V.S. microsporophyll, W.M. microspores, L.S. ovule, T.S. root (temporary/ permanent slide).

14	27 Oct. - 1 Nov.	Distribution and economic importance of gymnosperm	Pinus- Morphology (long and dwarf shoots, W.M. dwarf shoot, male cones and female cones), W.M. dwarfshoot, T.S. needle, T.S. stem, L.S./T.S. male cone, W.M. microsporophyll, W.M. microspores (temporary slides), L.S. female cone (temporary/ permanent slide).
15	3 Nov. - 8Nov	General account of paleobotany	Ephedra- Morphology, T.S. internode, L.S./T.S. male and female strobili, W.M. spores (wet and dry), T.S. rhizome (temporary/permanent slide).
16	10 Nov-15 Nov	Geological time scale.	Report on excursion tours with photographs, collection and preservation specimens related to Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms.
17	17 Nov -22 Nov	Revision	-----
18	24 Nov.	Revision	-----

Signature of Teacher

Head of Department

INDIRA GANDHI (P.G.) MAHILA MAHAVIDYALAYA ,KAITHAL

Affiliated to Kurukshetra University, Kurukshetra

Department Of Science

Lesson Plan (Session 2025-2026)

Class: B.Sc. Life Sciences

Semester: III

Name of the Course: Plant Physiology

Course Code :B23-BOT-301

Dates: 22 July, 2025 – 24 Nov., 2025

SYLLABUS

Maximum Marks: 100

Time: 3 hours

End Term Exam Marks: 50(T)+20(P)=70 Marks

Assessment: 20(T)+10(P)=30 Marks

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of short type question covering the entire syllabus in addition to that eight more questions will be set, two question from each unit. Students will be required to attempt in all. In addition to the compulsory question, student will have to attempt four more questions selecting one question from each unit.

Unit	Topics	Contact Hours
Unit: I	Plant water relations: absorption, water potential and transpiration; role of micro and macro nutrients. Photosynthesis, Respiration.	11
Unit: II	Biosynthesis, mechanism of action and uses of auxin, gibberellin, cytokinin, abscisic acid, ethylene, Lipid metabolism and Nitrogen metabolism.	11
Unit: III	Structure, function and mechanisms of action of phytochromes; stomatal movement; photoperiodism and biological clocks; mechanism of flowering.	12
Unit: IV	Concepts of plant growth; factors affecting germination and dormancy of seeds; physiological and biochemical changes associated with senescence and abscission.	11
V	<ul style="list-style-type: none">• Demonstration of imbibition by plaster of Paris method.• Demonstration of Osmosis by potato osmoscope method.• To study the Osmotic pressure of onion scale/ Rhoeo leaf peel by plasmolytic method.• To separate photosynthetic pigments by thin layer/paper chromatography.• To study the phenomenon of seed germination (effect of light).• To study the induction of amylase activity in germinating barley grains.• To demonstrate suction due to transpiration.• Determination of glucose by Benedict's solution.• To study the process of etiolation in the laboratory.• To study the action of Ethylene hormone on fruit ripening.	30

Text Books :

1. Jain, V. K. 2017. Fundamentals of Plant Physiology. S. Chand publishing. 20th edition.
2. Dr. B. B. Arora, Modern's Botany

Course Outcomes

After completing this course, the learner will be able to:

1. Students will acquire an understanding of various physiological process in plants.
- 2: Students will develop a comprehensive knowledge of plant hormones.
- 3: Students will learn about photomorphogenesis and its significance.
- 4: Students will gain a conceptual understanding of plant growth and senescence, including the natural aging process of plants.
- 5*. Students will be able to demonstrate practical aspects and learn the basic concepts of various physiological and biochemical process of plant.

Lesson Plan

SR. No	Date	Course Content	
		Theory (2)	Practical (2)
1	22 July -25July 2025	Plant water relations: absorption, water potential and transpiration.	-----
2	28 July - 2 August	Role of micro and macro nutrients.	-----
3	4 August -8 August	Photosynthesis	Demonstration of imbibition by plaster of Paris method.
4	11 August - 14 August	Respiration.	
5	18 August - 23August	Biosynthesis, mechanism of action and uses of auxin gibberellin	Demonstration of Osmosis by potato osmoscope method.
6	25 August -30 August	Biosynthesis mechanism of action and uses of cytokinin, abscisic acid, ethylene	
7	1 Sept. - 6 Sept.	Lipid metabolism	To study the Osmotic pressure of onion scale/ Rhoeo leaf peel by plasmolytic method.;
8	8 Sept. - 13 Sept.	Nitrogen metabolism	
9	15 Sept. - 20 Sept.	Structure, function and mechanisms of action of phytochromes.	To separate photosynthetic pigments by thin layer/paper chromatography.
10	22 Sept. - 27 Sept.	stomatal movement, photoperiodism	
11	29 Sept.- 4 Oct.	Biological clocks, mechanism of flowering.	To study the phenomenon of seed germination (effect of light).
12	6 Oct.- 11 Oct.	Concepts of plant growth; factors affecting germination	Determination of glucose by Benedict's solution.
13	13 Oct.- 18 Oct.	Factors affecting dormancy of seeds.	To study the induction of amylase activity in germinating barley grains.
14	27 Oct. - 1 Nov.	Physiological and biochemical changes associated with senescence	
15	3 Nov. - 8Nov	Physiological and biochemical changes associated with abscission.	To demonstrate suction due to transpiration.
16	10 Nov-15 Nov	Revision	To study the action of Ethylene hormone on fruit ripening.
17	17 Nov -22 Nov	Revision	-----
18	24 Nov.	Revision	-----

Signature of Teacher

Head of Department

INDIRA GANDHI (P.G.) MAHILA MAHAVIDYALAYA ,KAITHAL

Affiliated to Kurukshetra University, Kurukshetra

Department Of Science

Lesson Plan (Session 2025-2026)

Class: B.Sc. Life Sciences

Semester: V

Name of the Course: Economic Botany and Plant Biotechnology

Course Code :B23-BOT-501

Dates: 22 July, 2025 – 24 Nov., 2025

SYLLABUS

Maximum Marks: 100

Time: 3 hours

End Term Exam Marks: 50(T)+20(P)=70 Marks

Assessment: 20(T)+10(P)=30 Marks

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of short type question covering the entire syllabus in addition to that eight more questions will be set, two question from each unit. Students will be required to attempt in all. In addition to the compulsory question, student will have to attempt four more questions selecting one question from each unit.

Unit	Topics	Contact Hours
Unit: I	Food Plants: Introduction to Cereals and Millets; Origin, distribution, botanical description, brief idea of cultivation and uses of Rice, Wheat and Maize. Protein Crops (Pulses); Origin, distribution, botanical description, brief idea of cultivation and uses of Gram, Arhar, Peas. Introduction to Vegetables; Origin, distribution, botanical description, brief idea of cultivation and uses of Potato, Tomato, Onion. Fibers: Introduction to natural fibers; Origin, distribution, botanical description, brief idea of cultivation, processing and uses of Cotton, Jute and Flax. Oil Yielding Crops: Origin, distribution, botanical description, brief idea of cultivation and uses of Groundnut, Mustard and Coconut.	11
Unit: II	Spices and Condiments: Introduction to spices and condiments; Morphology of plant part used, brief idea of cultivation and uses of Coriander, Black Pepper, Ginger, Turmeric and Cloves. Medicinal Plants: Brief idea of Cultivation, botanical features and medicinal importance of Cinchona, Rauwolfia, Atropa, Opium, Cannabis, Indian Gooseberry and Withania. Beverages: Botanical description and processing of Tea and Coffee. Rubber: Botanical description and processing of Hevea Sugar: Botanical description, cultivation and harvesting of Sugarcane; processing of Sugar. Timber: Note on important timber yielding plants.	12
Unit: III	Plant Tissue Culture: Concept, History, Scope and Applications; Totipotency Organogenesis Cryopreservation Types of culture: Seed, Embryo, callus, suspension, organs, Cell and protoplast culture Micropropagation/clonal propagation (different routes of multiplication axillary bud proliferation, somatic embryogenesis, organogenesis), Synthetic seeds (a brief account) In vitro haploid production Androgenic methods: Anther culture, Microspore culture Androgenesis Significance and use of haploids Gynogenic haploids, factors effecting gynogenesis Somatic hybridisation, Cybrids, Somaclonal variations	11
Unit: IV	Genetic Engineering in plants: Introduction and applications Direct DNA transfer/Physical methods of gene transfer in plants - micro projectile bombardment, electroporation, liposome mediated, Calcium phosphate mediated etc. Restriction Endonucleases: Types and role; brief idea about cloning vectors- Ti plasmid, BAC, Lambda phage, cosmid, shuttle vector, eukaryotic vectors (YAC) Plant transformation by Agrobacterium tumefaciens and A. rhizogenes. Strategies for gene transfer to plant cells. Binary and co-integrate vectors.	11
V	<ul style="list-style-type: none"> Study of economically important plants: Wheat, Rice, Maize, Gram, Pea, Arhar, Black Pepper, Ginger, Clove, Tea, Coffee, Cotton, Groundnut, Coconut, Mustard and Sugarcane etc. 	30

	<ul style="list-style-type: none"> • Study of economically important plants: Potato, Tomato, Onion, fiberyielding and medicinal plants of the syllabus and different types of woods. • Collection and preparation of reports on various crops and economically important plants being cultivated/wildly available in your area. • Brief introduction to the components and working of the instruments-oven, autoclave, incubator, centrifuge, laminar air flow and spectrophotometer); Familiarization with basic equipment's in tissue culture. • Preparation of MS medium. • To prepare the slants and petri plates for plant tissue culture. • Demonstration of in vitro sterilization and inoculation methods using leaf and nodal explants of tobacco/Datura/Brassica or other available plant. • Study of anther, embryo and endosperm culture, micropropagation, somatic embryogenesis & artificial seeds through photographs. • Study of methods of gene transfer through photographs: Agrobacterium-mediated, direct gene transfer by electroporation, microinjection, microprojectile bombardment. 	
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Text Books :

1. Singh, B.D. 2021. Biotechnology 4th Edition. Kalyani Publications.
2. Dr. B. B. Arora, Modern's Botany.
3. S. N. Pandey, A. Chadha A textbook of Botany.

Course Outcomes

After completing this course, the learner will be able to:

1. Students will acquire an understanding of various physiological process in plants.
- 2: Students will develop a comprehensive knowledge of plant hormones.
- 3: Students will learn about photomorphogenesis and its significance.
- 4: Students will gain a conceptual understanding of plant growth and senescence, including the natural aging process of plants.
- 5*. Students will be able to demonstrate practical aspects and learn the basic concepts of various physiological and biochemical process of plant.

Lesson Plan

SR. No	Date	Course Content	
		Theory (2)	Practical (2)
1	22 July -25July 2025	Students doing their Internship	-----
2	28 July - 2 August	Students doing their Internship	-----
3	4 August -8 August	Food Plants: Introduction to Cereals and Millets; Origin, distribution. Botanical description, brief idea of cultivation and uses of Rice, Wheat and Maize.	Study of economically important plants: Wheat, Rice, Maize, Gram, Pea, Arhar, Black Pepper, Ginger, Clove, Tea, Coffee, Cotton, Groundnut, Coconut, Mustard and Sugarcane etc.
4	11 August - 14 August	Protein Crops (Pulses); Origin, distribution, botanical description, brief idea of cultivation and uses of Gram, Arhar, Peas.	Study of economically important plants: Potato, Tomato, Onion, fiber yielding and medicinal plants of the syllabus and different types of woods.
5	18 August - 23August	Introduction to Vegetables; Origin, distribution, botanical description, brief idea of cultivation and uses of Potato, Tomato, Onion.	----
6	25 August -30 August	Fibers: Introduction to natural fibers; Origin, distribution, botanical description, brief idea of cultivation, processing and uses of Cotton, Jute and Flax.	Study of economically important plants: fiber yielding and medicinal plants of the syllabus and different types of woods.,
7	1 Sept. - 6 Sept.	Oil Yielding Crops: Origin, distribution, botanical description, brief idea of cultivation and uses ofGroundnut, Mustard and Coconut.	-----
8	8 Sept. - 13 Sept.	Spices and Condiments: Introduction to spices and condiments; Morphology of plant part used, brief idea of cultivation and uses of Coriander, Black Pepper, Ginger, Turmeric and Cloves.	Brief introduction to the components and working of the instruments- oven, autoclave, incubator, centrifuge, laminar air flow and spectrophotometer); Familiarization with basic equipments in tissue culture.
9	15 Sept. - 20 Sept.	Medicinal Plants: Brief idea of Cultivation, botanical features and medicinal importance ofCinchona, Rauwolfia, Atropa, Opium, Cannabis, Indian Gooseberry and Withania.	-----
10	22 Sept. - 27 Sept.	Beverages: Botanical description and processing of Tea and Coffee. Rubber: Botanical description and processing ofHevea	Collection and preparation of reports on various crops and economically important plants being cultivated/wildly available in your area.
11	29 Sept.- 4 Oct.	Sugar: Botanical description, cultivation and harvesting of Sugarcane; processing of Sugar. Timber: Note on important timber yielding plants.	Preparation of MS medium.
12	6 Oct.- 11 Oct.	Plant Tissue Culture: Concept, History, Scope and Applications; TotipotencyOrganogenesis Cryopreservation Types of culture: Seed, Embryo, callus, suspension, organs, Cell and protoplast culture.	To prepare the slants and petri plates for plant tissue culture.
13	13 Oct.- 18 Oct.	Micropropagation/clonal propagation (different routes of multiplication axillary bud proliferation, somatic embryogenesis, organogenesis), Synthetic seeds (a brief account)	-----
14	27 Oct. - 1 Nov.	Anther culture, Microspore culture Ando genesis Significance and use of haploids Gynogenic haploids, factors effecting gynogenesis Somatic hybridisation, Cybrids, Somaclonal variations	Demonstration of in vitro sterilization and inoculation methods using leaf and nodal explants of tobacco/Datura/Brassica or other available plant
15	3 Nov. - 8Nov	Genetic Engineering in plants: Introduction and applications.	-----
16	10 Nov-15 Nov	Direct DNA transfer/Physical methods of gene transfer in plants - micro projectile bombardment, electroporation, liposome mediated, Calcium phosphate mediated etc.	Study of anther, embryo and endosperm culture, micropropagation, somatic embryogenesis & artificial seeds through photographs.
17	17 Nov -22 Nov	Restriction Endonucleases: Types and role; brief idea about cloning vectors- Ti plasmid, BAC, Lambda phage, cosmid, shuttle vector, eukaryotic vectors (YAC)	Study of methods of gene transfer through photographs: Agrobacterium-mediated, direct gene transfer by electroporation, microinjection, microprojectile bombardment.
18	24 Nov.	Plant transformation by Agrobacterium tumefaciens and A. rhizogenes. Strategies for gene transfer to plant cells. Binary and co-integrate vectors.	-----

Signature of Teacher

Head of Department

