



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

B.Sc. (Life Science / Biotechnology / Chemistry)

BSLS502 Plant Hormones and Plant Growth Regulators

| SUBJECT CODE | Category | SUBJECT NAME | TEACHING & EVALUATION SCHEME | | | | | | | | |
|--------------|----------|--|------------------------------|---------------|----------------------|-------------------------|----------------------|----|---|---|---------|
| | | | THEORY | | | PRACTICAL | | Th | T | P | CREDITS |
| | | | END SEM University Exam | Two Term Exam | Teachers Assessment* | END SEM University Exam | Teachers Assessment* | | | | |
| BSLS502 | DC | Plant Hormones and Plant Growth Regulators | 60 | 20 | 20 | 30 | 20 | 4 | 1 | 2 | 7 |

Legends: L - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;

***Teacher Assessment shall be based following components: Quiz/Assignment/Project/Participation in Class, given that no component shall exceed more than 10 marks.**

Course Objectives:

1. To have the knowledge of plant hormones and plant growth regulators
2. To know the applications of plant hormones and plant growth regulators in agriculture

Course Outcomes:

1. Student will be able to understand the biochemical nature of plant hormones and plant growth regulators
2. Student will understand the mechanism of action of plant hormones and their applications.

Unit – I

Growth parameters and measurement. Phototropism and discovery of auxin..Types of auxins and their chemical structure.physiological reactions regulated and mechanism of action of auxins.

Unit – II

Gibberellins – discovery and chemical structure. Physiological reactions regulated by gibberellins. Synthesis of amylase and gene regulation by gibberellins.

Cytokinins – synthetic and natural cytokinins. Physiological reactions regulated by cytokinins. Mechanism of action of cytokinins.



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Unit – III

Absciscic acid – discovery and physiological reactions regulated. Role of absciscic acid under water stress.

Ethylene – biosynthesis and physiological reactions regulated. Mechanism of action of ethylene.

Unit – IV

Natural and synthetic plant growth regulators. Physiological effects of ascorbic acid, polyamines, oligosaccharides, brassinosteroids, phenolic compounds and strobilins.

Unit – V

Applications of plant hormones and plant growth regulators in agriculture and horticulture. Applications of plant hormones in tissue culture and forestry.

BSLSL -505 Practical

1. Phototropism – dependence on wavelength of light.
2. Effect of auxin on the growth of coleoptile and stem internode
3. Effect of gibberellin on growth of dicot seedlings
4. Germination and activity of amylase in wheat and maize seeds
5. Effect of gibberellin on amylase activity in half seeds
6. Effect of gibberellin on light grown seedlings
7. Effect of kinetin on expansion growth of cotyledons
8. Effect of kinetin on senescence
9. Effect of kinetin on dark grown seedlings
10. Effect of absciscic acid on the growth of seedlings
11. Effect of absciscic acid on expansion of cotyledons
12. Effect of ethrel on growth of seedlings

Books:

1. Plant Physiology – Taiz and Zeiger
2. A text book of Plant Physiology, Biochemistry and Biotechnology – S K Verma
3. Plant growth regulators in Agriculture and Horticulture – their role and commercial uses – R. K. Shukla and A. S. Basra
4. Plant growth and development – Hormones and Environment – L. M. Srivastava.



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B.Sc. PCM/LS/BT SEMESTER V

| SUBJECT CODE | Category | SUBJECT NAME | TEACHING & EVALUATION SCHEME | | | | | | | | |
|--------------|----------|---------------------|------------------------------|---------------|------------------------|-------------------------|------------------------|----|---|---|---------|
| | | | THEORY | | | PRACTICAL | | Th | T | P | CREDITS |
| | | | END SEM University Exam | Two Term Exam | Teachers Assessment t* | END SEM University Exam | Teachers Assessment t* | | | | |
| BSCH503 | DC | Organic Chemistry I | 60 | 20 | 20 | 30 | 20 | 3 | 1 | 4 | 6 |

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

Q/A – Quiz/Assignment/Attendance, MST Mid Sem Test.

***Teacher Assessment** shall be based on following components: Quiz/Assignment/Project/Participation in class, given that no component shall exceed more than 10 marks.

Unit 1: Electromagnetic Spectrum Absorption Spectra

Ultraviolet (UV) absorption spectroscopy – absorption laws (Beer-Lambert law); molar absorptivity, types of electronic transitions, effect of conjugation. Concept of chromophore and auxochrome, Bathochromic, hypsochromic, hyperchromic and hypochromic shifts. U.V. spectra of conjugated enes and enones.

Infrared (I.R.) absorption spectroscopy – molecular vibrations, Hooke's law, selection rules, intensity and position of I.R. bands, measurement of I.R. spectrum, fingerprint region, characteristic absorptions of various functional groups and interpretation of I.R. spectra of simple organic compounds.

Unit 2: Mechanism of Organic Reactions:

Inclusion compounds, clathrates, charge transfer complexes, resonances, hyperconjugation, aromaticity, inductive and field effects, hydrogen bonding.

Curved arrow notation, drawing electron movements with allows, half-headed and double-headed arrows, homolytic and heterolytic bond fission, Types of reagents – electrophiles and nucleophiles, Types of organic reactions, Energy considerations. Reactive intermediates – Carbocations, carbanions, free radicals, carbenes, arynes and nitrenes (with examples). Assigning formal charges on intermediates and other ionic species. Methods of determination of reaction mechanism (product analysis, intermediates, isotope effects, kinetic and stereochemical studies).

Unit 3: Alkanes and Cycloalkanes:

IUPAC nomenclature of branched and unbranched alkanes, the alkyl group, classification of carbon atom in alkanes, Isomerism in alkanes, sources methods of formation (with special reference to Wurtz reaction, Kolbe reaction, Corey-House reaction and decarboxylation of carboxylic acids), physical properties and chemical reactions of alkanes, Mechanism of free radical halogenation of alkanes: orientation, reactivity and selectivity. Cycloalkanes – Nomenclature, methods of formation, chemical reactions, Baeyer's strain theory and its limitations. Ring strain in small rings (cyclopropane and cyclobutane), theory of strain less rings. The case of cyclopropane ring, banana bonds.



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Unit 4: Alkenes and Cycloalkenes:

Nomenclature of alkenes, methods of formation, mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halides, regioselectivity in alcohol dehydration, The Saytzeff rule, Hofmann elimination, physical properties and relative stabilities of alkenes. Chemical reactions of alkenes – mechanism involved in hydrogenation, electrophilic and free radical additions, Markownikoff's rule, hydroboration-oxidation, oxymercuration-reduction. Epoxidation, ozonolysis, hydration, hydroxylation and oxidation with KMnO_4 , Polymerization of alkenes, Substitution at the allylic and vinylic positions of alkenes, Industrial applications of ethylene and propene. Methods of formation, conformation and chemical reactions of cycloalkenes;

Unit 5: Dienes and Alkynes:

Nomenclature and classification of dienes : isolated, conjugated and cumulated dienes, Structure of allenes and butadiene, methods of formation, polymerization, chemical reaction – 1, 2 and 1, 4 additions, Diels-Alder reaction. Nomenclature, structure and bonding in alkynes, Methods of formation, Chemical reactions of alkynes, acidity of alkynes, Mechanism of electrophilic and nucleophilic addition reactions, hydroboration-oxidation, metal-ammonia reductions, oxidation and polymerization.

Guidelines for Practical:

A two credit lab is to be conducted by covering the most relevant and useful topics from afore mentioned syllabus.

REFERENCES:

1. Robert Thornot Morrison and Robert Neilson Boyd, "Organic Chemistry", Prentice Hall of India Pvt Ltd, New Delhi, Sixth Edition, 1992.
2. Bhupinder Mehta, Manju Mehta, "Organic Chemistry", Prentice Hall of India Pvt Ltd, New Delhi, 2005.
3. James B Hedrickson Donald J. Cram and George S. Hammond, "Organic Chemistry", McGraw-Hill Kogakusha, Ltd., Third Edition.
4. Arun Bahl, B. S. Bahl, "Advance Organic Chemistry", S. Chand & Company Ltd., New Delhi, First Edition, 2003.
5. I. L. Finar, "Organic Chemistry", Pearson Education Pvt Ltd, New Delhi, First Edition, 2002.
6. G. Marc Loudon, "Organic Chemistry", Oxford University Press, Forth Indian edition, 2010.
7. P.S.Kalsi, "Text book of Organic Chemistry", MacMillan of India Pvt. Ltd., 1999.
8. P.S. Kalsi, "Spectroscopy of Organic Compounds", New Age International Pvt. Ltd. Publishers, 2006.
9. C.N. Banwell, "Fundamentals of Molecular Spectroscopy", McGraw-Hill, 1994.
10. Y.R. Sharma, "Elementary Organic Spectroscopy (Principles and Chemical Applications)", S. Chand, 2007.



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B.Sc. (Life Science / Biotechnology / Chemistry)

BSBT504 Plant Tissue Culture, Animal cell culture and Stem cells

| SUBJECT CODE | Category | SUBJECT NAME | TEACHING & EVALUATION SCHEME | | | | | | | | |
|--------------|----------|--|------------------------------|---------------|----------------------|-------------------------|----------------------|----|---|---|---------|
| | | | THEORY | | | PRACTICAL | | Th | T | P | CREDITS |
| | | | END SEM University Exam | Two Term Exam | Teachers Assessment* | END SEM University Exam | Teachers Assessment* | | | | |
| BSBT504 | DC | Plant tissue culture, Animal cell culture and Stem cells | 60 | 20 | 20 | 30 | 20 | 4 | 1 | 2 | 7 |

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment shall be based following components: Quiz/Assignment/Project/Participation in Class, given that no component shall exceed more than 10 marks.**

Course Objectives:

1. To have the knowledge of methods of plant tissue culture and animal cell culture
2. To know the applications of plant tissue culture and stem cells

Course Outcomes:

1. Student will be able to understand the methods of culturing plant tissue and its applications
2. Student will understand the methods of culturing animal cells and applications of stem cells.

Unit – I

History of plant tissue culture. Preparation of media for plant tissue culture. Inorganic and organic nutrients in the media. Role of growth regulators in the media.

Unit – II

Selection and maintenance of callus. Single cell culture, suspension cultures and batch cultures. Cytodifferentiation, organogenic differentiation and somatic embryogenesis.

Unit – III

Haploid plants – anther and ovary culture. Protoplast isolation and cybrids. Application of tissue, cell and protoplast culture in agriculture, horticulture and pharmaceutical industry. Synthetic seeds. Introduction to transgenic plants and their advantages.



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Unit – IV

Animal cell culture technology. Culture media for animal cell cultures. Growth factors for animal cells. Differentiation of cells. Organ culture. Commonly used cell lines.

Unit – V

Stem cells – isolation, preservation and culture. Transplantation of stem cells. Differentiation of stem cells. Stem cell therapy.

BSBTL-506 Practical

1. Media preparation and sterilization
2. Methods of surface sterilization
3. Micropropagation
4. Callus induction from root, stem, leaf
5. Somatic embryos
6. Organogenesis
7. Synthetic seeds
8. Seed germination in-vitro

Books

1. Plant Biotechnology – Jitendra Prakash
2. Plant Biotechnology – Slater Scoff
3. Biotechnology in Agriculture – Natesh S.
4. Text book of Animal Biotechnology – Ramdas and Meeraya
5. Animal Biotechnology – Shashidhara R.
6. Stem cells: An insider guide – Paul Knoepfler
7. Engineering stem cells for tissue regeneration. – Ngan F Huang