

SEMESTER – III

Core Paper - IX

PLANT PHYSIOLOGY AND PHYTOCHEMISTRY

Instructional Hrs.:90

Sub. Code: 16BOPC309

Max.Marks: CIA 25; ESE -75

Credits:4

Objectives: To learn the metabolic and biochemical reactions in plants.

To understand the movement of water and solute.

To enhance the technical skill in fruit development and fruit ripening

UNIT-I

18Hrs.

Water- Structure- Properties- Biological significance- Water potential. A General account of absorption and translocation of water- solutes and assimilates. *Transpiration* and stomatal mechanism- Enzyme: Classification-Properties and mechanism of enzyme action.

UNIT- II

18 Hrs.

Photosynthesis- *Photosynthetic pigments*- Mechanism of Photosynthesis: Light reaction. Electron carriers- photophosphorylation- Carbon fixation in C₃ and C₄ plants- CAM pathway. Photorespiration and glycolate- metabolism.

UNIT- III

18 Hrs.

Respiration- Glycolysis- Pyruvate metabolism. TCA cycle- Electron transport system coupled with Oxidative phosphorylation- Metabolism of storage protein and fat to carbohydrates-*HMP pathway*.

UNIT- IV

18 Hrs.

Growth hormones- General account of Auxin- Gibberellins- Cytokinins- Ethylene - Abscissic acid. Senescence- Phytochrome- Photoperiodism- Vernalisation-*Biological clock*.

UNIT- V

18 Hrs.

Biomolecules - Classification- structure and properties of carbohydrates- amino acids- proteins and lipids - *secondary metabolites and antioxidant activity* (outline only).

Note: Bold and *Italics* denote Self Study Topics.

Practicals:

a. Plant Physiology

1. Preparation of Molar, Normal, ppm and Percent solutions
2. Determination of Osmotic Pressure (OP) of cell sap of given specimen (Rhoeo leaf)
3. Determination of Diffusion Pressure Deficit (DPD) with potato tuber.
4. Comparison of the rate of respiration in germinating seeds and flower buds using simple Respirometer.
5. Rate of photosynthesis under varying CO₂ concentrations in a water plant.
6. Effect of intensity of light on O₂ evolution during photosynthesis using Wilmott's bubble counter.
7. Determination of water absorption/transpiration ratio.
8. Calculation of stomatal index in upper and lower epidermal peelings and the percentage of leaf area
9. Measurement of Respiratory Quotient in germinating seeds.
10. Peroxidase Activity (pH and Temperature)

Demonstration Experiments

1. Nitrification by soil microorganisms.
2. Effect of GA₃ on amylase activity in cereals.
3. Effect of IAA on excised shoot/hypocotyl cuttings of legumes.
4. Demonstration of transpiration rate using simple Potometer

b) Bio-Chemistry

1. **pH** : Measure the pH of cell sap and soil solution.
2. **Buffer**: Preparation of phosphate and sodium citrate buffer.

3) Chromatography

I. Paper Chromatographic technique

Separation of leaf pigments

Separation of amino acids.

II. Thin layer chromatographic technique

Separation of leaf pigments

III. Column chromatographic technique to separate chloroplast / Flower pigments.

4) Qualitative and quantitative methods

- i) Extraction of plant material-cold percolation
- ii) Qualitative analysis of phytochemicals
- iii) Total free amino acids (Ninhydrin reagent method)
- iv) Proteins (Lowry *et al.* 1951 method.)
- v) Total soluble carbohydrates (Anthrone method)
- vi) Starch (Clegg's 1956)

Demonstration Experiments

- 1) Agarose gel Electrophoresis
- 2) Determination of absorption spectra of chlorophyll a and b with spectrophotometer
- 3) Extraction of plant materials using Soxhlet Apparatus

REFERENCES:

1. **Albert L. Lehninger**, "*Principles of Biochemistry*", CBS Publishers & Distributors, PVT Ltd., New Delhi, 1987.
2. **Frank B. Salisbury** and **Cleon W. Ross**, "*Plant Physiology*", CBS Publishers, New Delhi, 1974.
3. **Geoffrey Zubay**, "*Biochemistry*", Addison Wesley Publishing Company, Sydney, 1984.
4. **Jain, J.L.**, "*Fundamentals of Biochemistry*", S. Chand and Company PVT., LTD., New Delhi, 2002.
5. **Malcom S. Wilkins**, "*Advance Plant Physiology*", Longman Group UK LTD., England, 1987.
6. **Meirion Thomas, S., Ranson** and **Richardson J.A.**, "*Plant Physiology*", Longman group limited, London, 1973,
7. **Robert M. Devlin** and **Francis H. William**, "*Plant Physiology*", CBS Publishers & Distributors, New Delhi, 1972.

SEMESTER – III

Core Paper - X

BIOINFORMATICS

Instructional Hrs.:75

Sub. Code: I6BOPC310

Max.Marks:CIA 25; ESE -75

Credits:4

Objectives: To acquire the skill on computer architecture.

To analyse the structure and sequence of biomolecules using New technology.

UNIT- I

15 Hrs.

Introduction to internet-Usage of World Wide Web through Internet Explorer - e-mail server - internet server-URL -HTML - HTTP- Scope - Fields related to Bioinformatics- Application of Bioinformatics - *Human genome*.

UNIT- II

15 Hrs.

Molecular biology- General account of Nucleic acid – structure and chemistry of DNA- RNA- Genes - gene Expression-*Genetic code*- Protein synthesis.

UNIT- III

15 Hrs.

Introduction to Data base - Biological data bases- Objectives of Biological Databases- Types – Sequence data bases- NCBI – EMBL - DDBJ – SWISS- PROT, PIR-PRF - Structural data bases – PDB - *Carbohydrate database* - Literature databases - Pub Med - Agricola.

UNIT -IV

15 Hrs.

Sequence Analysis- Sequence alignment - Global and local alignment - Multiple sequence alignment and tools. Phylogenetic analysis - *Construction of phylogenetic tree* and its uses.

UNIT -V

15 Hrs.

Gene finding- Proteomics (general account) - Protein secondary structure prediction - *Data mining* - Drug designing – *Biomolecular Visualization tools*.

Note: Bold and *Italics* denote Self Study Topics.

Practicals:

1. Gene prediction using genemark-Algorithm
2. DNA Data Bank
3. Proteins- Secondary structure prediction- Algorithm
4. Literature Database – Pub Med
5. Sequence Alignment

REFERENCES:

1. **Andreas, D., Baxevanis,** and **B.F., Francis,** “*Ouellette Bioinformatics*”, John Wiley Sons Inc., PVT., LTD., Singapore, 2002.
2. **Arthur M. Lesk.,** “*Introduction to Bioinformatics*”, Oxford University Press, New York, 2003.
3. **Baxevanis and Quellette,** “*A Practical guide to analysis of genes and proteins*”, 1998.
4. **Mani, L.and Vijayaraj,** “*Bioinformatics for beginners*”, Kalai Kathir Achagam, Coimbatore, 2002.
5. **Smart M. Brown,** “*A biologist’s guide to bio computing and the internet*” 2000..
6. **Sundar Rajan, S. and Balaji, R.,** “*Introduction to Bioinformatics*”, Himalaya Publishing House, Mumbai, 2002.
7. **Rajadurai, M.,** “*Bioinformatics*”, PBS Book Enterprises, Chennai, 2010.
8. **Kumaresan, V.** “*Biotechnology*”, Saras publication Revised Edition, 2010.
9. **Shanmugavel, P. & Wadhwa G..** “*Practicals in Bioinformatics*”, Pointer Publishers, Jaipur, India, 2009.

SEMESTER – III
Skill Based Subject - II
HORTICULTURE

Instructional Hrs.: 45

Sub. Code:16BOPS302

Max.Marks:CIA-25;

ESE-75

Credits:5

Objectives: To understand the basic aspects of outdoor gardening.
To know the cultivation methods of vegetables and fruits.
To enhance the skill in plant propagation methods.

UNIT- I

9 Hrs.

Horticulture -History and importance of Horticulture - *Soil types* – Bio-fertilizers - Methods of plant propagation- layering- cutting – grafting.

UNIT- II

9 Hrs.

Outdoor Gardening- Garden styles- Lawn making- Kitchen garden- Rock garden - Water garden - Floriculture: *cut flower*

UNIT- III

9 Hrs.

Indoor gardening -Terrarium- Bottle and Dish garden- Hanging basket –Hydroponics- Bonsai - flower arrangement- dry decoration-*Ikebana*

UNIT- IV

9 Hrs.

Bulb Vegetable- Onion- Garlic; Tuber Vegetable – Sweet Potato; Root Vegetable – Carrot- Radish- *Beetroot.*

UNIT -V

9 Hrs.

Cultivation of fruits – Banana - Mango- Papaya, Vegetable and fruit carving - *preservation of fruits and vegetables.*

Note: Bold and *Italics* denote Self Study Topics

REFERENCES:

1. **Aiyar, Yegna Narayana, A.K.** "*Field crops of India*", Bangalore Printing and Publishing Company, Bangalore, 1980.
2. **Sivaranjan, V.V.** and **Indira Balachandra**, "*Ayurvedic drugs and their plant sources*" Oxford-IBH, Bangalore, 1994.
3. **Kumar, N.** Introduction to Horticulture. Oxford IBH Publishing Co. Pvt.Ltd.
4. **Das ,P.C.** Vegetable crops of India, Kalyani publishers, 2003
5. **Prem Singh Arya** . A text book of Vegetable culture, Kalyani publishers, 2002.

SEMESTER - III

Skill Based Subject – III

GREEN MEDICINE

Instructional Hrs. : 45

Sub. Code : 16BOPS303

Max. Marks : CIA – 25; ESE - 75

Credits : 5

Objectives : To acquire the knowledge about the herbal plants.
To update knowledge on plants used by tribal society.

UNIT – I

9 Hrs.

Ethnic society of India- Wild plants and Medicinal Plants used by the Tribal society. Digestive drug- *Cuminum cyminum*-Anti-tumour drug – *Vinca rosea*. Anti- diabetic drug – *Gymnema sylvestre*.

UNIT – II

9 Hrs.

Carminative drugs- Cultivation- structure- chemicals and uses – Ginger- Coriander- Asafoetida- Pepper- *Clove* – Garlic.

UNIT – III

9

Hrs.

Cultivation, chemicals and uses- *Curcuma longa*- *Foeniculum vulgare*- *Aloe vera* - *Azadirachta indica*.

UNIT – IV

9 Hrs.

Herbal Cosmetics- Preparations – Hand lotions- Lipsticks- Skin Fresheners- Face powders - *Sun Screens*.

UNIT – V

9 Hrs.

Traditional formulations and uses- *Zizyphus jujuba*- *Syzygium cumini*- *Punica granatum*- *Emblica officinalis*- *Ficus racemosa*.

Note : Bold and *Italics* denote Self Study Topics

REFERENCES:

1. **Gokhale,S.B., Kokate,C.K. and Purohit, A.P.** “*Pharmacognosy*”. Nirali Prakashan, Pune. Sixteenth edition, 2002.
2. **Panda, H.** “*Herbal Cosmetics Handbook*”. Asia Pacific Business Press Inc., New Delhi-35.2008.
3. **Sheelawant Patel.** ‘*Medicinal Trees – Distribution, Characteristics and Traditional Therapeutic Formulations*’.Pointer Publishers, Jaipur. 2009.
4. **Deepak Acharya and Anshu Shrivastava.** “*Indigenous Herbal Medicines Tribal Formulations and Traditional Herbal Practices*”. Aavishkar Publishers,Jaipur.2008.
5. **Rajiv. K. Sinha and Shweta Sinha.** “*Ethnobotany*”. Kalyani Publishers. 2001.
6. **Sivaranjan, V.V. and Indira Balachandra,** “*Ayurvedic drugs and their plant sources*” Oxford - IBH, Bangalore, 1994.