

CC XI - PLANT PHYSIOLOGY, BIOCHEMISTRY & BIOPHYSICS

Unit I

Water relation: significance, - osmotic and non-osmotic uptake of water. Ascent of sap-cohesion theory: root pressure, transpiration, physiology of stomatal Action, Translocation of solutes and assimilates. Mass flow, - Membrane permeability mineral uptake: Passive and active. Role of major and Minor elements, mineral deficiency symptoms.

Unit II

Photosynthesis: Absorption spectrum, Action spectrum, role of pigments enhancement effect, photosystems I & II Photosynthetic electron transport, Photophosphorylation, Carbon Assimilation: Calvin cycle Hatch & Salck pathway, CAM pathway- Respiration: respiratory substrates. Aerobic and anaerobic. Glycolysis. Krebs' Cycle and oxidative phosphorylation, energetics of respiration.

Unit III

Plant Growth: regulatory substances; auxins, kinins, gibberellins, abscissic acid and their function. Role of hormones in flowering, senescence and abscission- Photoperiodism, phytochrome-vernalization.

Unit IV

Biochemistry- Physico-chemical forces acting on the living body Enzymes: Nature and properties. Mechanism of enzyme action-factors affecting Enzyme action, substrate concentration - inhibitors, cofactors. Protein Synthesis Classification, Structure and functions of carbohydrates, lipids, Proteins, secondary plant product - alkaloids flavonoids, terpenoids and anthocyanins

Unit V

Biophysics-physical forces and chemical bonds, light diffraction-biological effect of ionising radiations basic principles of spectroscopy- Laws of Thermodynamics and entropy-electron transfer processes.

- a) Definition of pH-its determination;
- b) Buffers and electrolytes and their functions.
- c) Fractionation of biological materials by chromatography,
- d) Centrifugation.

References

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Practical :

For demonstration only

1. Enzyme activity using amylase.
2. Colorimeter – Operation and working principle
3. pH meter - Operation and working principle
4. Centrifuge - Operation and working principle

To be performed by each student.

1. Colorimetric estimation of sugars
2. Colorimetric estimation of Starch
3. Determination of osmotic pressure of onion/Rheo leaf.
4. Effect of light intensity on transpiration using Ganong's potometer.
5. Determination of stomatal frequency and estimation of transpiration rate.
6. Determination of absorption and transpiration ratio of twigs.
7. Measurement of respiration rate using germinating seeds and flower Buds with simple respiroscope.
8. Separation of plant pigments by paper chromatography.
9. Determination of photosynthetic rate in water plants under different CO₂ Concentrations.
10. Measurement of oxygen evolution under different coloured lights using Wilmott's bubbler.