

**SARDAR PATEL UNIVERSITY**  
**Programme: MSC (Integrated Biotechnology)**  
**Semester: V**  
**Syllabus with effect from: June 2012**

<b>Paper Code:</b> PS05CIGB06	<b>Total Credits: 3</b>
<b>Title Of Paper:</b> Plant Physiology	

Unit	Description in detail	Weightage (%)
<b>1</b>	<p><b>Absorption of water, transpiration and ascent of sap:</b>  Water – structure, physical properties and significance to plant life  Movement of materials into and out of cells – diffusion, osmosis, osmotic pressure, plant cell as osmotic systems, significance of osmosis in plants  Plasmolysis, its advantages and imbibition.  Mechanism of water absorption - Active (osmotic and non osmotic) and passive absorption. External factors affecting water absorption.  Transpiration – kinds of transpiration, mechanism of stomatal transpiration and its significance &amp; factors affecting the rate of transpiration, antitranspirants.  Ascent of Sap, Path of Ascent Sap. Vital theories, root pressure theory, physical forces theory, transpiration pull and cohesion of water theory  Absorption of mineral salts: - Mechanism of mineral salt absorption – ion-exchange, passive and active absorption, the carrier concept theory.</p>	
<b>2</b>	<p><b>Photosynthesis:</b> Photosynthetic apparatus, Photosynthetic pigments and absorption of light energy.  Excited states of atoms or molecules – Fluorescence, Phosphorescence, Quantum requirement and quantum yield  Red drop and Emerson’s enhancement effect. Photosynthetic units – the Quantosomes, action spectrum.  Mechanism of photosynthesis : Light reaction (Hill reaction) and Dark reaction (Calvin cycle), Blackman’s law of limiting factors, factors affecting photosynthesis, significance of photosynthesis to mankind.</p>	
<b>3</b>	<p><b>Growth &amp; Growth Hormones:</b> Growth, Kinetics of growth (Growth curve or sigmoid curve). Natural growth hormones - Auxins, Gibberellins, kinetin &amp; cytokinins, ethylene, abscisic acid (ABA) (Discovery, Chemical nature, physiological effects and practical applications).  <b>Photoperiodism and Vernalization</b> – Classification of plants on the basis of photoperiods, importance of photoperiodism. Vernalization – conditions necessary for vernalization, mechanism of vernalization, practical utility of vernalization</p>	
<b>4</b>	<p><b>Plant Movements and Stress physiology:</b>  Movements of locomotion – Autonomic and Paratonic (tactic)  Movements of curvature – Autonomic and paratonic (tropic) growth movements,  Paratonic Variation movements (Nastic movements) and hygroscopic movements.  Stress physiology – Introduction, water deficit and drought resistance, salt stress and salt resistance, cold injury and cold resistance, chilling injury and chilling resistance, freezing injury (frost) and freezing resistance, high temperature(heat) stress and high temperature(heat) resistance, heavy metal stress and heavy metal resistance.</p>	



<b>Practical:</b>	
	<ul style="list-style-type: none"> <li>• Demonstration the phenomenon of osmosis using potato osmoscope.</li> <li>• Measurement of diffusion pressure deficit of plant cell.</li> <li>• Demonstrate the phenomenon of Imbibitions.</li> <li>• Determination of osmotic pressure of cell sap by plasmolytic method.</li> <li>• To demonstrate the transpiration by four leaves method.</li> <li>• Measurement of root pressure and water lifting power of transpiration.</li> <li>• To demonstrate O<sub>2</sub> evolved during photosynthesis by inverted funnel method.</li> <li>• To compare rate of photosynthesis under different conditions.</li> <li>• Demonstration of CO<sub>2</sub> is necessary for photosynthesis (By Moll's half leaf experiment).</li> <li>• Separation of Chloroplast pigments by TLC / Paper Chromatography.</li> <li>• Demonstration of plant movements.</li> </ul>

### **Basic Text & Reference Books:**

- Jain, V.K. (2007) Fundamentals of plant physiology (10<sup>th</sup> Edition) S. Chand and Co., New Delhi, India. ISBN; 81 - 219 – 0462 – 5, Code; 03 020.
- S.N. Pandey & B.K.Sinha (2008) Plant Physiology (4<sup>th</sup> Edition) Vikas Publishing House Pvt. Ltd., A-22, Sector-4, Noida (UP), ISBN : 81-259-1879-5.
- S. Mukherji & A. K. Ghosh (2006) Plant physiology, New Central Book Agency (P) Ltd.,8/1 Chintamony Das Lane, Kolkata-700 009 India. ISBN: 81-7381-478-3
- Salisbury, F.B. and Ross, C.W. (1992) Plant physiology (4<sup>th</sup> Edition), Wadsworth Publishing Co., California, USA. ISBN : 10 : 0534151620.
- Mohr, H. and Sehopper, P. (1995) Plant physiology, Springer-Verlag, Berlin, Germany. ISBN : 3-540-58016-6.
- S. K. Verma and Mohit Verma, A text book of Plant physiology, Biochemistry and Biotechnology, S. Chand & Co., New Delhi, India. ISBN; 81-219-0627- Code; 03A 202.
- Devlin and Witham, Plant physiology
- Noggle and Fritz, Introduction to Plant physiology, Printice Hall, India.

