UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN PLANT BIOLOGY
AND PLANT BIOTECHNOLOGY
SYLLABUS WITH EFFECT FROM 2023-2024

<table>
<tr><td>Title of the Course</td><td colspan="8">CHEMISTRY FOR BIOLOGICAL SCIENCES II
(FOR BOTANY AND ZOOLOGY STUDENTS)</td></tr>
<tr><td>Paper No.</td><td colspan="8">Generic Elective IV</td></tr>
<tr><td>Category</td><td>Generic Elective</td><td>Year
Semester</td><td>I/II
II/IV</td><td>Credits</td><td>2</td><td>Course Code</td><td colspan="2">239E4A</td></tr>
<tr><td>Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td></td><td>2</td><td>-</td><td colspan="3">-</td><td colspan="2">2</td></tr>
<tr><td>Prerequisites</td><td colspan="8">Chemistry for Biological Sciences I</td></tr>
<tr><td>Objectives of the course</td><td colspan="8">This course aims to provide knowledge on
nomenclature of coordination compounds and carbohydrates.
Amino Acids and Essential elements o fbiosystem
understand the concepts of kinetics and catalysis
provide fundamentals of electrochemistry and photochemistry</td></tr>
<tr><td>Course Outline</td><td colspan="8">UNIT I
Co-ordination Chemistry and Water Technology
Co-ordination Chemistry: Definition of terms - IUPAC Nomenclature - Werner’stheory - EAN rule - Pauling’s theory – Postulates - Applications to $[Ni(CO)_4]$, $[Ni(CN)_4]^{2-}$,$[Co(CN)_6]^{3-}$ Chelation - Biological role of Hemoglobin and Chlorophyll (elementary idea) - Applications in qualitative and quantitative analysis.
Water Technology: Hardness of water, determination of hardness of water using EDTA method, zeolite method-Purification techniques –
BOD and COD.</td></tr>
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	Unit II Carbohydrates Classification, preparation and properties of glucose and fructose. Discussion of open chain ring structures of glucose and fructose. Glucose-fructose interconversion. Preparation and properties of sucrose, starch and cellulose.
	UNIT III **Amino Acids and Essential elements of biosystem** Classification - preparation and properties of alanine, preparation of dipeptides using Bergmann method - Proteins- classification – structure - Colour reactions – Biological functions – nucleosides -nucleotides – RNA and DNA – structure. Essentials of trace metals in biological system-Na, Cu, K, Zn, Fe,Mg.
	UNIT IV Electrochemistry Galvanic cells - Standard hydrogen electrode - calomel electrode - standard electrode potentials -electrochemical series. Strong and weak electrolytes - ionic product of water -pH, pKa, pKb. Conductometric titrations - pH determination by colorimetric method – buffer solutions and its biological applications - electroplating - Nickel and chrome plating – Types of cells -fuel cells-corrosion and its prevention.
	UNIT V Photochemistry Grothus - Drapper's law and Stark-Einstein's law of photochemical equivalence, Quantum yield - Hydrogen -chloride reaction. Phosphorescence, fluorescence, chemiluminescenceand photosensitization and photosynthesis (definition with examples).

Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/ JAM /TNPSC others to be solved (To be discussed during the Tutorial hours)
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended Text	1. A.Rajendran, Text book of allied chemistry Vol-I & II, Dhanam publications, Chennai, First edition, 2018. 2. V.Veeraiyan, Textbook of Ancillary Chemistry; High mount publishing house, Chennai, first edition,2009. 3. S.Vaithyanathan, Text book of Ancillary Chemistry; Priya Publications, Karur,2006. 4. Arun Bahl, B.S.Bahl, Advanced Organic Chemistry; S.Chand and Company, New Delhi, twenty third edition,2012. 5. P.L.Soni, H.M.Chawla, Text Book of Organic Chemistry; Sultan Chand &sons,New Delhi, twenty ninth edition,2007.
Reference Books	1. Arun Bahl, B.S.Bahl, Advanced Organic Chemistry; S.Chand and Company, New Delhi, twenty third edition,2012. 2. P.L.Soni, H.M.Chawla, Text Book of Organic Chemistry; SultanChand&sons,NewDelhi,twentyninthedition,2007. 3. P.L.Soni, Mohan Katyal, Text book of Inorganicchemistry; Sultan Chand and Company, New Delhi, twentieth edition, 2007.

4. B.R.Puri, L.R.Sharma, M.S.Pathania, Text book Physical Chemistry; Vishal Publishing Co., New Delhi, forty seventh edition,2018.

5. B.K,Sharma, Industrial Chemistry; GOEL publishinghouse, Meerut, sixteenth edition, 2014.

Course Learning Outcomes (for Mapping with POs and PSOs) On completion of the course the students should be able to

CO 1: write the IUPAC name for complex, different theories to explain the bonding in coordination compounds and water technology.

CO 2: explain the preparation and property of carbohydrate.

CO 3: enlighten the biological role of transition metals, amino acids and nucleic acids.

CO 4: apply/demonstrate the electrochemistry principles in corrosion, electroplating and fuel cells.

CO 5: outline the various type of photochemical process.