AUXILIUM COLLEGE (Autonomous)

(Accredited by NAAC with A^+ Grade with a CGPA of 3.55 out of 4 in the 3rd Cycle)

Gandhi Nagar, Vellore – 632006

Department of Botany

(Effective from the academic year 2024 - 2025)

The Department of Botany offers Allied and Optional Allied Course in Botany to the students of Zoology and Chemistry Department.

Objectives

- Understanding the basics of Botany
- Acquire knowledge of the diversity of the Plant kingdom
- Utilize the knowledge to understand the metabolism of Plants
- Apply the knowledge to develop a sustainable environment
- Acquire skills for self-employment as Agripreneurs
- Affirm the opportunities to become an entrepreneur

STRUCTURE OF THE COURSE

Year/ Sem	Course Code	Title of the Course	Course Type	Course Category	H/ W	Credits	Marks
I/II Year I/III Sem	UABTA24/ UABTA324	Allied Botany-I	Theory	Allied	4	3	40+60= 100
I/II Year I/III Sem	UABTB24/ UABTB324	Allied Practical: Botany - I	Practical	Allied	2	2	40+60= 100
I/II Year II/IV Sem	UABTC24/ UABTC424	Allied Botany-II	Theory	Allied	4	3	40+60= 100
I/II Year II/IV Sem	UABTD24/ UABTD424	Allied Practical: Botany - II	Practical	Allied	2	2	40+60= 100
II Year IV Sem	UNEVS24	Environmental Studies	Theory	General	2	2	25+25 +50 =100

Pattern of Question Paper for Semester

Theory-Total Marks 100

Section A (Answer All) - 10 x 2 = 20

Section B (either or) - 5 x 7= 35

Section C (3 out of 5) - 3 x 15 = 45

Practical - Total Marks 60

Practical: 50 Marks

Record: 10 Marks

<table>
<tr><td>Title of the Course</td><td colspan="7">ALLIED BOTANY-I</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Elective</td><td>Year</td><td>I/II</td><td rowspan="2">Credits</td><td rowspan="2">3</td><td rowspan="2">Course Code</td><td rowspan="2">UABTA24/UABTA324</td></tr>
<tr><td>Semester</td><td>I/III</td></tr>
<tr><td rowspan="2">Instructional Hours per week</td><td>Lecture</td><td colspan="3">Tutorial</td><td>Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>3</td><td colspan="3">1</td><td>-</td><td colspan="2">4</td></tr>
<tr><td>Pre-requisite</td><td colspan="7">To study the basics of botany.</td></tr>
<tr><td>Objectives of the Course</td><td colspan="7">• To study the life cycle of lower plants.
• To study the structure and importance of microbes.
• To study the detailed study of the structure of Plant cell and its organelles.
• To study the fundamentals of Genetics.
• To demonstrate techniques of Plant tissue culture.</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNIT-I (12 hours) (K1, K2, K3 & K4)
Algae:
1.1 Vegetative characters of Algae
1.2 Reproductive characters of Algae
1.3 Structure, reproduction and life cycle of Nostoc
1.4 Structure, reproduction and life cycle of Sargassum
1.5 Economic importance of Algae.</td></tr>
<tr><td></td><td colspan="7">UNIT-II (12 hours) (K1, K2, K3 & K4)
Fungi, Bacteria and Virus:
2.1 General characters of Fungi
2.2 Structure, reproduction and life cycle of Yeast
2.3 Structure, reproduction and life cycle of Agaricus
2.4 Economic importance of fungi.
2.5 Bacteria - general characters, structure and reproduction of Escherichia coli and economic importance of bacteria.
2.6 Virus - general characters, structure of TMV, Structure of Bacteriophage.</td></tr>
<tr><td></td><td colspan="7">UNIT-III (12 hours) (K1, K2, K3 & K4)
Bryophytes, Pteridophytes and Gymnosperms:
3.1 General characters of Bryophytes,
3.2 Structure and life cycle of Funaria.
3.3 General characters of Pteridophytes,
3.4 Structure and life cycle of Lycopodium.
3.5 General characters of Gymnosperms,
3.6 Structure and life cycle of Cycas.</td></tr>
<tr><td></td><td colspan="7">UNIT-IV (12 hours) (K1, K2, K3 & K4)
Cell Biology:
4.1 Prokaryotic and Eukaryotic cell- structure /organization.
4.2 Cell organelles - ultra structure and function of Chloroplast,
4.3 Mitochondria
4.4 Nucleus.
4.5 Cell division - Mitosis
4.6 Meiosis.</td></tr>
</table>

	UNIT-V (12 hours) (K1, K2, K3 & K4) **Genetics and Plant Biotechnology:** 5.1 Mendelism - Law of dominance, Law of segregation 5.2 Law of Independent Assortment 5.3 Incomplete dominance. 5.4 Monohybrid and dihybrid cross - Test cross - Back cross. 5.5 Plant tissue culture - *In vitro* culture methods. 5.6 Plant tissue culture and its application in biotechnology.
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 competitiveexaminations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC /others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Texts	1. Singh, V., Pande, P.C and Jain, D.K. 2021. A Text Book of Botany. Rastogi Publications, Meerut. 2. Bhatnagar, S.P and Alok Moitra. 2020. Gymnosperms, New Age International (P) Ltd., Publishers, Bengaluru. 3. Sharma, O.P. 2017. Bryophyta, MacMillan India Ltd. Delhi. 4. Lee, R.E. 2008. Phycology, IV Edition, Cambridge University Press, New Delhi. 5. Rao, K., Krishnamurthy, K.V and Rao, G.S. 1979. Ancillary Botany,S. Viswanathan Pvt. Ltd., Madras.
Reference books:	1. Parihar, N.S. 2012. An introduction to Embryophyta –Pteridophytes - Surjeet Publications, Delhi. 2. Alexopoulos, C.J. 2013. Introduction to Mycology. Willey Eastern Pvt. Ltd. 3. Vashishta, P.C. 2014. Botany for Degree Students Gymnosperms. Chand & Company Ltd, Delhi. 4. Coulter, M. Jhon, 2014. Morphology of Gymnosperms. Surjeet Publications, Delhi. 5. Vashishta, P.C. 2014. Botany for Degree Students Algae. 2014. Chand & Company Ltd, Delhi. 6. Parihar, N.S. 2013. An introduction to Embryophyta –Bryophytes -, Surjeet Publications, Delhi. 7. Pandey B.P. 1986, Text Book of Botany (College Botany) Vol I &II, S.Chand and Co. New Delhi.
Web Resources	1. https://www.kobo.com/us/en/ebook/the-algae-world 2. http://www.freebookcentre.net/biology-books-download/Fungi-(PDF-15P).html 3. http://scitec.uwichill.edu.bb/bcs/bl14apl/bryo1.htm 4. https://www.toppr.com/guides/biology/plant-kingdom/pteridophytes/ 5. https://arboretum.harvard.edu/wp-content/uploads/2013-70-4-beyond-pine-cones-an-introduction-to-gymnosperms.pdf 6. https://www.us.elsevierhealth.com/medicine/cell-biology 7. https://www.us.elsevierhealth.com/medicine/genetics 8. https://www.kobo.com/us/en/ebook/plant-biotechnology-1

Course Outcomes:

On completion of the course, the students should be able to

CO1: Increase the awareness and appreciation of human-friendly algae and their economic importance.(K1,K2,K3,K4)

CO2: Develop an understanding of microbes and fungi and appreciate their adaptive strategies (K1,K2,K3,K4)

CO3: Develop critical understanding on morphology, anatomy and reproduction of Bryophytes, Pteridophytes and Gymnosperms. (K1,K2,K3,K4)

CO4: Compare the structure and function of Plant cell and its organelles. (K1,K2,K3,K4)

CO5: Understand the core concepts and fundamentals of Plant tissue culture in biotechnology. (K1,K2,K3,K4)

CO/PO	PO					
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M	H	M	H
CO2	H	H	M	H	M	H
CO3	H	M	M	H	M	H
CO4	H	H	M	H	M	H
CO5	H	H	M	H	M	H

H-High(3), M-Moderate(2), L-Low(1)

<table>
<tr><td>Title of the Course</td><td colspan="6">ALLIED PRACTICAL: BOTANY -I</td></tr>
<tr><td>Category</td><td>Elective</td><td>Year</td><td>I/II</td><td>Credits</td><td>2</td><td>Course Code: UABTB24/ UABTB324</td></tr>
<tr><td></td><td></td><td>Semester</td><td>I/III</td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Instructional Hours per week</td><td colspan="2">Lecture</td><td>Tutorial</td><td>Lab Practice</td><td>Total</td></tr>
<tr><td colspan="2"></td><td colspan="2">-</td><td>-</td><td>2</td><td>2</td></tr>
<tr><td colspan="2">Pre-requisite</td><td colspan="5">Practicals pertaining to above subjects is important to get knowledge on various
aspects of plants.</td></tr>
<tr><td>Objectives of the Course</td><td colspan="6">• To enhance information on the identification of each taxonomical group by developing the skill-based detection of the morphology and microstructure of microorganisms, algae, and fungi.
• To identify specimens belonging to Bryophytes, Pteridophytes and Gymnosperms through vegetative and reproductive structures.
• Understanding of laws of genetics.
• Identification of Plant cell and its organelles through its electron micrographs.
• Analyse the process of Plant tissue culture and application.</td></tr>
<tr><td colspan="7">EXPERIMENTS

1. Make suitable micro preparation of the types prescribed in Algae and Pteridophytes.
2. Micro photographs of the Cell organelles ultra structure.
3. Simple genetic problems.
4. Spotters - Fungi,
Bacteria,
Virus,
Bryophytes,
Gymnosperms, Cell Biology
Plant Tissue Culture in Biotechnology.</td></tr>
<tr><td colspan="3">Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)</td><td colspan="4">Questions related to the above topics, from various competitiveexaminations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC /others to be solved
(To be discussed during the Tutorial hour)</td></tr>
<tr><td>Skills acquired from this course</td><td colspan="6">Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill</td></tr>
<tr><td>Recommende</td><td colspan="6">1. Sharma, O.P. 2017. Bryophyta, MacMillan India Ltd, New Delhi.</td></tr>
</table>

d Texts	2. Sharma, O.P. 2012. Pteridophyta, Tata McGraw-Hills Ltd, New Delhi. 3. Subramaniam, N.S. 1996. Laboratory Manual of Plant Taxonomy. Vikas Publishing House Pvt. Ltd., New Delhi. 4. Benjamin, A. Pierce. 2012. Genetics- A conceptual Approach. W.H. Freeman and Company, New York, England. 5.oggle G.R and G.J. Fritz. 2002. Introductory Plant Physiology. Prentice Hall of India, New Delhi. 6. Rao, K., Krishnamurthy, K.V and Rao, G.S. 1979. Ancillary Botany,S. Viswanathan Pvt. Ltd., Madras.
Reference Books	1. Strickberger, M.W. 2005. Genetics (III Ed). Prentice Hall, New Delhi, India. 2. Nancy Serediak and M. Huynh. 2011. Algae identification lab Guide. Accompanying manual to algae identification field guide, Ottawa Agriculture and Agri food Canada publisher. 3. Mohammed Gufran Khan, Shite Gatew and Bedilu Bekele. 2012. Practical manual for Bryophytes and Pteridophytes. Lambert Academic Publishing. 4. Aler Gingauz. 2001. Medicinal Chemistry. Oxford University Press & WileyPublications. 5. Steward, F.C. 2012. Plant Physiology Academic Press, US
Web Resources	1. https://www.amazon.in/Practical-Manual-Pteridophyta-Rajan-Sundara/dp/8126106883 2. https://www.google.co.in/books/edition/Gymnosperms/3YrT5E3Erm8C?hl=en&gbpv=1 &dq=gy mnosperms&printsec=frontcover 3. https://www.amazon.in/Computational-Phytochemistry-Satyajit-Dey-Sarker-ebook/dp/B07CV96NZJ 4. https://medlineplus.gov/genetocs/understanding/basics/cell/ 5. https://apan.net/meetings/apan45/files/17/17-01-01-01.pdf 6. http://www.cuteri.eu/microbiologia/manuale_microbiologia_pratica.pdf 7. https://www.amazon.in/Manual-Practical-Bryophyta-Suresh-Kumar/dp/B0072GNFX4

Course Outcomes:

On completion of the course, the students should be able to

CO1: To study the internal organization of Algae and Pteridophytes.(K1,K2,K3,K4)
CO2: Develop understanding on morphology, anatomy and reproduction of Fungi, Bryophytes, and Gymnosperms.(K1,K2,K3,K4)
CO3: To study the basic structure of microbes (K1,K2,K3,K4)
CO4: Understand the ultrastructure of Plant cell and its organelles. (K1,K2,K3,K4)
CO5: To study the fundamentals of Plant tissue culture and applications in biotechnology.(K1,K2,K3,K4)

CO/PO	PO					
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M	H	H	H
CO2	H	M	H	H	H	H
CO3	H	M	H	H	H	H
CO4	H	M	H	H	M	H
CO5	H	M	H	H	H	H

<table>
<tr><td>Title of the Course</td><td colspan="6">ALLIED BOTANY-II</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Elective</td><td>Year</td><td>I/II</td><td rowspan="2">Credits</td><td rowspan="2">3</td><td rowspan="2">Course Code
UABTC24/
UABTC424</td></tr>
<tr><td>Semester</td><td>II/IV</td></tr>
<tr><td rowspan="2">Instructional Hours per week</td><td colspan="2">Lecture</td><td>Tutorial</td><td colspan="2">Lab Practice</td><td>Total</td></tr>
<tr><td colspan="2">3</td><td>1</td><td colspan="2">-</td><td>4</td></tr>
<tr><td>Pre-requisite</td><td colspan="6">To study basics of Botany.</td></tr>
<tr><td>Objectives of the Course</td><td colspan="6">• To be familiar with the morphology and floral characters of Plants.
• To study the internal structure and tissue organization of Plants.
• To state the basic structure of Plant embryology.
• To learn about the various metabolic pathways in Plants.
• To know the energy currency stored in Plants.</td></tr>
<tr><td>Course Outline</td><td colspan="6">UNIT-I (12 hours) (K1, K2, K3 & K4)
MORPHOLOGY OF FLOWERING PLANTS:
1.1 Plant and its parts.
1.2 Structure and function of root and stem.
1.3 Leaf and its parts. Leaf types- simple and compound.
1.4 Phyllotaxy and types.
1.5 Inflorescence - Racemose, Cymose and Special types.
1.6 Flower description in technical terms.</td></tr>
<tr><td></td><td colspan="6">UNIT-II (12 hours) (K1, K2, K3 & K4)
TAXONOMY:
Study of the range of characters and plants of economic importance in the following families:
2.1 Caesalpiniaceae
2.2 Rubiaceae
2.3 Asclepiadaceae,
2.4 Euphorbiaceae and
2.5 Liliaceae</td></tr>
<tr><td></td><td colspan="6">UNIT-III (12 hours) (K1, K2, K3 & K4)
ANATOMY
3.1 Tissue and tissue systems
3.2 Simple and complex tissues.
3.3 Anatomy of monocot and dicot roots
3.4 Anatomy of monocot and dicot stems
3.5 Anatomy of dicot and monocot leaves.</td></tr>
<tr><td></td><td colspan="6">UNIT-IV (12 hours) (K1, K2, K3 & K4)
EMBRYOLOGY
4.1 Structure of mature anther
4.2 Structure of Ovule
4.3 Types of ovules,
4.4 Structure of embryo sac,
4.5 Pollination and double fertilization,
4.6 Structure of dicotyledonous and monocotyledonous seeds.</td></tr>
</table>

	UNIT-V (12 hours) (K1, K2, K3 & K4) **PLANT PHYSIOLOGY** 5.1 Role of water in Plants. 5.2 Absorption of Water 5.3 Photosynthesis - light reaction, Calvin cycle 5.4 Respiration – Glycolysis, Krebs cycle, Electron Transport System 5.5 Growth hormones – auxins, cytokinins and their applications.
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 competitiveexaminations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC /others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Texts	1. Sharma, O.P. 2017. Plant Taxonomy. (II Edition).The McGraw Hill Companies. 2. Bhojwani, S.S. Bhatnagar, S.P and Dantu, P.K. 2015. The Embryology of Angiosperms (6th revised and enlarged edition). Vikas Publishing House, New Delhi. 3. Maheshwari, P. 1963. Recent Advances in Embryology of Angiosperms. Intl. Soc. Plant Morphologists, New Delhi. 4. Salisbury, F. B.C.W. Ross.1991. Plant Physiology. Wassworth Pub. Co. Belmont. 5. Ting, I.P. 1982. Plant Physiology. Addison Wesley Pb. Philippines.
Reference books	1. Lawrence.G.H.M. 1985. An Introduction to Plant Taxonomy, Central Book Depot, Allahabad. 2. Bhojwani, S.S and Bhatnagar, S.P. 2000. The Embryology of Angiosperms (4th revised and enlarged edition). Vikas Publishing House, New Delhi. 3. Pandey, B.P. 2012. Plant Anatomy. S Chand Publishing. 4. Jain, VK. 2006. Fundamentals of Plant Physiology, S. Chand and Company Ltd. 5. Rajni Gupta. 2012. Plant Taxonomy: Past, Present and Future. Vedams (P) Ltd. New Delhi. 6. Jain, V.K. 2006. Fundamentals of Plant Physiology, S.Chand and Company Ltd., New Delhi. 7. Verma, S.K. 2006. A Textbook of Plant Physiology, S.K.Chand & Co., New Delhi.
Web Resources	1. https://books.google.co.in/books/about/Plant_Taxonomy.html?id=0bYs8F0Mb9gC&redir_esc=y 2. https://books.google.co.in/books/about/PLANT_TAXONOMY_2E.html?id=Roi0lwSXFnUC&redir_esc=y 3. https://archive.org/EXPERIMENTS/plantanatomy031773mbp 4. https://www.amazon.in/Embryology-Angiosperms-6th-S-P-Bhatnagar-ebook/dp/B00UN5KPQG 5. https://www.crcpress.com/Plant-Physiology/Stewart-Globig/p/book/9781926692692

Course Outcomes:

On completion of the course, the students should be able to

CO1: Learn the morphology of Plants and recognize the characters of the Plants in different families. (K1,K2,K3,K4)
CO2: Understand the fundamental concepts of plant anatomy. (K1,K2,K3,K4)
CO3: Analyze and recognize the reproductive structures of Plant embryology. (K1,K2,K3,K4)
CO4: Understand water relation of plants and its absorption mechanism. (K1,K2,K3,K4)
CO5: Study of metabolic pathways in Plants and its growth regulators. (K1,K2,K3,K4)

CO/PO	PO					
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M	H	H	H
CO2	H	M	H	H	H	H
CO3	H	M	H	H	H	H
CO4	H	M	H	H	M	H
CO5	H	M	H	H	H	H

Title of the Course	ALLIED PRACTICAL: BOTANY -II					
Category	Elective	Year	I/II	Credits	2	Course Code UABTD24/ UABTD424
		Semester	II/IV			

Instructional Hours per week	Lecture	Tutorial	Lab Practice	Total
	-	-	2	2

Pre-requisite	Practicals pertaining to above subjects is important to get knowledge on various aspects of plants.
Objectives of the Course	• To be familiar with the morphology and floral characters of Plants. • To study the internal structure and tissue organization of Plants. • To state the basic structure of Plant embryology. • To learn about the various metabolic pathways through experiments. • To know the role of growth hormones and its application.

EXPERIMENTS

1. To identify the family and explain the floral characters.
2. To study the Economic importance of the family.
3. Demonstration experiments
    1. Osmosis
    2. Ganong's Light screen
    2. Ganong's Respiroscope
4. To make suitable micro preparations of anatomy materials prescribed in the syllabus.
5. Spotters – Morphology- Root, Stem, Leaf
   Anatomy – Tissue and Tissue System
   Embryology
   Growth Hormone – Auxin/Cytokinin

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 competitiveexaminations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC /others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Recommended Texts

1. Gamble, J.S.- The Flora of Presidency of Madras. Vol. I, II and III.Bishen Singh and MahendraPal Singh, Dehra Dun. 1919-1925.
2. Dr. Ashok M. Bendrea and Dr. Ashok Kumar – A text book of Practical Botany –I,II ,RastogiPublications, New Delhi, 2009-2010.

Reference Books	1. Lawrence.G.H.M. 1985. An Introduction to Plant Taxonomy, Central Book Depot, Allahabad. 2. Bhojwani, S.S and Bhatnagar, S.P. 2000. The Embryology of Angiosperms (4th revised and enlarged edition). Vikas Publishing House, New Delhi. 3. Pandey, B.P. 2012. Plant Anatomy. S Chand Publishing. 4. Jain, VK. 2006. Fundamentals of Plant Physiology, S. Chand and Company Ltd. 5. Rajni Gupta. 2012. Plant Taxonomy: Past, Present and Future. Vedams (P) Ltd. New Delhi. 6. Jain, V.K. 2006. Fundamentals of Plant Physiology, S.Chand and Company Ltd., New Delhi. Verma, S.K. 2006. A Textbook of Plant Physiology, S.K.Chand & Co., New Delhi. 7. Steward, F.C. 2012. Plant Physiology Academic Press, US
Web Resources	1. https://www.amazon.in/Practical-Manual-Pteridophyta-Rajan-Sundara/dp/8126106883 **2.** https://www.amazon.in/Manual-Practical-Bryophyta-Suresh-Kumar/dp/B0072GNFX4

Course Outcomes:

On completion of the course, the students should be able to

CO1: Understanding the morphology of flowering plants.(K1,K2,K3,K4)
CO2: To observe the characters of the families. (K1,K2,K3,K4)
CO3: Analyse the internal structure of Plant parts. (K1,K2,K3,K4)
CO4: Understand the basic structure of Plant embryology. (K1,K2,K3,K4)
CO5: To study the metabolic pathways through experiments.(K1,K2,K3,K4)

CO/PO	PO					
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M	H	H	H
CO2	H	M	H	H	H	H
CO3	H	M	H	H	H	H
CO4	H	M	H	H	M	H
CO5	H	M	H	H	H	H

SEMESTER-III & IV

II Year- B.A / B.Sc. / B.Com / B.B.A / BCA

UNEVS24– ENVIRONMENTAL STUDIES

Year/ Sem	Course Code	Title of the Course	Course Type	Course Category	H/ W	Credits	Marks
II Years III & IV Sem	UNEVS24	Environmental Studies	Theory	General Paper	2	2	25+25+50= 100

COURSE OUTCOMES (CO):

On completion of the course, the students will be able to,

1. Gain knowledge on the multidisciplinary nature of environmental studies.
2. Understand the Ecosystem, its structure and function.
3. Understand the conservation of biodiversity.
4. Gain knowledge on Environmental pollution, its causes, and effects.
5. Apply the laws in the prevention of the environment.

UNIT I: Multidisciplinary nature of environmental studies: (6 hours)

1.1 Definition, scope, and importance **(K2, K3)**
1.2 Need for public awareness **(K1, K3)**
1.3 Natural resources: Renewable and non-renewable resources **(K3, K4)**
1.4 Forest Resources: Use and over-exploitation, deforestation (**K3, K4)**
1.5 Water Resources: Use and over-utilization of surface and groundwater **(K1, K2)**
1.6 Mineral Resources: Use and exploitation, environmental effects of extracting and Food resources **(K2,K3)**

UNIT II: Ecosystem: (6 hours)

2.1 Concept of an ecosystem (**K2, K3)**
2.2 Structure and functions of an ecosystem **(K1, K3)**
2.3 Energy flow in the ecosystem-Water cycle and carbon cycle (**K4)**
2.4 Food chain, food web, and ecological pyramids **(K3)**
2.5 Structure and functions of forest and grassland ecosystem **(K2,K3)**
2.6 Structure and functions of desert and aquatic ecosystem **(K1,K3)**

UNIT III: Biodiversity and its Conservation: (6 hours)

3.1 Definition: Genetic, Species, Ecosystem Diversity (**K1, K2)**
3.2 Biogeographic Classification of India (**K1, K2)**
3.3 Value of biodiversity: consumptive, productive use, social, ethical, aesthetic (**K2, K4)**
3.4 Hot spots of biodiversity, Endangered and endemic species of India (**K2,K3)**
3.5 Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts(**K3, K4)**
3.6 Conservation of biodiversity: in-situ and ex-situ (**K3, K4)**

UNIT IV: Environmental pollution:(6 hours)

4.1 Definition, causes, effects, and control measures of air, water, soil, and noise pollution(**K2, K3)**
4.2 Waste management (Solid, Liquid, E-waste): causes, effects, and control measures of urban and

industrial waste (**K2,K3)**

4.3 Climate change, global warming, (**K3)**

4.4 Acid rain, ozone layer depletion **(K3)**

4.5 Disaster management: floods, earthquakes, cyclones, landslides (**K1,K3)**

4.6 Rainwater harvesting (**K1,K2)**

UNIT V: Human Population and Environment: (6 hours)

5.1 Environmental acts- Environment Protection Act (1986), (**K1, K3)**

5.2 Air (Prevention and Control of Pollution Act 1981), Water (Prevention and Control of Pollution Act 1976 (**K2, K3)**

5.3 Wildlife Protection Act (1972), Forest Conservation Act (1980) (**K2)**

5.4 Population explosion – family welfare program **(K1,K3)**

5.5 Infectious diseases and Water-related diseases (**K2, K3)**

5.6 Role of information technology in environmental conservation. **(K1,K2)**

TEXT BOOKS:

1. Dr. V. Balu – Environmental Studies. 2004.
2. N. Arumugam – Concepts of Ecology, 2014.

REFERENCE BOOKS:

1. Verma and Agarwal – Environmental Biology, 2015.

2. Anubha Kaushik & Kaushik .C .P(2008)-Perspectives in Environmental Studies (3rd Edition)New age International publishers.

3. Environmental studies, Edition: Periyar EVR college, Trichy, Jazym Publications,Trichy, 2004.

OPEN EDUCATIONAL RESOURCES (OER):

7. https://youtu.be/PwmSa09Cl6E
8. https://youtu.be/brF0RWJyx9w
9. https://youtu.be/76K_5SrYyM4
10. https://youtu.be/PqxMzKLYrZ4

PATTERN OF QUESTION PAPER

CONTINUOUS ASSESSEMENT EXAMINATION

(Units I, II & III)

Time: 1 Hour **Maximum Marks: 25**

Section - A (25 × 1 = 25 Marks)

Objective Project -25 Mark

SEMESTER EXAMINATION

(Complete Syllabus)

Time: 2 Hour **Maximum Marks: 50**

Section - A (50 × 1 = 50 Marks) Objective