

**PG & RESEARCH DEPARTMENT
OF
BOTANY**

UG SYLLABUS

Proposed Course Structure based on UGC - LOCF and TANSCH
(Choice Based Credit System)

From the Academic Year 2022-2023



J.J.COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
PUDUKKOTTAI – 622 422

Programme Outcome (PO) – B.Sc.

- ✓ Acquire theoretical and practical knowledge and enhance the employability skills of the Graduates.
- ✓ Identify and analyze the problem and formulate solutions with appropriate consideration for the public Health, Safety, Security and Sustainable Environment.
- ✓ Acquire the responsibility to contribute for the personal development , the development of the community and to respect the ethical values, social responsibilities and diversity.
- ✓ Function as an individual and as a member, leader in diverse teams and in multidisciplinary settings.
- ✓ Recognize the need for and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

Program Specific Objectives (PSOs)

- ✓ Graduates will study the fundamental principles necessary for lifetime learning, communication skills, and the instilment of ethical ideals in order to create a better world.
- ✓ Graduates will learn about plant systematics, structure, and functions in order to manage cultivation procedures more effectively and improve plant performance.
- ✓ Graduates will build laboratory skills by collecting and processing data using modern equipment, procedures, and protocols in order to generate scientific issues and creative solutions.
- ✓ Through teamwork and project management techniques for employability and entrepreneurship, the student will be enabled to put the skills to use for the benefit of society.
- ✓ The students will utilise the knowledge gained through various courses for sustainable environment and human welfare.

J.J. COLLEGE OF ARTS AND SCIENCE (Autonomous)
PG AND RESEARCH DEPARTMENT OF BOTANY
B.Sc. BOTANY
Proposed Course Structure based on UGC - LOCF and TANSCHÉ
(Choice Based Credit System)
(Applicable for the candidates admitted from academic year 2022-2023 onwards)

Sem	Part	Course code	Course Title	Hrs/ Week	Credit	Exam Hours	Marks		Total Marks
							Int	Ext	
I	I	U1R2TL1/ HL1/FL1	Language Course – I	6	3	3	25	75	100
	II	U1R2EL1	English Language course – I	6	3	3	25	75	100
	III	U1R2BOCC1	Plant Diversity – I (Algae, Fungi, Lichen and Bryophytes)	5	5	3	25	75	100
		UIR2BOCC2P	Major Practical-I (Covering CC1)	5	4	3	40	60	100
		U1R2CHAC1	Allied Chemistry Theory – I	5	3	3	25	75	100
		-	Allied Practical -I	3	-	-	-	-	-
Total				30	18			500	
II	I	U2R2TL2/ HL2/FL2	Language Course – II	5	3	3	25	75	100
	II	U2R2EL2	English Language course – II	5	3	3	25	75	100
	III	U2R2BOCC3	Plant Diversity – II (Pteridophytes, Gymnosperms & Paleobotany)	6	5	3	25	75	100
		U2R2BOCC4P	Major Practical-II (Covering CC3)	5	4	3	40	60	100
		U2R2CHAC2	Allied Chemistry Theory – II	4	3	3	25	75	100
		U2R2CHAC3P	Allied Practical -I	3	3	3	40	60	100
IV	U2R2AECC1	Ability Enhancement Compulsory Course – 1 Environmental Studies	2	2	3	25	75	100	
			Total	30	23				700
III	I	U3R2TL3/ HL3/FL3	Language Course – III	5	3	3	25	75	100
	II	U3R2EL3	English Language course – III	5	3	3	25	75	100
	III	U3R2BOCC5	Anatomy and Embryology of Angiosperms	5	5	3	25	75	100
		U3R2BOCC6P	Major Practical-III (Covering CC5)	5	4	3	40	60	100
		U3R2ZOAC3	Zoology Theory – I	5	3	3	25	75	100
		-	Allied Practical – II	3	-	-	-	-	-
IV	U3R2AECC2	Ability Enhancement Compulsory Course – 2 Value Education	2	2	3	25	75	100	
			Total	30	20				600
IV	I	U4R2TL4/ HL4/FL4	Language Course – IV	5	3	3	25	75	100
	II	U4R2EL4	English Language course – IV	5	3	3	25	75	100
	III	U4R2BOCC7	Morphology, Taxonomy of Angiosperms & Economic Botany	6	5	3	25	75	100
		U4R2BOCC8P	Major Practical-IV (Covering CC7)	5	4	3	40	60	100
		U3R2ZOAC4	Zoology Theory – II	4	3	3	25	75	100
		U4R2ZOAC5P	Allied Practical – II	3	3	3	40	60	100
	IV	U4R2BOSEC1 :1/1:2	Skill Enhancement Course – 1 (1:1/1:2)	2	2	3	25	75	100

				Total	30	23				700
V	III	U5R2BOCC9	Cell Biology, Genetics & Evolution	5	5	3	25	75	100	
		U5R2BOCC10	Molecular Biology & Genetic Engineering	5	5	3	25	75	100	
		U5R2BOCC11	Plant Physiology & Biochemistry	5	5	3	25	75	100	
		U5R2BOCC12 P	Major Practical-IV (Covering CC9,CC 10 & CC11)	5	5	3	40	60	100	
		U5R2BODSE1 :1/1:2	Discipline Specific Elective – 1 (1:1 or 1:2)	4	4	3	25	75	100	
	IV	U5R2BOSEC2 :1/2:2	Skill Enhancement Course – 2 (2:1/2:2)	3	2	3	25	75	100	
		U5R2BOGEC1	Generic Elective Course - 1 To be chosen from other dept.	3	2	3	25	75	100	
			Total	30	28				700	
VI	III	U6R2BOCC13	Plant Biotechnology, Bio-informatics & Biostatistics	5	5	3	25	75	100	
		U6R2BOCC14	Plant Ecology, Phytogeography & Environmental Biotechnology	5	5	3	25	75	100	
		U6R2BOCC15 P	Major Practical-VI (Covering CC 13 & CC 14)	5	4	3	40	60	100	
		U6R2BODSE2 :1/2:2	Discipline Specific Elective – 2 (2:1 or 2:2)	5	4	3	25	75	100	
		U6R2BODSE3 :1/3:2	Discipline Specific Elective – 3 (3:1 or 3:2)	4	4	3	25	75	100	
	IV	U6R2BOSEC3 :1/3:2	Skill Enhancement Course – 3 (3:1/3:2)	2	2	3	25	75	100	
		U6R2BOGEC2	Generic Elective Course - 2 To be chosen from other dept.	2	2	3	25	75	100	
		U6R2AECC3	Ability Enhancement Compulsory Course – 3 Gender Studies	2	1	3	25	75	100	
	V		Extension Activities	-	1				---	
			Extra Credit Online Course - MOOCS	-	(4)				---	
			Total	30	28 (4)				800	
			Grand Total		140(4)				4000	

CC- Core Course / AC – Allied Course /DSE – Discipline Specific Elective / SEC – Skill Enhancement Course / GEC – Generic Elective Course / AECC – Ability Enhancement Compulsory Course /P – Practical Total Credit – 140 / Total Marks – 4000
Extension activities shall be outside the instruction hours.

Discipline Specific Elective Courses – (DSE)

Discipline Specific Elective – 1

1. Internship/Mini Project 1:1
2. Microbiology & Plant Pathology 1:2

Discipline Specific Elective - 2

1. Agri Based Microenterprises 2:1
2. Herbal Ethnobotany 2:2

Discipline Specific Elective - 3

1. Techniques in Biology 3:1
2. Seaweed Technology 3:2

Skill Enhancement Courses (SEC)

Skill Enhancement Course - 1

1. Plant Breeding and Horticulture 1:1
2. Organic Farming 1:2

Skill Enhancement Course - 2

1. Mushroom Culture Technology 2:1
2. Computer Applications in Biology 2:2

Skill Enhancement Course - 3

1. Bio-fertilizer Production and Application 3:1
2. Green Nanotechnology 3:2

Generic Elective Courses GEC) (Offered by the Department)

1. Vermitechnology
2. Flower Decoration and Bouquet preparation

Ability Enhancement Compulsory Course (AECC)

1. Environmental Studies
2. Value Education
3. Gender Studies

SEMESTER I

2022 – 2023ஆம் கல்வியாண்டு முதல் சேர்க்கப்பட்ட இளநிலை பட்ட மாணவர்களுக்குரியது

தலைப்பு :	இக்கால இலக்கியம் - இலக்கணம்	வரிசை எண் :	c1
பருவம் :	முதலாம் பருவம்	தாள் குறியீடு:	U1R2TL1
பிரிவு :	பகுதி ஐ தமிழ்	மதிப்புப் புள்ளி:	3
மதிப்பெண் :	CIA -25, EA -75	கற்றல் நேரம் :	6 மணி

நோக்கம்

1. தற்கால தமிழ் இலக்கியத்தின் நவீனத்தன்மையை அறிந்து கொள்ளல்
2. வசனகவிதையின் அமைப்புமுறையைப் புரிந்துகொள்ளல்
3. புதுக்கவிதைக்கும் மரபுக்கவிதைக்கும் உள்ளவேறுபாட்டுத் தன்மையைப் பிரித்துக் காட்டுதல்
4. உரைநடைவாசிப்பின் மூலம் நானெகிழ்ப் பயிற்சி அளித்தல்
5. சமூக மாற்றத்திற்குச் சிறந்த ஊடகம் கதை இலக்கியம் என்பதை ஆய்ந்தறியத் தூண்டுதல்

கூறு: 1 **இக்கால இலக்கியவரலாறு, இலக்கணம்** (15hrs)

இக்கால இலக்கியவரலாறு-உரைநடை, சிறுகதை, புதினம், கவிதை, நாட்டுப்புற இலக்கியம், இலக்கணம் - ஆகுபெயர்கள்.

கூறு: 2 **வசனகவிதை** (15hrs)

பாரதியார்-கண்ணன் பாட்டு - கண்ணன் என் சேவகன், பாரதிதாசன் - வாளினைஎடுதா, கவிமணி தேசிகவிநாயகம்பிள்ளை - மலரும் மாலையும் - பாரதியும் பட்டிக்காட்டனும், வாணிதாசன் - புதிய ஆத்திசூடி, நாட்டுப்புறப்பாட்டு - நாற்றுநடும் பாட்டு, கதைப்பாடல் - 1980 வைகை வெள்ளத்துயர்.

கூறு: 3 **புதுக்கவிதை** (15hrs)

அப்துல்ரகுமான் - ஆலாபனை-ஆறா(து)அறிவு, மீரா - ஊசிகள் - நான் அவன் நண்பன், மு. மேத்தா - ஆகாயத்திற்கு அடுத்தவீடு, வெ.இறையன்பு-பூபாளத்திற்கு ஒருபுல்லாங்குழல் - நிறவெறிக்குகறுப்பு, சூ.செல்லப்பா - தேன்கிண்ணம் - புழுதிக்காட்டுப் புலம்பல், ஆங்கரைப் பைரவி-விரல் தொட்டவானம் - புத்தகம்.

கூறு: 4 **உரைநடை** (15hrs)

பாரதியார் - கொள்கைக்கும் செயலுக்குமுள்ள தூரம், நா. சஞ்சீவி - மொழிவழிப் பொழுதுபோக்குகள், மு.வரதராசன் - தங்கைக்கு, பூ.ஆலாலசுந்தரம் - பழந்தமிழர் பண்பு, ரா.பி.சேதுபிள்ளை- கலையும் கற்பனையும், பால் வளன் அரசு-தமிழகக் கோவில்கள், எஸ். வையாபுரிப்பிள்ளை-கம்பனும் தமிழும்.

கூறு: 5 **சிறுகதை** (12hrs)

செம்பைமணவாளன் - தவம், அண்டனூர் சுரா-மிடற்றுத் தாகம், சுரே' மான்யா-உயிர் நிலம், சோலச்சி-கதையல்ல, ந.சோலையப்பன் - பூமராங், புதுகைசஞ்சுவி- திருமதிதலைவர், மிடறுமுருகதாஸ் - தூக்குக் கூடை.

பாடநூல்கள்:

இலக்கியவரலாறு	-	துறைவெளியீடு
செய்யுள் திரட்டு	-	துறைவெளியீடு
நிறப்பிரிகை (சிறுகதைத் தொகுதி)	-	துறைவெளியீடு
உரைமாலை (உரைநடைத் தொகுதி)	-	துறைவெளியீடு

இப்பாடத்தினைக் கற்பதின் மூலம் மாணவர்கள் பெறும் பயன்கள்

Sl.No	Course Outcomes	Knowledge Level
CO1	காலந்தோறும் தமிழ் இலக்கியம் கடந்துவந்த காலச்சுவடுகளை அறிந்துகொள்வர்	K2
CO2	கவிதையில் கையாளப்பட்டுள்ளச் சொல்லாடலைக் கண்டுணர்வர்	K2
CO3	புதுக்கவிதையின் வரலாற்றுக்குரியக் கருப்பொருளை மதிப்பிடுவர்	K5
CO4	ஊரைநடை வாசிப்புத் திறனில் மேன்மை அடைவர்	K2
CO5	சிறுகதைப் படைப்பதில் உள்ள நுணுக்கங்களை வரையறை செய்வர்	K4

இக்கால இலக்கியம், இலக்கணம்						U1R2TL1					
Course Out comes	Programme Outcomes (POs)					Programme Specific Outcomes(PSOs)					Mean Score
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	3	3	3	2	2	3	3	3	2	2.7
CO2	3	2	3	3	2	2	3	2	3	2	2.5
CO3	3	2	3	3	3	2	3	3	3	2	2.7
CO4	3	2	2	3	2	2	3	2	3	2	2.4
CO5	3	3	3	3	2	3	3	3	3	2	2.8
Mean Overall Score											2.6
Result											High

SEMESTER I
(For the candidates admitted from the academic year 2022-2023)

Title of the Course : PROSE AND ENGLISH FOR COMMUNICATION

Category of the Course : PART-II ENGLISH

Course Code : U1R2EL1

Nature of the Skill : Communicative Skill

Marks: CIA: 25 +Ext: 75 = 100

Hrs / Week : 06

Credits: 03

Total Inst. Hrs: 72

OBJECTIVES:

1	To expose the learner to modern English prose.
2	To extend learners communication skills through suitable tasks.
3	To expand the learners passive and active vocabulary and repertoire of structures.
4	To develop the ability in independent writing.
5	To provide enough practice for real life applications of language (English)

Unit – 1

(Inst. Hrs: 09)

A.P.J Abdul Kalam My vision for India

Jim Corbett A Deed of Bravery

Bertrand Russell Has Man A Future?

Unit – II

(Inst. Hrs: 12)

Swami Vivekananda: The Secret of Work

C.E.M. Joad: Our Civilization

Nirad C. Chaudhuri: The Great City

Rabindranath Tagore: The Auspicious Vision

Unit – III

(Inst. Hrs: 17)

Synonyms - Antonyms - Homonyms - One Word Substitutes - Idioms and Phrases-Use of Articles, Prepositions, Analysis of Simple Sentences into SVOCA, Tag Questions, Framing questions to suit responses - short form responses both positive and negative to questions.

Unit - IV

(Inst. Hrs: 17)

Comprehension Exercises oral and written - 12 passages (multiple choice & Questions and Answers supplemented by listening exercises to be given by the teacher)

Unit – V

(Inst. Hrs: 17)

Letter Writing - Both formal & Informal, Jumbled words and sentences, Paragraph Writing (Hints Development)

Web Resources

<https://mastanappa.blogspot.com/2016/03/our-civilization-c-e-m-joad-additional.html>

<https://peacenews.info/node/5147/bertrand-russell-has-man-future>

Course Outcomes:

Relationship Matrix for CO, PO, PSO

Title of the Course : Prose and English for Communication						Course code : U1R2EL1					
Course Outcome (CO)	Programme Outcome (PO)					Programme Specific Outcome (PSO)					Mean Score of COs
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO – 1	3	2	1	3	2	2	2	3	3	1	2.2
CO – 2	2	3	2	2	3	3	2	2	3	3	2.5
CO – 3	3	2	2	3	3	3	3	2	3	2	2.6
CO – 4	2	3	3	2	1	3	2	3	2	2	2.3
CO – 5	3	3	2	2	3	1	2	2	3	1	2.2
	Mean Overall Score										2.36
	Result										HIGH

SEMESTER I

Title of the Course: PLANT DIVERSITY I (Algae, Fungi, Lichens & Bryophytes)

Category of the course: Core Course

Course code: U1R2BOCC1

Nature of the course: Skill Development

Marks: CIA: 25 + Ext: 75 = 100

Hrs / Week: 5

Credits: 5

Total Inst. Hrs: 60

Course Objectives

- To study the general characters and phylogeny of lower plants.
- To know the thallus organization of Algae, Fungi, Lichens and Bryophytes.
- To know the reproduction on lower plants.
- To learning the classification of Algae, Fungi, Lichens and Bryophytes.
- To know the economic and environmental importance of lower plants

Unit – I: Algae- General Characters, Classification and Thallus organization (12 hours)

General characters of algae. Introduction to prokaryotic and Eukaryotic algae. Classification (F.E. Fritsch, 1945), criteria for classification, algal distribution, thallus organization (unicellular-*Chlamydomonas*, Diatoms, colonial-*Volvox*, filamentous-*Anabaena*, *Oedogonium*, siphonous-*Caulerpa*, parenchymatous-*Ulva*, *Sargassum*, *Gracilaria*),

Unit – II: Algae- Reproduction and Economic Importance (12 hours)

Reproduction: Vegetative, asexual, sexual reproduction and life cycles (haplontic-*Chlamydomonas*, *Oedogonium* and *Chara*, diplontic-*Diatoms* and *Sargassum*, diplohaplontic-*Ulva* and diplobiontic-*Gracilaria*). Economic importance of algae: Algae as food and feed; Agar-agar, Alginic acid and Carrageenan; Diatomite.

Unit- III: Fungi- General characters, Classification and Reproduction (14 hours)

Classification (Alexopoulos), criteria for classification, Characteristic features, structure, reproduction and life-history of classes, each with one suitable example: Zygomycotina (*Mucor*), Ascomycotina (*Peziza*), Basidiomycotina (*Agaricus*) and Deuteromycotina (*Cercospora*). Economic importance of Fungi: Medicine, food, biopesticides, biofertilizers and industrial uses such as alcohol, acids and enzymes. Harmful effects of Fungi.

Unit – IV: Lichens – General characters and reproduction (10 hours)

General characters, structure, types, distribution, reproduction and ecological significance of lichens with special reference to *Usnea*. Economic importance of lichens.

Unit – V: Bryophytes – General characters, Classification (12 hours)

General characters of Bryophytes. Classification of Bryophyta (Watson)-structure and reproduction of the following classes each with a suitable example: Hepaticopsida (*Marchantia*); Anthocerotopsida (*Anthoceros*) and Bryopsida (*Funaria*). Position of Bryophytes in the evolution of higher plants.

Books for References

1. South G.R. and A. Whittick 1987 Introduction to Phycology. Blackwell Scientific Publications, Oxford.
2. Vashista, Sinha B.R., Singh, V.P., 2002, Botany for Degree students, Algae 9th revised edition, S.Chand& Company Ltd., New Delhi.
3. Pandey B.P., 2000 Revised edition, Text Book of Botany Algae, S.Chand& Company, New Delhi.
4. Sharma O.P., 1992, Text Book of Algae, Tata McGraw Hill Publication Company Ltd., New Delhi.
5. Alexopolous, C.J. and C.W. Misra 1972. Introductory mycology. John Wiley and Sons, New York.
6. Vashista B.R., 1982, Botany for Degree Students – Fungi- S.Chand& Co New Delhi.
7. Chopra G.L., A Text book of Fungi, S.Nagin& Co. Meerut, India
8. Pandey B.P., 1997 College Botany Vol. I Fungi & Pathology.
9. Dube, H., 1978, A textbook of Fungi, Bacteria and Virus. Vikas Publishers.

Web Resources

1. <https://www.biologydiscussion.com/algae/classification-algae/classification-of-algae/49912>
2. <https://archive.bio.org/articles/biotechnology-and-algae>
3. <http://www.nou.ac.in/econtent/Msc%20Botany%20Paper%20IV/MSc%20Botany%20PaperIV%20Unit-1.pdf>

Course Outcomes		K Level
After the completion of the course, students will able to		
CO 1	acquire the basic knowledge about structure and classification of algae, fungi, lichen and Bryophytes	K2
CO 2	analyze the reproduction and life cycles of algae, fungi, lichen and Bryophytes	K4
CO 3	realize the major classes and examples of lower plants	K3
CO 4	recognize the phylogeny of lower plants	K3
CO 5	Identify the economic importance of algae, fungi, lichen and Bryophytes	K4

Relationship matrix for CO, PO & PSO

Course Outcome (CO)	Programme Outcome (PO)					Programme Specific Outcome (PSO)					
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO 1	2	2	2	2	2	3	3	2	3	2	24
CO 2	2	2	2	2	2	3	2	3	3	2	23
CO 3	2	2	2	2	2	2	3	2	2	2	21
CO 4	2	2	2	1	2	3	2	3	2	3	22
CO 5	1	2	2	2	2	2	3	2	3	2	21
											111

Mean overall Relationship is 2.22 which is high

SEMESTER I

Title of the course: MAJOR PRACTICAL – I

Category of the course: Core Course

Course code: U1R2BOCC2P

Nature of the course: Skill Development

Marks: CIA: 40 + Ext: 60 = 100

Credits: 4

Hrs / Week: 5

Total Inst. Hrs: 60

Course Objectives

- To learn identification of lower and primitive group of plants.
- To study the vegetative and reproductive organs of sub-microscopic plants.
- To identify the plant diseases and casual organisms.
- To learning the classification of Algae, Fungi, Lichens and Bryophytes.
- To know the economic and environmental importance of lower plants

1. Study of Compound and Dissecting microscope.

2. Make Micro preparation of vegetative and reproductive structures of the following types:

1. *Oscillatoria*, 2. *Volvox*, 3. *Dictyota*, 4. *Ectocarpus* and 5. *Polysiphonia*.

3. Make micro preparation of vegetative and reproductive parts of the following types:

1. *Albugo*, 2. *Puccinia*, 3. Lichens – *Usnea*.

4. Identify the diseases mentioned in the syllabus with respect to causal organism and symptoms. Make micro preparations wherever necessary.

Tikka disease (Fungal disease), Citrus canker (Bacterial disease), Tobacco mosaic virus (Viral disease).

5. Bryophytes – *Riccia* or *Marchantia* and *Polytrichum*.

6. Botanical tour for algal collection and submission of field report.

SEMESTER I

Title of the Course	Allied Chemistry – I	Marks: CIA:25 + Ext:75=100
Category of the Course	Allied Course	Hrs/Week :04
Course Code	U1R2CHAC1	Total Inst. Hrs: 64
Nature of the Course	Skill Development	Sem: I

Course Objectives:

- To understand the basic concepts in chemical bonding.
- To understand the chemical reactions and their mechanism.
- To know the types of solutions, concentration and theories of acid-bases.
- To know the chemical kinetics and catalysis
- To know the types of colloids, Properties and its applications

Unit – I Chemical Bonding

1.1 Ionic bond- Nature of Ionic bond–structure of NaCl, KCl & CsCl- Factors influencing the formation of ionic bond.

1.2. Covalent bond- nature of covalent bond–VSEPR theory - shapes of BeCl₂, BF₃, CH₄, PCl₅, IF₇, NH₃ & H₂O.

1.3 Coordinate Bond–Nature of coordinate bond, Werner’s theory and structure of some complexes - Ni(CO)₄, [Co(NH₃)₆]Cl₃, K₄[Fe(CN)₆].

1.4. Hydrogen bonding–Theory of Hydrogen bonding - Inter and Intra molecular hydrogen bonding- consequences of hydrogen bonding, van der Waals and London Dispersive forces in simple molecules.

Unit - II Types of Reactions

2.1- Types of chemical reactions, Types of intermediates- Electrophiles – nucleophiles – free radicals.

2.2– Substitution Reactions: Nucleophilic and electrophilic substitution with mechanism (one example for each), Addition Reactions (Addition of HBr on alkenes) – Elimination Reactions (Dehalogenation of alkyl halides) – Condensation Reactions (formation of ester).

2.3– Polymerisation Reactions (Formation of Poly vinyl Chloride) – Reduction reactions (Hydrogenation of oil) - Oxidation Reactions (Conversion of benzaldehyde to benzoic acid).

Unit- III Solutions

3.1 Types of Solutions – Homogeneous and Heterogeneous, saturated and unsaturated, Mole Concept, Normality, Molarity, Molality and Parts per Million – Problems.

3.2 Primary and secondary standards and preparation of standard solutions - Problems.

3.3 Acids and bases: Arrhenius, Lowry- Bronsted, Lewis concepts- strong and weak acids and Bases.-pH, pK_a , pK_b , buffer solutions, Derivation of Henderson – Hasselbalch equation.

Unit- IV Chemical Kinetics and Catalysis

4.1 Chemical kinetics: rate of reaction, order, molecularity, first order rate law, half life period and derivation of the first order rate equation.

4.2 Catalysis–homogeneous and heterogeneous catalysis, intermediate complex formation theory and adsorption theory, Positive and Negative Catalysts, Promoters and poisons, Auto catalysis, applications.

4.3 Enzyme catalysis –Mechanism and Michaelis-Menton Equation (No derivation)- Factors affecting enzyme catalysis.

Unit - V Colloids

5.1 Colloids – Types with examples – classification based on affinity (Lyophilic & Lyophobic).

5.2 Optical, Kinetic and Electrical properties of colloids – Electrophoresis, Electro-osmosis, Peptization, Coagulation.

5.3 Applications of colloids- Dialysis, Desalination of water, Artificial Rain.

Text Books

1. B.R. Puri, L.R. Sharma and K.C. Kalia, *Principles of Inorganic Chemistry*, Milestone Publishers, New Delhi, 2017 **(Unit I, II, III)**
2. ArunBahl and B.S. Bahl, *Advanced Organic Chemistry*, S. Chand & Co. Ltd., New Delhi, 2012 **(Unit IV)**
3. B.R. Puri, L.R. Sharma and Madan S. Pathania, *Principles of Physical Chemistry* Vishal Publishing Co., Jalandhar, 2017 **(Unit V)**
4. P.L.Soni, H.M. Chawla, *Text Book of Organic Chemistry*, Sultan Chand & Sons, New Delhi, 2004
5. R.L. Madan and G.D. Tuli, *Inorganic Chemistry*, S. Chand Co. Ltd., New Delhi, 2010
6. Gurdeep Raj, *Advanced Physical Chemistry*, Goel Publishing House, Meerut, 2016.

References

1. J.D. Lee, “Concise Inorganic Chemistry”, Oxford University Press, New Delhi, 2008.
2. Morrison and Boyd “Organic Chemistry” Pearson Education, 2016.
3. Peter Atkins and Julio de Paula, “Physical Chemistry” Oxford University Press, 2018.

Course Outcomes:

CO No.	CO-Statements	Cognitive Level (K-Level)
On Successful completion of the course, students will be able to		
CO-1	Identify different types of chemical bonds, hybridization and structures of compounds.	K2
CO-2	Recollect the importance of types of reactions of organic compounds.	K3
CO-3	Explain the basic concepts on acid and bases.	K4
CO-4	Derive the integrated rate expressions for first order reactions and looking for suitable catalyst for industrial applications.	K5
CO-5	Identify different applications of colloids in day to day life.	K2

Relationship Matrix for CO, PO and PSO

Title of the Course: ALLIED CHEMISTRY-I							Course Code: U1R2CHAC1				
Course Outcomes (Cos)	Programme Outcomes(POs)					Programme Specific Outcomes (PSOs)					Mean Score of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	1	3	2	1	3	2	3	2	2	2.2
CO2	3	2	2	2	3	2	2	2	3	2	2.3
CO3	2	2	3	1	3	2	3	2	3	3	2.4
CO4	3	3	1	3	3	3	2	3	2	3	2.6
CO5	3	3	2	3	2	2	3	2	3	2	2.5
	Mean Overall Score										2.40
	Result										High

SEMESTER I

Title of the Course	Allied Chemistry Practical – II (For Biochemistry and Botany)	Marks: CIA:40+ Ext:60=100
Category of the Course	Allied Course	Hrs/Week :03
Course Code	U2R2CHAC2P	Total Inst. Hrs: 48
Nature of the Course	Skill Development	Sem:II

Course Objectives:

- To understand the basic principles and types of volumetric analysis.
- To understand the concepts of indicators and Standard solutions
- To know the estimation of total hardness of water
- To gain skills in identifying organic compounds and quantifying
- To appreciate the importance of qualitative and quantitative analysis

I. VOLUMETRIC ANALYSIS

a) Acidimetry and Alkalimetry

- i) Estimation of hydrochloric acid
- ii) Estimation of sodium hydroxide

b) Permanganimetry

- iii) Estimation of oxalic acid using KMnO_4
- iv) Estimation of ferrous sulphate using MnO_4

c) Iodometry

- v) Estimation of CuSO_4 by using Sodium Thiosulphate
- vi) Estimation of KMnO_4 by using Sodium Thiosulphate
- vii) Estimation of $\text{K}_2\text{Cr}_2\text{O}_7$ by using Sodium Thiosulphate

d) Compluxometry

- viii) Estimation of hardness of Water

II. ORGANIC ANALYSIS

Analysis of organic compounds with the following tests for

- i) Aromatic/ Aliphatic nature
- ii) Saturation / unsaturatio
- iii) presence of nitrogen and
- iv) Fuctional group

Organic Compounds

- Carbohydrates
- Phenols
- Aldehydes
- Ketones
- Acids
- Primary Amines
- Amids

Reference Books

1. V. Venkateswaran, R. Veerasamy, A.R. Kulandaivelu, Basic Principles of Practical Chemistry, Sultan Chand & Sons, New Delhi, 1997
2. Sundaram, Krishnan, Raghavan, Practical Chemistry (Part II), S. Viswanathan Co. Pvt., 1996.
3. N.S. Gnanapragasam and G. Ramamurthy, Organic chemistry – Lab manual, S. Viswanathan, Co. Pvt. Ltd., 1998.
4. J.N. Gurtu and R. Kapoor, Advanced Experimental Chemistry (Organic), S. Chand and Co., 1987.

Course Outcomes:

CO No.	CO-Statements	Cognitive Level (K-Level)
On Successful completion of the course, students will be able to		
CO-1	Apply the Principles of titrimetry	K2
CO-2	Familiarize the concepts of indicators and dilutions	K3
CO-3	Deduct the total hardness of water	K4
CO-4	Deduct the various functional group	K5
CO-5	Perform the quantitative and qualitative analysis on organic compounds.	K2

Relationship Matrix for Relationship Matrix for CO, PO and PSO

Title of the Course: ALLIED CHEMISTRY PRACTICAL							Course Code: U2R2CHAC2P				
Course Outcomes (Cos)	Programme Outcomes(POs)					Programme Specific Outcomes (PSOs)					Mean Score of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	2	3	2	1	2	3	3	3	3	2	2.4
CO2	3	2	1	2	3	2	3	2	3	2	2.3
CO3	3	2	3	1	2	3	2	2	3	3	2.4
CO4	1	2	3	3	3	3	3	2	2	3	2.5
CO5	3	2	3	2	2	3	3	2	3	2	2.5
	Mean Overall Score										2.42
	Result										High

SEMESTER II

(2022-2023 முதல் சேர்க்கைப் பெற்றவர்களுக்கு உரியது)

தலைப்பு	: இடைக்கால இலக்கியம், இலக்கணம்	வரிசை எண்	: c2
பருவம்	: இரண்டாம் பருவம்	தாள் குறியீடு:	U2R2TL2
பிரிவு	: பகுதி ஐ தமிழ்	மதிப்புப் புள்ளி:	3
மதிப்பெண்	: CIA -25, EA -75	கற்றல் நேரம்:	5 மணி

நோக்கம் :

1. இடைக்கால இலக்கியம் கூறும் தத்துவங்களை மீட்டறியச் செய்தல்
2. சமயக்கல்வி மூலம் ஏற்படும் நல்லிணக்க நெறிகளைப் புரிந்துகொள்ளச் செய்தல்
3. வைணவ இலக்கியத்தை வாழ்வியலோடு ஒப்பிட்டு அறிய தூண்டுதல்
4. சிற்றிலக்கியத்திலுள்ள இலக்கியச் சுவையை எதார்த்த வாழ்வியலோடு பொருத்திப் பார்க்கச் செய்தல்
5. புதினம் உணர்த்தும் மனித உளவியல் கூறுகளை மதிப்பீடு செய்தல்

கூறு : 1 இலக்கியவரலாறு, இலக்கணம் (13hrs)

பக்தி இலக்கியங்கள் - பன்னிருதிருமுறைகள், நாலாயிரதிவ்யபிரபந்தம், சிற்றிலக்கியங்கள், இலக்கணம் - வழு, வழாநிலை, வழுவமைதி, இரட்டைக்கிளவி.

கூறு : 2 சைவ இலக்கியம் (13hrs)

திருஞானசம்பந்தர் தேவாரம் - திருச்சாயக்காடுபதிகம் (பாடல் : 100 -110), திருநாவுக்கரசர் - திருமழப்பாடிபதிகம் (பாடல் : 2567 - 2576), திருவாசகம் - அன்னைப்பத்து.

கூறு : 3 வைணவ இலக்கியம் (12hrs)

திருமங்கை ஆழ்வார் - பெரியதிருமொழி-பெரியதிருமந்திரத்தின் மகிமை, (பாடல் :948 -957) நாச்சியார் திருமொழி-குயிற்பத்து (பாடல் 545 -556) பூதத்தாழ்வார் - இரண்டாம் திருவந்தாதி (பாடல்: 2182 - 2191).

கூறு : 4 சிற்றிலக்கியங்கள், சித்தர் இலக்கியம் (12hrs)

முத்துக்குமாரசாமிபிள்ளைத் தமிழ் - முத்தப்பருவம் (4ஆவது பாடல்), வருகைப்பருவம் (2ஆவது பாடல்) திரிகூடராசப்பக் கவிராயர் - குறவஞ்சி வசந்தவள்ளிபந்தாடியது (முதல் நான்குபாடல்கள், தமிழ் விடுதாது -151-160 கண்ணிகள், பட்டினத்தார் பாடல்கள் - நெஞ்சொடுபுலம்பல் (1 - 10 பாடல்கள்).

கூறு : 5 நாவல் (10hrs)

பனையடி-ஆசிரியர் இரா.செல்வம்

பாடநூல்கள் :

பக்தி இலக்கியவரலாறு	-	துறைவெளியீடு
பனையடி (நாவல்)	-	இரா. செல்வம் ஜேனடர் சென்னை.

இப்பாடத்தினைக் கற்பதின் மூலம் மாணவர்கள் பெறும் பயன்கள்

Sl.No	Course Outcomes	Knowledge Level
CO1	பக்தி இலக்கியத் தோற்றத்தின் அவசியத்தைமீட்டுணர்வர்	K2
CO2	சைவ இலக்கியங்களில் காணலாகும் உயிர்ப்பரவல் உயிர் தோற்றம் போன்றவற்றை அறிவியல் கருத்துகளோடு பொருத்திகாண்பர்	K4
CO3	வைணவம் கூறும் மனிதத்தைப் போற்றி பின்பற்றுவர்	K3
CO4	சிற்றிலக்கியச் சுவையறிந்து செய்யுள் நலம் பாராட்டுவர்	K6
CO5	புதினம் காட்டும் புனிதத்தை உணர்ந்து பாத்திரப் பண்புகளைத் திறனாய்வுச் செய்வர்	K4

இடைக்கால இலக்கியம், இலக்கணம்						U2R2TL2					
Course Out comes	Programme Outcomes (POs)					Programme Specific Outcomes(PSOs)					Mean Score
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	2	3	2	2	3	2	3	1	2.3
CO2	3	3	3	1	2	3	3	3	2	2	2.4
CO3	2	2	2	1	2	2	2	2	1	1	1.7
CO4	3	2	2	3	2	3	3	2	3	2	2.5
CO5	3	3	3	3	2	3	3	2	3	2	2.7
Mean Overall Score											2.3
Result											High

SEMESTER II
(For the candidates admitted from the academic year 2022-2023)

Title of the Course : POETRY AND ENGLISH FOR COMMUNICATION
Category of the Course : PART-II ENGLISH
Course Code : U2R2EL2
Nature of the Skill : Reading and Study Skill
Marks: CIA: 25 +Ext: 75 = 100
Credits: 03
OBJECTIVES

Hrs / Week : 05
Total Inst. Hrs: 60

1	To give the learner a feel of poetry
2	To promote a perception of the aesthetic use of language
3	To revise a few aspects of grammar from a communicative angle
4	To provide reading and writing practice
5	To give practice in free writing.

Unit - I **(Inst. Hrs: 13)**

Shakespeare: All the World's a Stage... (lines 139-166) (The seven stages of Man)
As You Like It (Act II Scene VII)

Henry Wordsworth Longfellow: A Psalm of Life

Oliver Goldsmith: The Village Schoolmaster

Rabindranath Tagore: Where the mind is without Fear

John Masefield Laugh and Be Merry

Unit – II **(Inst. Hrs: 12)**

Rupert Brooke The Soldier

P.B. Shelley Ozymandias

Judith Wright The Company of Lovers

Sarojini Naidu The Queen's Rival

Unit - III **(Inst. Hrs: 15)**

Verbs –Infinitives and Gerunds - Modals - Tenses – Active &Passive - Direct and Indirect -
Clauses – Analysis and Transformation of sentences – Concord and Governance– Word order.

Unit - IV **(Inst. Hrs: 10)**

Note making – Arguments for and against Issues - Summarizing

(Inst. Hrs: 10)

Web Resources

<https://poemanalysis.com/henry-wadsworth-longfellow/a-psalm-of-life/#:~:text=Henry%20Wadsworth%20Longfellow-,Summary,matter%20of%20number%20and%20figures>

<https://www.litcharts.com/poetry/rupert-brooke/the-soldier>

<http://sumanabala.blogspot.com/2012/10/queens-rival-sarojini-naidu.html?m=1>

Course Name - Poetry and English for Communication	Course Code - U2R2EL2	Knowledge Level
On completion of the course, students will be able to		
CO1	interpret and appreciate simple poems.	K5
CO2	categories and respond to aspects of poetic language like deviance, figures of speech, etc.	K4
CO3	perceive features like tense and time reference, polysemy, ambiguity and paraphrase relations.	K5
CO4	construct ordinary dialogues , conversations and group discussions to suit real life situations.	K6
CO5	design communications in writing on ordinary matters like narrating an incident, describing a process, etc.	K6

Title of the Course : Poetry and English for Communication							Course code : U2R2EL2				
Course Outcome (CO)	Programme Outcome (PO)					Programme Specific Outcome (PSO)					Mean Score of COs
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO – 1	3	2	2	3	1	3	3	3	2	3	2.5
CO – 2	3	1	1	2	3	3	2	2	3	1	2.1
CO – 3	2	3	1	2	2	3	3	2	3	2	2.3
CO – 4	2	1	3	3	2	2	3	2	3	2	2.3
CO – 5	1	3	2	2	3	3	1	2	3	3	2.3
	Mean Overall Score										2.30
	Result										HIGH

SEMESTER II

Title of the course:	PLANT DIVERSITY - II (Pteridophytes, Gymnosperms & Paleobotany)	
Category of the course:	Core Course	
Course code:	U2R2BOCC3	
Nature of the course:	Skill Development	
Marks: CIA: 25 + Ext: 75 = 100		Hrs / Week: 6
Credits: 5		Total Inst. Hrs: 72

Course Objectives

- To learn the diversity of vascular cryptogams and their evolution.
- To understand the vegetative and reproductive features of vascular cryptogams.
- To know about the usage of fossils and to study the past plants.
- To study the geological time scale.
- To identify the economic importance of gymnosperms.

Unit – I: Pteridophytes –General characters, Classification and Reproduction (18 hours)

General characteristics of Pteridophytes. Classification of Pteridophyta (Reimer). Structure and reproduction of the taxa belonging to each of the following classes: Psilotopsida (*Psilotum*), Lycopsidea (*Lycopodium* / *Selaginella*), Sphenopsida (*Equisetum*), Pteropsida (*Adiantum*/ *Marsilea*).

Unit – II: Pteridophytes – Phylogeny and Economic importance (12 hours)

Stellar evolution in Pteridophytes. Heterospory and Seed Habits. Economic importance of Pteridophytes.

Unit – III: Gymnosperms – General characters and Classification (13 hours)

Classification of Gymnosperms (Smith/Sporne). General characteristics, structure and reproduction of Gymnosperms.

Unit – IV: Gymnosperms – Reproduction and Economic importance (14 hours)

Salient features, structure and reproduction of following orders: Cycadales (*Cycas*), Coniferales (*Pinus*). Gnetales (*Gnetum*). Economic importance: Oil, resin, timber, etc.

Unit – V: Paleobotany (15 hours)

Introduction to fossils and fossilization processes such as compression, casts, molds, petrification, impressions and coal balls. Geological time scale. Study of the following fossils: *Rhynia*, *Lepidodendron*, *Calamites* and *Williamsonia sewardiana*.

Books for References

1. Parihar, N.S. 1967 An introduction to Embryophyta vol. II. Pteridophyta. Central Book Depot, Allahabad
2. Sporne, K.R. 1976 Morphology of Pteridophytes. B.I. Publishers, New Delhi.

- Vashista, P.C. 1971 Botany for degree students: Pteridophyta. S. Chand & Co., New Delhi
- Vashista, P.C. 1978 Botany for degree students: Gymnosperms. S. Chand & Co., New Delhi.
- Sporne, K.R. 1965 Morphology of Gymnosperms-Hutchinson Co., Ltd., London.
- Chamberlain, C.A. 1986 Gymnosperms-Structure and Evolution, Publishers & Distributors.
- Arnold, C.A. 1947 An introduction to Palaeobotany. McGraw Hill Publisher.
- Sukla and S.P. Mishra 1982 Essentials of Palaeobotany. Vikas Publishing House.

Web Resources

- https://gurukpo.com/Content/B.SC/Pteridophytes_Gymnosperms_&Palaeobotany.pdf
- <https://www.easybiologyclass.com/pteridophytes-free-online-study-materials-tutorials-lecturenotes-ppts-mcqs/>
- <https://www.pteridoportal.org/portal/index.php>

Course Outcomes		K Level
After the completion of the course, students will able to		
CO 1	understand the basic knowledge on structure and classification of pteridophytes, gymnosperms and palaeobotany	K2
CO 2	analyze the reproduction and life cycles of pteridophytes, gymnosperms	K4
CO 3	realize the major classes and examples of vascular cryptogams	K2
CO 4	recognize the evolutionary feature of fossil and fossilization	K4
CO 5	learn the economic importance of pteridophytes and gymnosperms	K1

Relationship matrix for CO, PO & PSO

Course Outcome (CO)	Programme Outcome (PO)					Programme Specific Outcome (PSO)					
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO 1	3	2	2	2	2	3	2	3	2	2	23
CO 2	2	2	2	2	3	3	3	2	3	2	24
CO 3	3	2	2	2	2	3	3	2	2	2	23
CO 4	2	2	2	2	2	3	2	3	2	2	22
CO 5	2	1	2	2	2	3	2	2	2	3	21
											113

Mean overall Relationship is **2.26** which is **High**

SEMESTER II

Title of the course: MAJOR PRACTICAL - II

Category of the course: Core Course

Course code: U2R2BOCC4P

Nature of the course: Skill Development

Marks: CIA: 40 + Ext: 60 = 100

Hrs / Week: 5

Credits: 4

Total Inst. Hrs: 60

Course Objectives

- To learn the identification and description of specimens belonging to higher cryptogams.
- To learn the tissue system of vascular cryptogams
- To learn the anatomy of vascular cryptogams
- To learn slide preparation techniques of stelar plants.
- To understand the fossil plants by the permanent slides.

Pteridophytes

Study of morphology and anatomy of vegetative and reproductive parts of the following:

1. *Lycopodium*
2. *Selaginella*
3. *Equisetum*
4. *Marselia*

Gymnosperms

Study of morphology and anatomy of the vegetative and reproductive parts of the following:

1. *Cycas*
2. *Pinus*
3. *Gnetum*

Paleobotany

Study of internal morphology of the following fossils:

1. *Lepidodendron*
2. *Calamites* and
3. *Williamsonia* (Extinct and fossil forms)

SEMESTER II

Title of the Course	Allied Chemistry – II	Marks: CIA:25 + Ext:75=100
Category of the Course	Allied Course	Hrs/Week :04
Course Code	U2R2CHAC3	Total Inst. Hrs: 64
Nature of the Course	Skill Development	Sem:II

Course Objectives:

- To understand the chemistry of biomolecules.
- To learn the basic concepts of chemical analysis of water.
- To learn the basic concepts of types of errors.
- To learn the principles of analytical techniques like chromatography and calorimetry.
- To know the chemical structure and uses of various industrial products.

Unit– I Chemistry of Biomolecules

1.1 Classification of carbohydrates, glucose & fructose – preparation, properties – muta- rotation, Inter-conversion of glucose and fructose, manufacture of sucrose, test for sugars.

1.2 Amino acids – preparation and properties of glycine and alanine, peptides (elementary treatment) - proteins-classification based on physical properties and biological functions- structure of proteins – primary and secondary –Test for proteins.

1.3 Coordination compounds: biological role of haemoglobin and chlorophyll.

Unit–II Chemistry of Water

2.1 Water as a universal solvent–hardness of water- permanent and temporary hardness, disadvantages of hard water- DO, BOD and COD - definition, Methods of determination (any one method).

2.2 Water Softening methods - Zeolite process, Reverse Osmosis.

2.3 Preparation of Deionised water- Distilled water–Double Distilled water– Packaged drinking water.

Unit–III Basics of Quantitative Analysis

3.1. Error analysis: accuracy, precision, determinate and indeterminate errors, relative error, absolute error.

3.2. Quantitative analysis: Titrimetry- principle, acid-base titrations and redox titrations with examples -End point and equivalence point.

3.3. Theory of Indicators- Types of indicators - Quinonoid theory.

Unit - IV Analytical Techniques

4.1 Chromatography-introduction-principle, sampling and applications of paper, thin layer and column chromatography.

4.2 Photochemistry: Laws of Photochemistry, components of a colorimeter (Block diagram), application (estimation of iron).

4.3 Purification methods – Steam distillation, Vacuum Distillation, Fractional Distillation, Solvent extraction, Crystallization and Sublimation.

Unit -V Industrial Chemistry

5.1- Synthetic Polymers: Preparation, Properties and uses of Teflon, Polyester, Nylon-66 PVC, Polyethylene.

5.2 – Halogen containing compounds: Preparation and uses of Freons, CH_2Cl_2 , CHCl_3 , CCl_4 , Pesticides- DDT, BHC- Preparation and uses.

5.3- Fuel gases: Water gas, Producer gas, LPG, Gobar gas, Natural Gas- Manufacture and uses.

5.4- Cosmetics: Basic ingredients, Additives and fragrances used in Soaps, Toothpaste, Lipstick, Perfumes, Deodorants and Antiperspirants. Basic tests for identification of good and bad cosmetics - pH test.

Text Books

1. Tiwari K.S., Melhotra S.N., Vishnoi N.K, A Text book of Organic Chemistry, Vikas Publishing House Pvt. Ltd., New Delhi, 2017. **(Unit-I, V).**
2. R. Gopalan, P. S. Subramanian and K. Rengarajan, Elements of Analytical Chemistry, Sultan Chand and Sons, New Delhi, 1997. **(Unit- IV).**
3. Puri B.R., Sharma L. R., Kalia K.K, Principles of Inorganic Chemistry, 23rd Edition, New Delhi, Shoban Lal Nagin Chand & Co, 2107. **(Unit- I, III)**
4. Puri B.R., Sharma L. R., Kalia K.K, Principles of physical Chemistry, 23rd Edition, New Delhi, Shoban Lal Nagin Chand & Co, 2017. **(Unit-II).**
5. B.K. Sharma, Industrial Chemistry, Goel Publishing Co., 1997.

Reference Books

1. R.T. Morrison & R.N. Boyd, Study Guide to Organic Chemistry, Pearson Education, New Delhi, 2016.
2. R.L. Madan and G.D. Tuli, Inorganic Chemistry, S. Chand Co., Ltd., New Delhi, 2010
3. Gurdeep Raj, Advanced Physical Chemistry, Goel Publishing House, Meerut, 2016.

Course Outcomes:

CO No.	CO-Statements	Cognitive Level (K-Level)
On Successful completion of the course, students will be able to		
CO-1	Know the biological functions with the importance of biomolecules	K2
CO-2	Know the chemistry of water.	K3
CO-3	Know the types of errors and indicators in quantitative analysis	K4
CO-4	Explain the purification techniques and the basic concepts of various analytical techniques.	K5
CO-5	Describe the various industrial products.	K4

Relationship Matrix for CO, PO and PSO

Title of the Course: ALLIED CHEMISTRY-III							Course Code: U2R2CHAC3				
Course Outcomes (Cos)	Programme Outcomes(POs)					Programme Specific Outcomes (PSOs)					Mean Score of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	2	3	2	1	2	3	3	3	3	2	2.4
CO2	3	2	1	2	3	2	3	2	3	2	2.3
CO3	3	2	3	1	2	3	2	2	3	3	2.4
CO4	1	2	3	3	3	3	3	2	2	3	2.5
CO5	3	2	3	2	2	3	3	2	3	2	2.5
	Mean Overall Score										2.42
	Result										High

SEMESTER II

Title of The Course : Environmental Studies	Category of The Course : Ability Enhancement Compulsory Course (AECC)
Course Code : U2R2AECC1	Nature of The Skill : Skill Development
Marks : CIA : 25 + Ext: 75 = 100	Hrs / Week : 02
Credits : 2	Total Inst. Hrs : 24

COURSE OBJECTIVES

- To impart basic knowledge of various natural resources
- To understand the importance of ecosystem and biodiversity in Earth
- To be effective in Pollution & waste water management of our nation.
- To acquire knowledge on environmental issues & social issues.
- To gain the knowledge about population management.

UNIT I

Inst. Hrs: 5

The Multidisciplinary nature of environmental studies: Definition, scope and importance - Need of public awareness. **Natural Resources:** Renewable and non-renewable resource, Natural resources and associated problems.

- a) Forest resources: Use and over-exploitation, Deforestation, Case studies. Timber extraction, mining, Dams and their effects on forests and tribal people.
 - b) Water resources: use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams - benefits of and related problems.
 - c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
 - d) Food resources: World food problems, changes caused by agriculture and overgrazing, Effects of modern agriculture, fertilizer and pesticide problems, Water logging, salinity, case studies.
 - e) Energy resources: Growing energy needs, Renewable and non-renewable energy resources, use of alternate energy sources, case studies
 - f) Land resources: land as a resource, land degradation, man induced landslides, soil erosion desertification.
- Role of an individual in conservation of natural resources.
 - Equitable use of resources for sustainable lifestyle.

UNIT - II

Inst. Hrs: 5

Ecosystem: Concept of an ecosystem - Structure and functions of an ecosystem – Producers, Consumers and Decomposers - Energy flow in the ecosystem - Ecological succession - food chains, food webs and ecological pyramids. Types, characteristic feature, structure and functions of the following ecosystem: Forest ecosystems, Grassland ecosystems, Desert ecosystems and Aquatic ecosystems (Ponds, streams, lakes, rivers, oceans, estuaries).

Biodiversity:

Introduction - Definition: Genetic, species and ecosystem diversity. Biogeographical classification of India, Value of biodiversity: Consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, national and local levels, India as a mega-diversity nation, Hot-spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, Endangered and endemic species of India, Conservation of biodiversity: *In-situ* conservation and *ex-situ* conservation.

UNIT - III

Inst. Hours: 5

Environmental pollution:

Definition, causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Radioactive pollution.

Solid waste management:

Causes, effects and control measures of urban and industrial waste, Role of an individual in the prevention of pollution - pollution case studies - disaster management: floods, earthquakes, cyclones, landslides.

Effects of Fireworks:

Firework and celebrations, Health Hazards, Types of Fire, Firework and safety.

UNIT - IV

Inst. Hrs: 5

Social issues and Environment:

From unsustainable to sustainable development, urban problems related to energy, water conservation, rainwater harvesting, watershed management. Resettlement and rehabilitation of people: Its problems and concerns - case studies, Environment ethics; issues and possible solutions. Climate change, Global Warming, Acid Rain, Ozone Layer Depletion, Nuclear Accidents and Holocaust - Case studies.

Wasteland reclamation, Consumerism and waste products, Environment Protection Act - Air (prevention and control of pollution) Act, Water (prevention and control of pollution) Act - Wildlife Protection Act, Forest Conservation Act, Issues involved in the enforcement of environmental legislation. Public awareness.

UNIT - V**Inst. Hrs: 5****Human Population and the Environment:**

Population growth, variation among nations

Population explosion - Family Welfare Programmes;

Environment and human health

Human Rights and Value Education;

HIV/AIDS, Women and Child Welfare;

Role of Information Technology in Environment and Human Health;

Case Studies

Field work:

- Visit to a local area to document environmental assets: river / forest / grasslands/ hill / mountain.
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural
- Study of common plants, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc.

REFERENCE:

- Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd.,Ahmedabad – 380 013, India, Email:mapin@icenet.net (R)
- Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
- Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
- Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p.
- Manigandan G . 2020 Environmental Studies, PoGo publications, Trichy ISBN: 978-93-83069-36-1

COURSE OUTCOMES

Environmental Studies		Course Code : U2R2AECC1
S. No.	Course Outcome	Knowledge Level
Upon completion of course, the students will be able to		
CO - 1	Understand the resources of environment and its importance in detail.	K2
CO - 2	Get an in-depth knowledge about the nature of biodiversity.	K3
CO - 3	Apply their knowledge about solid waste management.	K3
CO - 4	Analyze various social issues & determining the solution from this.	K4
CO - 5	acquire knowledge on Human Population from case studies	K6

Relationship matrix for CO, PO and PSO

Course Outcome	Programme Outcome (PO)					Programme Specific Outcome (PSO)					
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO5	Mean
CO-1	3	2	2	2	2	3	3	2	2	3	2.4
CO-2	2	3	3	2	2	2	2	2	2	2	2.2
CO-3	2	3	3	1	3	2	3	3	3	3	2.6
CO-4	3	2	3	1	2	2	2	2	2	2	2.1
CO-5	2	2	2	3	3	3	1	3	3	2	2.4
Mean Overall Score											2.34
Result											High

SEMESTER III

(2022 – 2023ஆம் கல்வியாண்டு முதல் சேர்க்கைப் பெற்றவர்களுக்குரியது)

தலைப்பு :	காப்பிய இலக்கியம், இலக்கணம்	வரிசைஎண் :	c3
பருவம் :	மூன்றாம் பருவம்	தாள் குறியீடு :	U3R2TL3
பிரிவு :	பகுதிஐ தமிழ்	மதிப்புப் புள்ளி :	3
மதிப்பெண் :	CIA -25, EA -75	கற்றல் நேரம் :	5 மணி

நோக்கம்

1. தமிழில் காப்பியங்களை அறிமுகப் படுத்துதல்.
2. காப்பியங்கள் கூறும் வாழ்வியல் அறங்களை உயர்த்துதல் .
3. புராணங்கள் வழி வாழ்வியல் தத்துவத்தை மதிப்பீடு செய்தல்.
4. சமயக் காப்பியத்தின் மூலம் வாழ்வின் பன்முகத் தன்மையை வரையறுத்துக் கூறுதல்.
5. காப்பிய, நாடக இலக்கியங்களுக்கு இடையிலான ஒற்றுமை. வேற்றுமைகளைப் பகுப்பாய்ச் செய்தல்.

கூறு : 1 இலக்கியவரலாறு, இலக்கணம்

(12hrs)

இலக்கியவரலாறு - ஐம்பெருங்காப்பியங்கள், ஐஞ்சிறுகாப்பியங்கள் - பிறகாப்பியங்கள்
நாடகத்தின் தோற்றமும் வளர்ச்சியும், இன்றையநிலை. இலக்கணம் - மூவிடப் பெயர்கள்
தன்மை, முன்னிலை, படர்க்கை.

கூறு : 2 காப்பியங்கள்

(12hrs)

சிலப்பதிகாரம் - கணாத்திரம் உரைத்தகாதை, மணிமேகலை - கந்திந்பாவை வருவது
உரைத்தகாதை, சீவகசிந்தாமணி - சுரமஞ்சரியார் இலம்பகம் - 42 பாடல்கள் (1-7, 14,
17 - 36, 44 - 47, 57 - 62, 64 - 68).

கூறு : 3 இதிகாசம், புராணம்

(12hrs)

கம்பராமாயணம் - குகப்படலம் (1 - 23 பாடல்கள்) பெரிபுராணம் - சண்டேசுவரநாயனார்
புராணம் (1, 8 - 12, 30 - 42, 51 - 59) வில்லிபாரதம் - உலூகன் தூது சருக்கம் (1 -
21 பாடல்கள்)

கூறு : 4 பிறகாப்பியங்கள்

(12hrs)

இராவணக் காவியம் - விந்தக்காண்டம் - தசரதப்படலம் (1-27 பாடல்கள்).
சீறாப்புராணம் - ஈத்தங்குலை வரவழைத்தப் படலம் (1-17 பாடல்கள்), தேம்பாவணி -
நீர்வரம் அடைந்தபடலம் (1-19 பாடல்கள்)

கூறு : 5 நாடகம்

(12hrs)

பதினெட்டாம் போர் (கூவாகத்தில் கொலுவிருக்கும் அரவான் புகழ் கூறும் நாடகம்),
ஆசிரியர் முத்துவேலழகன்.

பாடநூல்கள்:

சிலப்பதிகாரம் மூலமும் உரையும்	-	ச. வே. சுப்பிரமணியன், கங்கை புத்தகநிலையம்
மணிமேகலை மூலமும் உரையும்	-	ஸ்ரீசந்திரன், வர்த்தமானன் பதிப்பகம், சென்னை
சீவகசிந்தாமணி மூலமும் உரையும்	-	ஞா. மாணிக்கவாசகம், மாணிக்கவாசகர் பதிப்பகம்,
இராவணகாவியம்	-	புலவர் குழந்தை, வேலா பதிப்பகம், ஈரோடு
பதினெட்டாம் போர்	-	முத்துவேலழகன், சீதைபதிப்பகம், சென்னை

இப்பாடத்தினைக் கற்பதின் மூலம் மாணவர்கள் பெறும் பயன்கள்

Sl.No	Course Outcomes	Knowledge Level
CO1	காப்பிய இலக்கியத்தின் தலைமைப் பண்புகளை அறிவர்	K2
CO2	காப்பியக் கதைகள் வழி அறச்சிந்தனைகளை உணர்வர்	K2
CO3	பல்வேறு வகையான காப்பியவடிவங்களில் இடம்பெறும் பொருண்மையைப் பாகுபடுத்தி அறிவர்	K3
CO4	சமூகவளர்ச்சிக்குச் சமயக் காப்பியங்களின் பங்களிப்பை மதிப்பீடு செய்வர்.	K5
CO5	தமிழ்ச் சமூகவளர்ச்சியோடு நாடகக்கலை தொடர்ந்துவரும் காலச்சூழலை ஆராய்ந்துணர்வர்	K6

காப்பிய இலக்கியம், இலக்கணம்						U3R2TL3					
Course Out comes	Programme Outcomes (POs)					Programme Specific Outcomes(PSOs)					Mean Score
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	2	2	3	3	3	3	3	3	3	2	2.7
CO2	3	3	3	2	2	3	3	2	2	1	2.4
CO3	3	2	3	2	3	2	3	3	3	1	2.5
CO4	3	3	3	2	3	3	3	3	2	1	2.6
CO5	3	2	3	3	2	3	3	2	2	1	2.4
Mean Overall Score											2.52
Result											High

SEMESTER III

Title of the Course : DRAMA AND ENGLISH FOR COMPETITIVE EXAMINATIONS
Category of the Course : PART-II ENGLISH
Course Code : U3R2EL3
Nature of the Skill : Comprehension and Appreciation
Marks : CIA: 25 +Ext: 75 = 100 **Hrs / Week : 05**
Credits : 03 **Total Inst. Hrs: 60**

OBJECTIVES:

1	To introduce the learner to living language in dramatic situations
2	To enable the student to see the special features of dramatic language
3	To give the class practice in proper reading with correct stress and intonation
4	To enable the learner to perceive the structure of paragraphs and passages
5	To promote skills in dialogue writing and precise writing and make them see the elements of sentence and paragraph structure

Unit I

(Inst. Hrs: 15)

Shakespeare 1.Trial for a Pound of Flesh
(The Merchant of Venice)
2. Forum scene (Julius Caesar)

Edith M Barling His Majesty Masquerades

Unit II

(Inst. Hrs: 15)

Fritz KarinthyThe Refund

Anton Chekov The Bear

Ella Adkins The Expected

Unit III

(Inst. Hrs: 14)

Note making - Precis Writing – Rhetorical features – The dynamics of communication – Field – Mode – Interpersonal context – Greetings, Partings, Fillers and Tonal variations

Unit IV

(Inst. Hrs: 06)

Dialogue Writing - Writing Interviews -Group Discussions

(Inst. Hrs: 10)

Web Resources

<https://www.sparknotes.com/shakespeare/juliuscaesar/section7/>

<https://educationallodge.com/2021/01/the-bear-by-anton-chekhov-summary-characters-questions-answers.html>.

OUTCOME:

Course Name – Drama and English for Competitive Examinations	Course Code - U3R2EL3	Knowledge Level
On completion of the course, students will be able to		
CO1	analyse the force of dramatic language, improve their histrionic abilities and pronunciation skills.	K5
CO2	perceive subtle differences in language use and their tonal implications.	K5
CO3	develop skills of logical reasoning and become capable of identifying markers of coherence and concord.	K6
CO4	construct ordinary dialogues and conversations in real life.	K6
CO5	estimate ideas and situations and ways of expressions to construct written messages.	K5

Relationship Matrix for CO, PO, PSO

Title of the Course : DRAMA AND ENGLISH FOR COMPETITIVE EXAMINATIONS						Course code : U3R2EL3					
Course Outcome (CO)	Programme Outcome (PO)					Programme Specific Outcome (PSO)					Mean Score of COs
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO – 1	3	2	1	3	3	2	3	3	3	2	2.5
CO – 2	2	3	1	2	2	2	3	1	2	3	2.1
CO – 3	2	3	1	2	3	3	3	2	3	3	2.5
CO – 4	2	3	3	1	2	3	2	3	3	2	2.4
CO – 5	2	3	2	3	3	2	3	2	2	3	2.5
	Mean Overall Score										2.30
	Result										HIGH

SEMESTER III

Title of the course:	ANATOMY AND EMBRYOLOGY OF ANGIOSPERMS
Category of the course:	Core Course
Course code:	U3R2BOCC5
Nature of the course:	Skill Development
Marks: CIA: 25 + Ext: 75 = 100	Hrs / Week: 5
Credits: 5	Total Inst. Hrs: 60

Course Objectives

- To inculcate the primary tissues and anatomical features of plants.
- To instruct the knowledge about the embryology of Angiosperms.
- To understand the primary, secondary & anomalous, anatomical structure of plant parts.
- To know the various types of pollination mechanism.
- To study the fertilization process in angiosperms.

Unit – I: Tissues – structure, classification and functions (12 hours)

Structure and function of simple & complex tissues. Meristematic tissues: definition, structure, function & classification. Apical organization and theories: apical cell theory, Histogen theory & Tunica – Corpus theory. Root apex: Histogen theory & Korper-Kappe theory. Secretory tissues: external glands & nectarines and laticifers.

Unit – II: Anatomy – Structure of monocot and dicot root, stem and leaves (12 hours)

Tissue systems: Primary structure of root, stem & leaves. Epidermal tissue system: epidermis, cuticle, trichome, stomata, bulliform cells, cork and silica cells. Ground tissue systems: cortex, endodermis, pericycle, pith & pith rays. Vascular tissue systems: different types of vascular bundles and their arrangement in root and stem.

Unit – III: Anatomy – Anomalous structure of monocot and dicot stem (12 hours)

Nodal anatomy: leaf trace, leaf gap, branch trace and branch gap. Stem thickening in monocots and dicots, Dicot root thickening. Anomalous secondary growth of *Stem-Bougainvillea*, *Bignonia*, *Nyctanthes* and *Dracaena*. Periderm structure and development: Phellem, Phellogen, Phelloderm, Rhytidome and lenticels.

Unit – IV: Embryology – Development of gametes and ovule (14 hours)

Structure and development of anther-microsporogenesis, development of male gametophyte, dehiscence of anther, structure of pollen and its germination, and viability. Structure and types of ovule, development of ovule –megasporogenesis, development of an embryosac –monosporic (*Polygonum* type), bisporic (*Allium* type) and tetrasporic (*Peperomia* type).

Unit – V: Embryology – Fertilization, Endosperm and Polyembryony (10 hours)

Structure of mature embryo sac, double fertilization, apomixis. Development of an endosperm and embryo in dicots and monocots, polyembryony, structure of fruit and seed.

Books for References

1. Tayal, M.S., Plant Anatomy, 3rd edition, 2012. Rastogi Publications, Meerut.
2. Pandey, B.P., 1978, Plant Anatomy, S.Chand & Co., New Delhi,
3. Vasishta, P.C., A Text Book of Plant Anatomy, Pradeep Publications, Jullunder.
4. Esau, K., 1975, Plant Anatomy, Wiley Eastern Private Ltd., New Delhi.
5. Fahn, A., 1974, Plant Anatomy, Pergoman Press, Oxford.
6. Bhojwani, S.S. and Bhatnagar, S.P., 1974 The embryology of Angiosperms, Vihas Publishing House, New Delhi.
7. Johri, B.M. 1984 Embryology of angiosperm. Springer-Verlag, Berlin.
8. Dwinedi, J.N., 1988, Embryology of Angiosperms, Rastogi and Co., Meerut.
9. Singh, V., Pande, P.C., Jain, D.K., Embryology of Angiosperms, 2010-11, Rastogi Publications, Meerut.
10. Maheswari, P., 1971, An introduction to Embryology of Angiosperms, Tata McGraw Hill Publishing Co.Ltd, New Delhi.
11. Swamy, B.G.L. and Krishnamurthy, K.V., From Flower to Fruit, Tata McGraw Hill Publishing Company Ltd., New Delhi.

Web Resources

1. <https://www.biology-pages.info/P/PlantTissues.html>
2. https://academic.oup.com/plcell/article/16/suppl_1/S46/6010562
3. <http://mgcub.ac.in/pdf/material/20200501064652545422c4ae.pdf>

Course Outcomes		K Level
After the completion of the course, students will able to		
CO 1	Obtain knowledge on tissues of root, stem and leaves	K2
CO 2	Understand the primary and secondary anatomical structure of plants	K4
CO 3	learn the economic importance of commercial wood species	K2
CO 4	acquire the knowledge on development of male and female gametophytes	K4
CO 5	attain the knowledge on fertilization, development of endosperm and polyembryony	K2

Relationship matrix for CO, PO & PSO

Course Outcome (CO)	Programme Outcome (PO)					Programme Specific Outcome (PSO)					
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO 1	2	2	2	2	2	3	2	2	2	2	21
CO 2	2	2	2	2	2	2	2	3	2	2	21
CO 3	2	2	2	2	2	3	3	2	2	2	22
CO 4	3	2	2	2	2	2	2	2	3	2	22
CO 5	2	2	2	1	3	2	1	2	2	3	20
											106

Mean overall Relationship is **2.12** which is **Medium**

SEMESTER III

Title of the course: MAJOR PRACTICAL - III

Category of the course: Core Course

Course code: U3R2BOCC6P

Nature of the course: Skill Development

Marks: CIA: 40 + Ext: 60 = 100

Hrs / Week: 5

Credits: 4

Total Inst. Hrs: 60

Course Objectives

- To observe internal organization of plant body.
- To understand primary, secondary and anomalous, anatomical structure of plant parts.
- To observe the pollen morphology and types of pollens.
- To acquire knowledge about the embryology of Angiosperms
- To know the various types of pollination mechanism

Anatomy:

Preparation of Transverse Sections of the following plant parts to observe and record the internal structure.

1. Monocot and Dicot stem
2. Monocot and dicot Root
3. Monocot and Dicot leaf
4. Normal secondary thickening in Dicot stem.
5. Anomalous secondary thickening in *Boerhaavia* and *Dracaena* stem.
6. Nodal anatomy: unilacunar & trilacunar.

Embryology:

1. T.S. of anther (young and mature)
 2. Pollen types
 3. L.S. of ovule
 4. Types of ovules - orthotropous and anatropous.
 5. Dicot Embryo Dissection.
- **Submission of semi-permanent slide at least five per students**

SEMESTER III

Title of the Course:	ALLIED ZOOLOGY (Zoology Theory - I)	
Category of the course:	Allied Course	
Course code:	U3R2BOAC3	
Nature of the course:	Skill Development	
Marks: CIA: 25 + Ext: 75 = 100		Hrs / Week: 4
Credits: 2		Total Inst. Hrs: 48

Course Objectives

- To study the basic concept of zoology
- To learn the human pathogens and diseases
- To study the various system of human physiology
- To study the circulatory system of animal
- To learn the reproductive and nervous system of animal

Unit – I: Nomenclature and Classification (10 Hours)

Basic principles of zoological taxonomy and nomenclature. General classification of the animal kingdom (up to phylum with examples). Salient features of all phyla Prochordates- Vertebrates (Classes: Pisces, Amphibia, Reptilia, Aves and Mammalia)

Unit – II: Human pathogens and diseases (8 Hours)

Type study of *Plasmodium vivax*, *Taenia solium* and *Ascaris lumbricoids* – morphology and life history. General topics – Parasite adaptation of Helminthes/Nematodes.

Unit – III: Human Physiology (10 Hours)

Principles of human physiology: Digestion - physiology of digestion, absorption and excretion/ – accessory glands and their role. Respiration: transport of oxygen and carbon dioxide. Excretion: structure of a nephron, physiology of urine formation

Unit – IV: Circulatory system and Muscle (10 Hours)

Circulation – structure and working of heart. Blood: types of blood cells, functions of plasma proteins. Blood grouping. Muscles: types and structure.

Unit – V: Reproductive, Nervous system and Deficiencies (10 Hours)

Hormones: types. Reproduction – male and female reproductive organs, Nervous system: Structure of neuron; Types of neurons; nerve impulse transmission, synaptic transmission.

Books for references

1. Ambrose, PD. 2004. The Insect: Structure, function and biodiversity, First edition. Kalyani Publishers, New Delhi.
2. Daly, HV, Doyen, JT. & Ehrlich, PR. 1998. Introduction to Insect Biology Diversity, First Edition, McGraw Hill Book, New York.

3. Vasantharaj D B & Kumaraswami, T. 1978. Elements of Economic Entomology, Popular Book Department, Chennai.
4. Nayar, KK., Ananthakrishnan, TN. & David, BV. 1976 General and Applied Entomology, Tata McGraw Hill, New Delhi.
5. Imms, AD. 1963. General Text Book of Entomology, Asia Publ House, New Delhi.

Course Outcomes		K Level
After the completion of the course, students will able to		
CO 1	acquire the basic knowledge animal biology	K2
CO 2	analyze the reproduction and nervous system of animals	K4
CO 3	understand important systems of animals	K2
CO 4	Understand the role of invertebrates in human well-being	K3
CO 5	Identify the physiological functions of various human organ system	K4

Relationship matrix for CO, PO & PSO

Course Outcome (CO)	Programme Outcome (PO)					Programme Specific Outcome (PSO)					
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO 1	2	2	2	2	2	3	2	2	3	2	22
CO 2	2	2	2	2	2	2	2	3	2	2	21
CO 3	2	2	2	2	2	2	3	2	2	2	21
CO 4	2	2	2	2	2	3	2	3	2	3	23
CO 5	1	2	2	2	2	2	3	2	3	2	21
											108

Mean overall Relationship is **2.16** which is **Medium**

SEMESTER III

Title of the Course:	ALLIED ZOOLOGY (Allied Practical – II)	
Category of the course:	Allied Course	
Course code:	U3R2BOAC4P	
Nature of the course:	Skill Development	
Marks: CIA: 25 + Ext: 75 = 100		Hrs / Week: 4
Credits: 2		Total Inst. Hrs: 48

Course Objectives

- To dissect the mouth parts of cockroach
- To learn the organelle system of insects and fishes
- To learn the mounting techniques of insects, worms and fishes
- To study the morphology of invertebrates
- To learn the commercial importance of silk thread and vermicompost

Dissection

Cockroach: Digestive and nervous systems \ **Earthworm:** nervous system and body setae.
Fish: Digestive system

1. Effects of temperature on salivary amylase activity.
2. Blood grouping and determination of Rh factor
3. Qualitative estimation of excretory products -Nitrogenous waste: Ammonia-fishes, Urea-cow, Uric acids- birds.

Mountings\Slide preparation

Mouth parts – Cockroach and Mosquito

Earthworm - Body setae

Fish- Placoid scales and Fins

Species of animals used in Vermiculture - *Eisenia fetida* and *Lampito maruitii*

Apiculture – *Apis indica*, Sericulture – *Bombyx mori*, Aquaculture - Major carps: Catla, Rohu and Mirgal.

Animal products: Honey, Bees wax, Lac, Silk, and Hen's egg.

Spotters

Invertebrates : *Amoeba*, *plasmodium*, *Aurelia*, Liver fluke, Tapeworm, *Nereis*, *Taenia-scolex*, *Ascaris*- male & female, Cockroach, Prawn, Star fish

Chordates: Amphioxus, Shark, Teleost Fish, Frog, Pigeon, Snake, and Rat

Commercial Importance: Mulberry leaves, Silk thread and Vermicompost

Record Note

SEMESTER III

Title of the Course	: VALUE EDUCATION	
Category of the Course	: Ability Enhancement Compulsory Course-II	
Course Code	: U3R2AECC2	
Nature of the Skill	: Life Skills	
Marks	: CIA: 25 +Ext: 75 = 100	Hrs / Week : 02
Credits	: 02	Total Inst. Hrs: 24

OBJECTIVES:

1	To sensitize learners to the need for values in human life.
2	To make them aware of the need for values in all roles of life.
3	To make them see the need for value-education.
4	To make them realize the noble values as basis of all religions.
5	To sensitize them to the need for gender equity and social justice.

UNIT I - PHILOSOPHY OF LIFE

(Inst. Hrs: 05)

Life - Principles of Living - Laws of Nature - Protection of all living organisms -Conservation of natural resources - Individual qualities and Social Welfare. (Thirukural No:- 629, 46, 131, 374, 322, 16)

UNIT II - PERSONAL VALUES

(Inst. Hrs: 05)

Culture – Self -Analysis – Right Desires – Avoidance of Worries – Benefits of Blessings – Merits of Friendship – Love and Compassion – Personal Harmony and Peace. (Thirukural No:- 72, 158, 629, 786, 76, 318)

UNIT III – SOCIAL VALUES

(Inst. Hrs: 05)

Family – Family Peace – Society –Way of Living – Principles of Brotherhood – Status of Woman - Five types of Duties towards Family, Society, Country, World and Environment – Business and Economic roles – Social hygiene - Education – Politics – Duties and Responsibilities of Citizens – World Peace. (Thirukural No:-45, 1025, 446, 952, 807, 56, 43, 754, 298, 400, 691, 37, 572)

UNIT IV – TAPPING AND CULTIVATING THE MIND

(Inst. Hrs: 05)

Potential of Mind - Personality – Mind and Body – Creativity and Positivity – The Centrality of the Mind – Astral and Physical Bodies – Knowledge of the divine and quest for perfection - Life Force – Tapping the Life Force – Perceiving the Kernel- Realization of Self- Stream of Consciousness – Hierarchy of Self motivation- Meditation – Spiritual Values. (Thirukural No:- 457, 261, 423)

UNIT V – PRESERVING THE BODY HEALTH

(Inst. Hrs: 04)

Structure of human body – Three States of Living – Relationship between body and spirit – Natural Causes for Bodily Diseases – Man-made causes for diseases – Preventive and Curative

Value Education, Vethathiri Publications

Course Name: VALUE EDUCATION	Course Code: U3R2EGAEC2	Knowledge Level
On completion of the course, students will be able to		
1	develop into balanced individuals.	K6
2	function as responsible members in society.	K4
3	apply physical and psychological energy in creative living.	K3
4	take up leadership roles in confidence.	K3
5	judge right and wrong with perspicacity.	K5

Title of the Course : VALUE EDUCATION						Course code : U3R2EGAEC2					
Course Outcome (CO)	Programme Outcome (PO)					Programme Specific Outcome (PSO)					Mean Score of COs
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO – 1	2	3	3	2	3	3	2	3	2	3	2.6
CO – 2	3	2	3	2	2	3	2	2	2	1	2.2
CO – 3	2	3	2	3	2	2	2	2	2	3	2.3
CO – 4	3	3	3	2	3	2	2	3	2	1	2.4
CO – 5	2	2	3	3	2	2	3	3	3	2	2.5
	Mean Overall Score										2.40
	Result										HIGH

SEMESTER IV

(2022 – 2023ஆம் கல்வியாண்டு முதல் சேர்க்கைப் பெற்றவர்களுக்குரியது)

தலைப்பு	: சங்க இலக்கியம், இலக்கணம், அறிவியல் தமிழ்	வரிசைஎண்	: c4
பருவம்	: நான்காம் பருவம்	தாள் குறியீடு	: U4R2TL4
பிரிவு	: பகுதி ஐ தமிழ்	மதிப்புப் புள்ளி	: 3
மதிப்பெண்	: CIA -25, EA -75	கற்றல் நேரம்	: 5 மணி

நோக்கம்

1. சங்க இலக்கியங்களின் பின்னணிச் சூழலை அறியச் செய்தல்.
2. தமிழர்களின் வாழ்வியல் கூறுகளைப் புரிந்துகொள்ளல்.
3. அகவாழ்வியலில் கடைபிடிக்க வேண்டிய நெறிமுறைகளை வகுத்துக் கொள்ளல்.
4. தமிழ் இலக்கியத்தோடு அறிவியல் தமிழை ஒப்பிட்டுப் வேறுபடுத்தியும் பார்க்கும் திறன் வளர்த்தல்.
5. ஆக்கத்திறனைக் கண்டறியும் வழிமுறைகளை உருவாக்குதல்.

கூறு: 1 இலக்கியவரலாறு, இலக்கணம்

(12hrs)

சங்க இலக்கியவரலாறு-பதினெண் மேற்கணக்கு நூல்கள் - செம்மொழி இலக்கிய வரலாறு-செம்மொழிப் பண்புகளஇ செம்மொழி நூல்கள் இலக்கணம் - வழுஇ வழுவுமைதி, வழாநிலை

கூறு: 2 அகஇலக்கியம்

(12hrs)

குறுந்தொகை-ஐந்துபாடல்கள் - (பாடல்-38இ 54இ 68இ 74இ 82) நற்றிணை - இரண்டுபாடல்கள் (பாடல் 156இ 228) ஐங்குநாறு - இளவேனிற் பத்து அகநானூறு- இரண்டுபாடல்கள் (23இ31) பாலைத்திணைத் தலைவிக் கூற்று கலித்தொகை- இரண்டுபாடல்கள் (126இ132) தோழிக் கூற்று

கூறு: 3 புறமும் பாட்டும்

(12hrs)

பத்துப்பாட்டு-மதுரைக்காஞ்சி 58 வரிகள் (பாடல் 725 - 782) புறநானூறு - 10 பாடல்கள் 201இ 202இ236இ237இ247இ308இ373இ382இ386இ400

கூறு: 4 அறிவியல் தமிழ் - செயல்முறை(12hrs)

அறிவியல் தமிழ் - கலைச் சொல்லாக்கம் - ஒலிபெயர்ப்பு-சீர்மையாக்கம் - தரப்படுத்தம்

கூறு: 5 அறிவியல் தமிழ் - பயன்முறை(12hrs)

அறிவியல் கட்டுரைகள் - துறைச் சார்ந்தக் கருத்துகளைத் தமிழில் (கலைச்சொற்களுடன்) உருவாக்கப் பயிற்சி அளித்தல்

பாடநூல்கள் :

சங்கத் தமிழ்	-	தஞ்சை தமிழ்ப் பல்கலைக்கழக வெளியீடு
அறிவியல் தமிழ் கலைச்சொல்லாக்கம்	-	முனைவர் இராதா செல்லப்பன்

இப்பாடத்தினைக் கற்பதின் மூலம் மாணவர்கள் பெறும் பயன்கள்

Sl.No	Course Outcomes	Knowledge Level
CO1	இலக்கியங்களின் மூலம் வாழ்வியல் நெறிமுறைகளை அறிவர்	K2
CO2	ஐந்திணையின் பாகுபாட்டுத் தன்மையை இனங்காண்பர்	K2
CO3	துணிமனித ஒழுக்கம் பண்பாட்டுநெறிமுறைகளை வளர்த்துக் கொள்வர்	K3
CO4	அறிவியல் தமிழின் அவசியத்தை உய்த்துணரும் ஆற்றல் பெறுவர்	K5
CO5	படைப்பாளனுக்குரியத் தகுதியை வளர்த்துக் கொள்வதற்கானப் பயிற்சிகளை மேற்கொள்வர்	K6

சங்க இலக்கியம், இலக்கணம், அறிவியல் தமிழ்						U4R2TL4					
Course Out comes	Programme Outcomes (POs)					Programme Specific Outcomes(PSOs)					Mean Score
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	2	3	2	2	3	2	3	1	2.3
CO2	3	3	3	1	2	3	3	3	2	2	2.4
CO3	2	2	2	1	2	2	2	2	1	1	1.7
CO4	3	2	2	3	2	3	3	2	3	2	2.5
CO5	3	3	3	3	2	3	3	2	3	2	2.7
Mean Overall Score											2.3
Result											High

SEMESTER IV

Title of the Course	: SHORT STORIES AND ENGLISH FOR COMPETITIVE EXAMINATIONS		
Category of the Course	: PART-II ENGLISH		
Course Code	: U4R2EL4		
Nature of the Skill	: Reading and Analytical Skills		
Marks	: CIA: 25 +Ext: 75 = 100	Hrs / Week	: 05
Credits	: 03	Total Inst. Hrs:	60

OBJECTIVES

1	To enable the learner to respond to short fiction.
2	To sensitize the learner to identify the elements of fiction.
3	To enable the learner to write short reviews paragraph and essays.
4	To give them practice in contextualized letter writing, making presentations and writing reports.
5	To enable them to identify error zones and correct sentences.

Unit – I (Inst. Hrs: 10)

Tagore	Suba
R.K. Narayan	An Astrologer's Day
Anita Desai	A Devoted Son

Unit - II (Inst. Hrs: 10)

O'Henry	A Retrieved Reformation
Arthur Conan Doyle	The Blue Carbuncle
Maupassant	Simon's Pa

Unit - III (Inst. Hrs: 10)

Paragraph Writing - General Essay, Book review, Film review

Unit – IV (Inst. Hrs: 15)

Replying to Letters - Letter Chains - Presentations –Visuals and their interpretations - Reports

Unit - V (Inst. Hrs: 15)

Error Zone Identification - Correction of Sentences, Speech Writing – Expository Argumentative, Descriptive and Narrative – Fallacies and their avoidance.

Web Resources

<https://bookishloom.wordpress.com/2018/10/01/subha-by-rabindranath-tagore-my-read/#:~:text=Tagore%20portrayed%20the%20everyday%20agonies,central%20character%2C%20%27Subha%27>

<https://smartenglishnotes.com/2019/05/31/the-white-flower-by-r-k-narayan-summary-explanations-and-question-solutions/>

<https://digestablewords.wordpress.com/short-story-a-devoted-son-by-anita-desai/>

<https://www.toppr.com/guides/english/english-literature/ozymandias-summary/>

<https://americanliterature.com/author/guy-de-maupassant/short-story/simons-papa>

OUTCOME:

Course Name- Fiction and English for Competitive Examinations	Course Code - U4R2EL4	Knowledge Level
On completion of the course, students will be able to		
CO1	adapt study habits to face competitive examinations with confidence.	K6
CO2	appraise the themes and structure of fiction through independent reading .	K5
CO3	justify their perceptions on characters ,themes and aspects of fiction.	K5
CO4	categorize and correct errors in usage.	K4
CO5	design the style of communication as needed.	K6

Relationship Matrix for CO, PO, PSO

Title of the Course: Fiction and English for Competitive Examinations.							Course code : U4R2EL4				
Course Outcome (CO)	Programme Outcome (PO)					Programme Specific Outcome (PSO)					Mean Score of COs
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO – 1	2	3	3	2	1	2	3	3	3	2	2.4
CO – 2	3	2	1	3	2	3	2	3	2	2	2.3
CO – 3	1	2	2	1	3	3	3	2	3	3	2.3
CO – 4	2	3	3	2	3	2	3	2	2	2	2.4
CO – 5	2	3	3	2	3	2	2	3	2	1	2.3
	Mean Overall Score										2.34
	Result										HIGH

Title of the course:	MORPHOLOGY, TAXONOMY OF ANGIOSPERMS & ECONOMIC BOTANY	
Category of the course:	Core Course	
Course code:	U4R2BOCC7	
Nature of the course:	Employability	
Marks: CIA: 25 + Ext: 75 = 100		Hrs / Week: 6
Credits: 5		Total Inst. Hrs: 72

Course Objectives

- To observe the variations among plants, especially angiosperms.
- To understand the way of nomenclature and classifying the plants.
- To learn about various modification and its purpose in plant parts.
- To study the salient feature of angiosperms families
- To learn the economic importance of angiosperms

Unit – I: Morphology of Angiosperms (15 hours)

Morphology of Plant: Root and root modifications. Stem and stem modifications. Leaf and leaf modifications, Phyllotaxy. Inflorescence and its types. Description of floral parts (Calyx, Corolla, Androecium and Gynoecium), floral diagram, floral formula. Fruit and its outline classification.

Unit – II: Classification of Angiosperms (15 hours)

History, Scope and Importance of Plant Taxonomy, System of classification: Artificial system (Carl Linnaeus), Natural system (Bentham & Hooker), Phylogenetic system (Engler&Prantl), APG IV system. Taxonomic hierarchy. Principles of Cytotaxonomy, Chemotaxonomy, Numerical taxonomy and Molecular taxonomy.

Unit – III: Nomenclature & Taxonomic evidences (15 hours)

Binomial Nomenclature, International Code of Nomenclature for Algae, Fungi and Plants, Rules of ICN. Taxonomic keys. Herbarium methodology. Botanical Survey of India (BSI). Characters and sources of Taxonomic Evidences.

Unit – IV: Angiosperm families (15 hours)

Detailed study on salient features, description, distribution and economic importance of the families: Nymphaeaceae, Annonaceae, Araceae, Commelinaceae, Cyperaceae, Phyllanthaceae, Amaranthaceae, Rutaceae, Malvaceae, Rubiaceae.

Unit – V: Families & Economic Botany (12 hours)

Apocynaceae, Convolvulaceae, Solanaceae, Lamiaceae, Asteraceae, Economic importance of Cereals, Pulses, Fibre, Resins and Oils yielding plants.

Books for References

1. Lawrence GHM. 1967. Taxonomy of Vascular Plants. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Sambamurthy AVSS. 2005. Taxonomy of Angiosperms. I.K. International Pvt. Ltd., New Delhi.
3. Bharati Bhattacharyya. 2005. Systematic Botany. Narosa Publishing House, Delhi.
4. Gupta RK. 2006. Text Book of Systematic Botany. CBS Publishers & Distributors, New Delhi.
5. Pandey BP. 1978. Economic Botany. S. Chand & Company Ltd., New Delhi.
6. APG IV 2016. An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG IV. Botanical Journal of the Linnean Society, 181, 1–20.
7. Vasishta, P.C., 1994, Taxonomy of Angiosperms R.S. Chand & Company
8. Pandey, B.P., Economic Botany, S.Chand& Company, New Delhi.

Web Resources

1. <https://www.biologydiscussion.com › essay › taxonomy>
2. <https://www.wileyindia.com/taxonomy-of-angiosperms.html>
3. <https://www.easybiologyclass.com/angiosperm-systematics-and-taxonomy-free-online-studymaterials-and-lecture-notes/>

Course Outcomes		K Level
After the completion of the course, students will able to		
CO 1	Obtain the basic knowledge on morphology of plants	K2
CO 2	Equip themselves on description and identification of plants	K6
CO 3	Understand the classification of angiosperms	K2
CO 4	Learn about the nomenclature and herbarium management	K3
CO 5	attain the knowledge on economic importance of angiosperms	K2

Relationship matrix for CO, PO & PSO

Course Outcome (CO)	Programme Outcome (PO)					Programme Specific Outcome (PSO)					
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO 1	2	2	2	3	2	3	2	3	2	2	23
CO 2	2	2	3	2	2	3	2	2	2	2	22
CO 3	2	2	3	2	2	2	3	2	2	2	22
CO 4	3	2	2	2	2	3	2	2	3	2	23
CO 5	1	2	2	2	2	2	2	3	2	2	20
											110

Mean overall Relationship is 2.2 which is **High**

SEMESTER IV

Title of the course: MAJOR PRACTICAL - IV

Category of the course: Core Course

Course code: U4R2BOCC8P

Nature of the course: Skill Development

Marks: CIA: 40 + Ext: 60 = 100

Credits: 4

Hrs / Week: 5

Total Inst. Hrs: 60

Course Objectives

- To identify the plants under natural environment.
- To learn the dissection of flower
- To study the modifications of plant parts
- To get knowledge on preparation of Herbarium.
- To learn about to draw a floral diagrams.

Morphology

1. Root and stem modifications.
2. Phyllotaxy types.
3. Types of inflorescence – Raceme, Cyme, Mixed and Special.
4. L.S. of Dicot flower – Hypogynous/Epigenous/Perigynous
5. Mounting of floral parts.
6. Construction of floral diagram and floral formula.

Taxonomy

1. Detailed of study of the plants belonging to the families mentioned in theory.
2. Compulsory botanical tour for minimum of three days.
3. Submission of 5 herbarium sheets, field note book and tour report.
4. Spot identification (Binomial and Family) of plants included in theory.

SEMESTER IV

Title of the Course:	ALLIED ZOOLOGY (Zoology Theory - II)	
Category of the course:	Allied Course	
Course code:	U3R2BOAC4	
Nature of the course:	Skill Development	
Marks: CIA: 25 + Ext: 75 = 100		Hrs / Week: 4
Credits: 2		Total Inst. Hrs: 48

Course Objectives

- To study the classification and morphology of insects
- To learn the organelle system of insects
- To study the economic importance of important insects
- To study the integrated pest management
- To learn the apiculture, sericulture and lac culture

Unit – I: Vermiculture and Applications (10 Hours)

Vermiculture: Species of earthworms. Biology of *Lampito marutii*. Preparation of vermicompost and methods. Nutrient composition of Vermicompost and Advantages of vermicompost. Application of vermicomposting in agriculture and Horticultural practices. Economic importance of vermitechnology.

Unit – II: Apiculture and Lac Culture (8 Hours)

Apiculture - Species of honey bees. Formation and Extraction of honey. Nutritive and medicinal value of honey. Economics of apiculture and management. Lac culture: Life cycle of lac insect-extraction of Lac- Economic importance of lac.

Unit – III: Sericulture and Morigulture (10 Hours)

Sericulture: Types of silk worms. Nature economic importance of sericulture in India. Morigulture: Optimum conditions for mulberry growth : Planting for mulberry cultivation . Economic importance of silkworm and silk.

Unit – IV: Aquaculture (10 Hours)

Aquaculture: Prawn culture, commercial culture of catla & catfish, aquarium. By products of fishing and its commercial values. Pearl culture: Formation and nature of pearls -commercial importance of pearl culture in India.

Unit – V: Poultry Techniques (10 Hours)

Poultry farming - Introduction to Poultry keeping. Important breeds of poultry- Desi, Cittagong, Leghorn, Nutritional value of egg. Marketing of egg and By products of poultry.

Books for References

1. Sukla, G.S. and Upadhyay, V.B. 2000. Economic Zoology - ISBN - 81- 7133 - 8 Rastogi Publication, Meerut, India.
2. Jawaid Ahsan and Subhas Prasad sinha -2000. A Handbook on Economic Zoology- Chand & co., Ltd., New Delhi.
3. Major Hall, C.B.2005. Ponds and Fish culture. Agrobios (India), Jodhpur - India.

Course Outcomes		K Level
After the completion of the course, students will able to		
CO 1	Understand the economic value of vermicompost.	K2
CO 2	analyze the importance of apiculture	K4
CO 3	understand the importance of aquaculture	K2
CO 4	Understand the economic value of seri and lac culture	K3
CO 5	Develop the skill about poultry techniques	K4

Course Outcome (CO)	Programme Outcome (PO)					Programme Specific Outcome (PSO)					
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO 1	2	2	2	2	2	1	2	2	3	2	20
CO 2	2	2	2	2	2	3	2	3	2	2	22
CO 3	2	3	2	2	2	2	3	2	2	2	22
CO 4	2	2	2	2	2	3	2	3	2	3	23
CO 5	2	2	2	1	2	2	3	2	3	2	21
											108

Mean overall Relationship is **2.16** which is **Medium**

SEMESTER V

Title of the course:	CELL BIOLOGY, GENETICS & EVOLUTION	
Category of the course:	Core Course	
Course code:	U5R2BOCC9	
Nature of the course:	Skill Development	
Marks: CIA: 25 + Ext: 75 = 100		Hrs / Week: 5
Credits: 5		Total Inst. Hrs: 60

Course Objectives

- To learn about the structure and function of eukaryotic plant cells.
- To acquire a knowledge on molecular level of organelles.
- To understand the basic ideas on cell cycle.
- To learn the basic principles and theory of evolution.
- To study the basics of genetics

Unit – I: Cell structure and organelles (12 hours)

Plant cell structure and function. Ultra structure of Prokaryotic cell and Eukaryotic cell. Cell wall- Structure, chemistry and functions. Plasma membrane - Structure, Chemistry and function. Cell Organelles: Ultra Structure and origin of the following: Endoplasmic Reticulum, Golgicomplex, Lysosomes, Mitochondria, Chloroplast, Ribosomes and Microbodies.

Unit – II: Cell division and cell cycles (12 hours)

Structure and Functions of Nucleus, Nuclear Envelope, Nucleoplasm, Nucleolus, Chromosome – Euchromatin & heterochromatin, Giant chromosomes-Polytene and Lambrush chromosomes. Nucleic acids. Molecular structure and functions of DNA and RNA. Cell divisions - Mitosis and Meiosis. Cell cycle. Cell signaling- Cell surface receptors-MAP Kinase pathway

Unit – III: Genetics (12 hours)

Monohybrid and Dihybrid cross, test cross, back cross, Mendel's Laws. Deviation from Mendelian ratio – incomplete dominance, lethal factor, complementary factor, supplementary factor, duplicate and inhibitory. Polygenic inheritance – Inheritance of Wheat Kernel and ear length in Maize.

Unit – IV: Genetics (12 hours)

Linkage – Crossing over and recombination. Gene Mapping. Chromosome theory of inheritance. Sex determination in plants, Sex Linked Inheritance, Sex linked diseases, Haemophilia, Colour blindness. Extra nuclear inheritance - male sterility in corn, Population genetics, Hardy-Weinberg's principles, factors affecting.

Unit – V: Evolution (12 hours)

Origin of Life – chemosynthetic theory –evidences (any five). Evolution: Evolutionary theories of Lamarck, Darwin, De Vries, Modern synthetic theory of evolution. Variation- Analysis and

sources, Adaptive radiation, Isolation mechanism, Concept of species - Allopatric and Sympatric. Isolating mechanisms.

References

1. Turner, P.C. A.G. MC Lennan. A.D. Bates and M.R.H. White. 1998. Instant Notes in Molecular. Biology. Viva Books Pvt. Ltd. Chennai.
2. Verma, P.S and Agarwal, V.K. 2007. Cytology. S. Chand & Co. Chennai.
3. Wolfe, S.L. 1993. Molecular and Cellular Biology. Wadsworth Publishing Co, California.
4. De Robertis, E.D.P & De Robertis, E.M.F (1980) Cell and molecular biology, Holt Saunders International Editions, Philadelphia, Tokyo.
5. Rastogi, S.C. (1992) Cell biology, Tata McCraw Hill Publishing Co., Ltd., New Delhi.
6. Sundararajan, S., (2000) Cytology, Anmol Publication (P) Ltd., New Delhi.
7. Sinnott, E.W; L.C. Dunn and T. Dobzhansky 1958. Principle of genetics. McGraw Hill, Newyork.
8. Gupta, P.K. 2000. Genetics. Rastogi publications. Meerut.
9. Swaminathan, M.S; P.K. Gupta and V. Singa. 1983. Cytogenetics of crop plants. Macmillan India Pvt. Ltd. New Delhi.

Web Resources

1. <https://www.khanacademy.org/test-prep/mcat/cells/eukaryotic-cells/a/organelles-article>
2. <https://microbenotes.com/types-of-microscopes/>
3. <https://www.nature.com/scitable/topicpage/mitosis-and-cell-division-205/>

Course Outcomes		K Level
After the completion of the course, students will able to		
CO 1	Obtain knowledge on cell organelles and organization	K2
CO 2	Understand the cell cycles and functions	K4
CO 3	acquire the knowledge on cell division and cell signaling	K2
CO 4	resolving the problems and principles of genetics	K4
CO 5	attain the knowledge on evolution concept	K2

Relationship matrix for CO, PO & PSO

Course Outcome (CO)	Programme Outcome (PO)					Programme Specific Outcome (PSO)					
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO 1	2	2	3	2	2	3	2	2	3	2	23
CO 2	2	2	2	2	2	3	2	3	2	2	22
CO 3	2	2	2	2	2	3	2	2	2	3	22
CO 4	2	2	2	2	3	2	3	2	3	2	23
CO 5	2	1	3	2	2	3	2	3	2	1	21
											111

Mean overall Relationship is 2.22 which is **High**

SEMESTER V

Title of the course:	MOLECULAR BIOLOGY & GENETIC ENGINEERING	
Category of the course:	Core Course	
Course code:	U5R2BOCC10	
Nature of the course:	Skill Development	
Marks: CIA: 25 + Ext: 75 = 100		Hrs / Week: 5
Credits: 5		Total Inst. Hrs: 60

Course Objectives

- To acquire a knowledge on molecular level of organelles.
- To understand the basic ideas on cell cycle.
- To study the synthesis of DNA and RNA
- To learn the basic principles of genetic engineering
- To learn the importance of BT crops

Unit – I: Molecular Biology (15 hours)

Nucleic acid - structure and properties (physical, chemical, spectroscopic and thermal). DNA-types (A, B, C & Z), Watson and Crick model of DNA, viral DNA, bacterial DNA, Mitochondrial and Chloroplast DNA. Dissociation and re-association kinetics of DNA. DNA as genetic material, DNA synthesis and replication (prokaryote and eukaryote) – Enzymes involved, origin of replication, priming, DNA polymerases. Methylation of DNA. Damage and Repair of DNA.

Unit – II: Molecular Biology (15 hours)

RNA-synthesis - types. RNA polymerases-role. Transcription-(Prokaryote, Eukaryotes), Initiation, elongation, termination, post transcriptional changes in RNA. Genetic code-Translation-ribosome assembly, formation of initiation complex, initiation factors, elongation and termination, Wobble hypothesis, translational proof-reading, translational inhibitors, post-translational modification of proteins.

Unit – III: Molecular Biology (10 hours)

General principles of Gene Regulation, Gene Regulation in prokaryotes, Operon concept, *lac* Operon, Positive and negative control, Catabolite Repression, Gene Regulation in Eukaryotes, Transcriptional, Translational and Post translational control in eukaryotic cells. Gene silencing.

Unit – IV: Genetic Engineering (10 hours)

Introduction to Genetic Engineering; techniques- Restriction endonucleases- Ligation, Adapters and Linkers, Cloning Vectors-Plasmids, Cosmids, Phagemids, YAC and BAC, cDNA Libraries, ISSR, PCR, Hybridisation- Southern, Northern Western Blotting.

Unit – V Genetic Engineering – Gene transfer and GM plants (10 hours)

Genetic Engineering in plants, Target cells for transformation, Gene transfer technique using *Agrobacterium*, physical delivery methods: PEG stimulated, Microinjection and Macro

infection, Micro projectile (Particle Gun), Electroporation, Liposome mediated gene transfer. Silicon Carbide. GM plants- Bt-Brinjal, Bt- Cotton, Golden rice- Bioethical issues.

Books for References

1. Friefelder, D. 2005 Molecular biology. Second Edition. Narosa Publishing House.
2. Watson, J.D. et al., 2003 Molecular biology of the Gene. IV Edition. The Benjamin Cummings Pub. Co.
3. Gerald Karp 2002 Cell and Molecular Biology. John Wiley & Sons, NY.
4. Gupta, P.K. 2004 Cell and Molecular biology. III Edition, Rastogi Publications.
5. Lewin, b. 1994. Genes v. Oxford University press.
6. Smith-keary, P. 1991. Molecular genetics. Macmillan pub. Co. Ltd. London.
7. Strickberger, M.W. 1990. Genetics. Third edition. Macmillan publishing company

Web Resources

1. <https://www.khanacademy.org/test-prep/mcat/cells/eukaryotic-cells/a/organelles-article>
2. <https://microbenotes.com/types-of-microscopes/>
3. <https://www.nature.com/scitable/topicpage/mitosis-and-cell-division-205/>

Course Outcomes		K Level
After the completion of the course, students will able to		
CO 1	acquire the basic knowledge about structure and organization of nucleic acids and genetic codes	K2
CO 2	analyze the process of transcription & translation in prokaryotes and eukaryotes	K4
CO 3	learn the basic principles of gene regulation	K2
CO 4	recognize the principles of genetic engineering	K3
CO 5	analyze the gene transfer methods and applications of GM plants	K4

Relationship matrix for CO, PO & PSO

Course Outcome (CO)	Programme Outcome (PO)					Programme Specific Outcome (PSO)					
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO 1	2	2	2	2	2	2	3	2	3	2	22
CO 2	2	3	2	2	2	3	2	3	2	2	23
CO 3	2	2	2	2	2	3	2	3	2	2	22
CO 4	3	2	2	2	2	2	3	2	3	2	23
CO 5	2	1	2	2	3	3	2	2	2	1	20
											110

Mean overall Relationship is 2.2 which is **High**

SEMESTER V

Title of the course: PLANT PHYSIOLOGY & BIOCHEMISTRY

Category of the course: Core Course

Course code: U5R2BOCC11

Nature of the course: Skill Development

Marks: CIA: 25 + Ext: 75 = 100

Hrs / Week: 5

Credits: 5

Total Inst. Hrs: 60

Course Objectives

- To gain knowledge about plant bio molecules.
- To understand different pathways occurring in a cell.
- To provide an advanced integral knowledge on Biochemistry.
- To develop understanding in the plant cells.
- To acquired basic knowledge in physiological process.

Unit – I: Plant Physiology – Water plant relations, Transpiration (15 hours)

Water Relations in Plants - Water potential-Definition, components, Measurement and relation of water potential. Transpiration: Definition, Significance and Mechanism of stomatal transpiration, Starch - Sugar inter-conversion, synthesis of organic acid in guard cells, ATP driven H⁺ and K⁺ exchange pump. Mechanism of mineral salt absorption: Theories; Donnan equilibrium; Carrier Concept and Cytochrome pump theory.

Unit – II: Plant Physiology – Photosynthesis & Respiration (15 hours)

Photosynthesis-Principles of light absorption by plants, Photosystem I and II: composition, function, location in thylakoids and Photo phosphorylation reactions. CO₂ assimilation pathway: C₃, C₄ cycles and CAM, Photorespiration, Factors influencing photosynthesis. Respiration -Respiratory quotient, Fermentation and Anaerobic processes, Glycolysis, Substrate level Phosphorylation, Entner - Doudroff pathway, Glyoxylate cycle, Krebs cycle, Electron flow components, Electron transport pathway, Oxidative phosphorylation.

Unit – III: Plant Physiology – Nitrogen metabolism (15 hours)

Nitrogen metabolism- Sources of Nitrogen, Biochemistry of nitrogen fixation, Nitrate and Nitrite reduction, Assimilation of Nitrite and Ammonium ions. Growth hormones - Chemical nature, Bioassay, Physiological effect and practical applications of the following Phytohormones: Auxin, ABA, Cytokinin, Gibberellic acid and Ethylene, Photoperiodism, Florigen concept and Vernalization.

Unit – IV: Biochemistry – Enzymology and Biomolecules (12 hours)

Enzymology: Properties of Enzymes, General classification, CoEnzyme, Isozymes, Prosthetic group. Mode of Enzyme action, Mechanism of Enzyme action. Factors affecting enzyme activity, Enzyme Kinetics, Michaelis – Menton equation, Competitive, uncompetitive, non-competitive and Allosteric inhibition, Carbohydrates: General classification, Synthesis and breakdown of carbohydrates (starch, glycogen, pectin, Glucose).

Unit – V: Biochemistry - Biomolecules and Secondary metabolites (12 hours)

Amino acids and proteins: General classification of amino acids and proteins, Structure, synthesis and properties of amino acids, protein structure (Primary, secondary, tertiary and quaternary), Ramachandran plot. Vitamins. Outline of secondary metabolites (with one example) Phenolics (Tannins) Flavonoids, Terpenoids (steroids), Alkaloids, pigments (Anthocynins). Lipid metabolism: General classification of Phospho, Spingo, Glycolipid biosynthesis and oxidation.

Books for References

1. Mukherji, S. and A.K. Ghosh. 2004. Plant Physiology. Kolkatta: New Central Book Agency (P) Ltd.
2. Salisbury, F.B. and C. Ross. 2004. Plant Physiology. New Delhi: Prentice Hall.
3. Taiz, L. and E. Zeiger. 2004. Plant Physiology. New Delhi: Panima Publishing Corporation.
4. Buchanan B.B, Gruissem W. and Jones R.L 2000. Biochemistry and Molecular Biology of Plants. American Society of Plant Physiologist Maryland, USA.
5. Dennis D.T., Turpin, D.H. Lefebvre D.D. and Layzell D.B. (eds) 1997. Plant Metabolism (Second Edition) Longman, Essex, England.
6. Leninger A.C 1987. Principles of Biochmistry, CBS Publishers and Distributers (Indian Reprint).

Web Resources

1. <http://www.esalq.usp.br/lepse/imgs/conteudo/Plant-Physiology-by-Vince-Ordog.pdf>
2. <http://epgp.inflibnet.ac.in/Home/ViewSubject?catid=4>
3. http://employees.csbsju.edu/ssaupe/biol327/Lecture/mineral_nutrition.htm

Course Outcomes		K Level
After the completion of the course, students will able to		
CO 1	asses the physiological process of plants	K2
CO 2	evaluate the nitrogen metabolism and plant growth regulators	K5
CO 3	Understand the principles of photosynthesis	K2
CO 4	evaluate the importance of secondary metabolites to society	K5
CO 5	attain the knowledge on role of enzymes in biological systems	K4

Relationship matrix for CO, PO & PSO

Course Outcome (CO)	Programme Outcome (PO)					Programme Specific Outcome (PSO)					
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO 1	2	2	2	2	3	2	2	3	2	2	22
CO 2	2	2	2	2	2	3	3	2	3	2	23
CO 3	3	2	2	2	2	3	2	3	2	2	23
CO 4	2	3	2	2	2	2	2	2	2	3	22
CO 5	2	2	2	1	2	3	1	2	2	2	19
											109

Mean overall Relationship is **2.18** which is **Medium**

SEMESTER V

Title of the course: MAJOR PRACTICAL – V (Covering CC9, CC10 & CC11)

Category of the course: Core Course

Course code: U5R2BOCC12P

Nature of the course: Skill Development

Marks: CIA: 40 + Ext: 60 = 100

Hrs / Week: 5

Credits: 5

Total Inst. Hrs: 60

Course Objectives

- To perform double stained permanent slide mounting
- To have a practical exposure on violating the DNA from plant materials
- To get knowledge on separating the pigments from plant leaflet
- To perform the experiments on photosynthesis, respiration and growth of plants
- To identify amount of sugar total lipids, free amino acids and total proteins

Cell Biology

1. Study of structure of plant cell organelles using electron photo micrographs from standard books.
2. Study of mitosis in root tips
3. Study of meiosis in anthers
4. Isolation of DNA from plant source (Onion Bulb, Coconut Endosperm)
5. Demonstration on Extraction and separation of Plant protein by SDS-PAGE.
6. Extraction and separation of plant DNA by agarose gel electrophoresis.

Genetics

1. Problems on Mendelian Genetics: Monohybrid cross and modification. Dihybrid cross and modification.
2. Mapping of chromosomes.

Plant Physiology

1. Determination of water potential by Dye method.
2. Determination of root pressure and sap exudation.
3. Estimation of chlorophyll and carotenoids.
4. Effect of light and CO₂ on photosynthesis.
5. Estimation of carbohydrates.
6. Estimation of protein.
7. Estimation of total lipids

Demonstration

8. Aerobic respiration – Ganong's respiroscope.
9. Plant growth regulators- Demonstration.
10. Arc Auxanometer.
11. Hydroponics

Biochemistry

1. Qualitative estimation of sugars.
2. Estimation of total lipids.
3. Estimation of amino acids.
4. Quantitative estimation of total protein.
5. Effect of pH/temperature on enzyme activity
6. Estimation of total phenolics
7. To determine the units of activity and specific activity of α amylase enzyme.
8. Separation of pigments by paper chromatography and TLC

SEMESTER VI

Title of the course: PLANT BIOTECHNOLOGY, BIO-INFORMATICS & BIOSTATISTICS

Category of the course: Core Course

Course code: U6R2BOCC13

Nature of the course: Employability

Marks: CIA: 25 + Ext: 75 = 100

Credits: 5

Hrs / Week: 5

Total Inst. Hrs: 60

Course Objectives

- To understand the Scope and importance application of biotechnology
- To know about the vectors and their mechanisms
- To basic ides on plant genome organization
- To learn the web based biological data bases
- To study the basic principles and problems of biostatistics

Unit – I: Plant Biotechnology – Plant tissue culture (12 hours)

Scope and history of plant tissue culture, culture, technique – tissue culture media –MS media preparation, sterilization, explants preparation and inoculation callus induction, organogenesis (embryogenesis) Suspension culture, somatic embryogenesis, Artificial seed, Anther and ovule culture haploids in crop improvement, Protoplast isolation, purification, fusion, somatic hybridization. Immobilisation techniques.

Unit – II: Plant Biotechnology –Bio-fertilizers and Fermentation technology (12 hours)

Bio-fertilizers- Mass cultivation and uses of Bacterial bio-fertilizers – *Rhizobium*, *Azospirillum*, Algal bio-fertilizers– *Anabaena*, *Nostoc*, Fungal bio-fertilizer – Mycorrhiza (VAM) Plant Pesticides – Bio-Insecticides. Fermentation Technology-Production of Ethanol, Production of Penicillin, Vaccines – Types, Source, production and uses.

Unit – III: Plant Biotechnology – Biofuels, Nutritional value of microorganisms (14 hours)

Outline of Biofuel – Hydrogen Production. Microorganisms used as SCP-*Spirulina*, *Chlorella*, Yeast (*Saccharomyces cerevisiae*) – Mass cultivation of *Spirulina*, *Chlorella*, and Yeast. Biogas production – Methanogenesis.Waste treatment – Aerobic and anaerobic.Reusage of Sewage.

Unit – IV: Bioinformatics (12 hours)

Introduction to bioinformatics: Biological Database – Protein and DNA sequence data base, Structure database, literature database, (Pubmed, NCBI, Medline). Sequence Alignment, Database similarity searching; FASTA; BLAST, Proteomics – protein structure prediction (primary, secondary & tertiary), Human Genome Project.

Unit – V Biostatistics (10 hours)

Classification of data, mean, median and mode. Standard deviation, standard error, variance, correlation, chi square test.

Books for References

1. Balasubramanian, D., BRYCE, C. F. A., Dharmalingam, K., Green, J. and Kunthala Jayaraman. (eds.) 1996. Concepts in Biotechnology. University Press (India) Ltd.
2. Brown, C.W., I. Campbell and F.G. Priest. 1987. Introduction to biotechnology Blackwell scientific publications. Oxford.
3. Chawala, H. S. 2002. Introduction to Plant Biotechnology. Oxford & IBH Publishing Co. Pvt. Ptd. New Delhi.
4. Ignacimuthu, S. 1996. Basic Bio-Technology. Tata-McGraw, Hill Publishing Co. Ltd., New Delhi.
5. Ignacimuthu, S.J. 2012 Biotechnology –An introduction. Narosa Publishing House, New Delhi.
6. Dubey, R.C.1993. A Text book of Bio-Technology. S. Chand & Co. Ltd. New Delhi.
7. Kumar, H.D.1993. A Text book of Bio-Technology. East West Affiliated Press Ltd., New Delhi.
8. Srivastava "H.S. An Introduction to Bio-Technology. Rastogi Publishing Company Meerut.
9. Rangaswami, R.A. 1995. A. textbook of Agricultural statistics. New Age International publications, Chennai.

Web Resources

1. <http://www.bio-nica.info/biblioteca/OksmanCaldentey2002PlantBiotechnology.pdf>
2. <http://epgp.inflibnet.ac.in/Home/ViewSubject?catid=3>
3. <https://www.cambridge.org/core/journals/genetics-research/article/principles-of-genemanipulation-and-genomics-7th-edition>

Course Outcomes		K Level
After the completion of the course, students will able to		
CO 1	establish the tissue culture technique	K2
CO 2	understand the importance of bio-fertilizers and fermentation process	K4
CO 3	obtain the knowledge on mass cultivation of single cell protein	K3
CO 4	acquire the knowledge on principles and importance of bioinformatics tools	K4
CO 5	resolving the problems of data analyses	K6

Relationship matrix for CO, PO & PSO

Course Outcome (CO)	Programme Outcome (PO)					Programme Specific Outcome (PSO)					
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO 1	3	2	2	2	2	3	2	3	2	2	23
CO 2	2	2	2	2	2	2	3	2	2	3	22
CO 3	2	2	2	3	2	2	3	2	3	2	23
CO 4	3	2	2	2	2	3	2	3	2	2	23
CO 5	2	2	1	2	2	3	3	2	3	2	22
											113

Mean overall Relationship is **2.26** which is **High**

SEMESTER VI

Title of the course:	PLANT ECOLOGY, PHYTOGEOGRAPHY & ENVIRONMENTAL BIOTECHNOLOGY	
Category of the course:	Core Course	
Course code:	U6R2BOCC14	
Nature of the course:	Skill Development	
Marks: CIA: 25 + Ext: 75 = 100		Hrs / Week: 5
Credits: 5		Total Inst. Hrs: 60

Course Objectives

- To learn advanced knowledge about plants and their environment
- To study the plant ecosystem and their impact on society
- To understand and implement effective measures in biodiversity conservation programmes
- To study the geographical regions on India
- To learn the basics of environmental biotechnology

Unit – I: Plant Ecology – Biogeochemical cycles & Ecosystem (12 hours)

Biotic and abiotic factors and their influence on vegetation – a brief account of microbes, plants, animals, soil, wind, light, temperature, rainfall and fire. Biogeochemical cycles (Nitrogen, Carbon). Ecosystem – concept, processes and components.

Unit – II: Plant Ecology –Energy flow and Ecosystem types (12 hours)

Food chain, food web, energy flow, pyramids. Nutrient cycling. Types of ecosystems - coastal and grassland. Autecology and Synecology – Vegetation – Units of Vegetation – Formation, Association, Consociation, Society – development of vegetation.

Unit – III: Plant Ecology – Vegetation analysis (12 hours)

Migration – Ecesis, colonization, Methods of study of vegetation (Quadrat and transect) Plant succession –Hydrosere and Xerosere. Ecological classification of plants: Morphological and anatomical features of plants and their correlation to the habitat factors. Soil erosion.

Unit – IV: Phytogeography – Forest types & biogeography of India (12 hours)

Phytogeography – principles – vegetation types of India. Tropical rain forest, Sholas and Deciduous Forest – Sand dunes, Mangrove vegetation and Scrub jungle, Phytogeographical regions of India, Biodiversity, Hotspot, Endemism, Plant Indicators.

Unit – V: Environmental Biotechnology (12 hours)

Biodegradation of xenobiotics using microbes Biomonitoring - Biodegradation of Xenobiotics using microbe, Types of Bioremediation: *in situ* and *ex situ*, Phytoremediation, Biosensors and Bioindicators, Bioleaching.

Books for References

1. Singh, J.S., Singh, S.P. and Gupta, S. (2006) Ecology Environment and Resource Conservation. Anamaya Publications, New Delhi.
2. Wilkinson, D.M. (2007). Fundamental Processes in Ecology. An Earth System Approach. Oxford.
3. Daubenmier, R.F. (1970). Plants and Environment: A text book of Plant Autoecology, Wiley Eastern Private Limited.
4. Daubenmier, R.F. (1970), Plant Communities, Wiley Eastern Private Limited
5. Odum, E. (2008) Ecology. Oxford and IBH Publisher.
6. Sharma, P.D. (2010) Ecology and Environment, (8th Ed.) Rastogi Publications, Meerut.

Web Resources

1. <https://www.sscasc.in/wp-content/uploads/downloads/Botany/2-Sem-Botany.pdf2>.
2. <https://cmpcollege.ac.in/wp-content/uploads/2017/07/e-learning-BOT-507-community-ecology.pdf>
3. <https://www.saraspublication.com/books/plant-ecology-and-phytogeography/>

Course Outcomes		K Level
After the completion of the course, students will able to		
CO 1	attain the knowledge on importance of biogeochemical cycles	K2
CO 2	understand the ecosystem types and importance	K4
CO 3	hands on the quadrant and transect methods for vegetation analysis	K3
CO 4	conserve the biodiversity and endemic plants	K5
CO 5	resolving the problems of environmental issues	K6

Relationship matrix for CO, PO & PSO

Course Outcome (CO)	Programme Outcome (PO)					Programme Specific Outcome (PSO)					
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO 1	2	2	2	2	2	3	2	3	2	3	23
CO 2	2	3	2	3	2	2	3	2	3	2	24
CO 3	3	2	2	2	2	2	2	3	2	2	22
CO 4	2	2	2	2	2	3	2	2	3	2	22
CO 5	3	2	2	2	1	3	3	2	1	2	21
											112

Mean overall Relationship is **2.24** which is **Medium**

SEMESTER VI

Title of the course: MAJOR PRACTICAL – VI (Covering CC13 & CC14)

Category of the course: Core Course

Course code: U6R2BOCC15P

Nature of the course: Skill Development

Marks: CIA: 40 + Ext: 60 = 100

Hrs / Week: 5

Credits: 5

Total Inst. Hrs: 60

Course Objectives

- To gain advanced knowledge about plants and their environment
- To study the plant ecosystem and their impact on society
- To understand and implement effective measures in biodiversity conservation programmes

Plant Biotechnology

1. Culture media and sterilization techniques
2. Generation of In vitro plants
3. Embryo culture
4. Callus induction and differentiation
5. Somatic embryogenesis.
6. Micropropagation and Synthetic seeds

Biostatistics

1. Sampling by Random Number Table
2. Data Collection
3. Classification of Data: Discrete, continuous and cumulative.
4. Statistical diagrams: Histogram, Frequency curve, Bar chart and Ogive curve
5. Measures of Central Values: Mean, Median and Mode
6. Measures of Dispersion: Range, Mean Deviation and Standard Deviation

Bioinformatics

1. BLAST, FASTA

Ecology

1. Vegetation analysis– Quadrant and line transect method
2. Estimation of Dissolved oxygen.
3. Estimation of BOD.
4. Determination of net primary productivity.
5. Portability of water
6. Determination of acidity of water.
7. Determination of alkalinity of water.
8. Determination of hardness of water.

Title of the course: MICROBIOLOGY & PLANT PATHOLOGY

Category of the course: DSE

Course code: U5R2BODSE1:2

Nature of the course: Employability

Marks: CIA: 25 + Ext: 75 = 100

Hrs / Week: 4

Credits: 4

Total Inst. Hrs: 48

Course Objectives

- To learn about the basic and applied aspect in microbial biology.
- To acquire knowledge on the on the importance of microorganisms.
- To understand the basic principles and importance of immune system.
- To study the plant pathogens and their pathogenicity
- T learn the control measures of plant diseases

Unit – I: Microbiology-history, Classification, structure of TMV (10 hours)

The scope of microbiology - history of microbiology – classification of microorganisms-Whittaker's Five Kingdom concept. Viruses: structure of TMV and bacteriophage; bacteriophage replication- lytic and lysogenic cycles Bacteria: outline of bacterial classification-Bergey's manual of determinative bacteriology. Ultrastructure-Gram positive and gram negative bacteria, flagellation, nutrition, cell division, reproduction, Endospore and genetic recombination-Transformation, transduction and conjugation.

Unit – II: Microbiology - Applications in Industries, Sewage treatment (8 hours)

Microbial applications in Industries: dairy, alcohol, acid and enzymes. Microbiology of water-Bacteriological evidence of pollution, purification of water - sedimentation, filtration, disinfection-Sewage treatment-primary, secondary and tertiary. Microbiology of soil-soil profile, rhizosphere, rhizoplane-plant-microbes interaction – Rhizobium

Unit – III: Microbiology- Dairy Microbiology, Control of Microbes (10 hours)

Dairy Microbiology-composition of milk, dairy products-cheese and: yogurt Food Microbiology: source and processing of the following fermented foods: Saurkraut and Kimchi tempeh, soysauce, sago and food spoilage. Microbiology of air, indoor and outdoor environments-control of microbes in air by Heat, moist heat, dry heat, chemicals, UV, filtration, Laminar air flow chamber.

Unit – IV: Plant Pathology- Plant Disease, symptoms and control measures (10 hours)

Plant Pathology -History, Detailed studies of the nature of plant disease and its causal agents (fungi, bacteria, viruses, Mycoplasma, nematodes, environmental/chemical agents), Common diseases: symptoms, disease cycle and control measures. Rots- Late blight disease of potato, Damping off disease of seedlings, Downy mildew –peas, Wilt of cotton, Leaf spot disease of ground nut, Citrus canker, Mosaic disease of tomato, Bunchy top disease of banana and rust of wheat. Little leaf of Brinjal.

Unit – V: Plant Pathology- Mechanisms of pathogenesis, Penetration (10 hours)

Host pathogen interactions. Mechanisms of pathogenesis- recognition phenomenon, penetration, invasion, primary disease determinant, Defense mechanism in plants - morphological, phytoalexins.

Books for References

1. Pelczar, Michel J. JR., E.C.S. Chan and Noel R. Krieg (Eds.) Text book of Microbiology. Tata McGraw Hill. Co. New Delhi.
2. Atlas, R.M. 1989 Microbiology-Fundamentals and applications. McMillan Publishing Company, New York.
3. Anantharayan, R. and C.K.J. Paniker 2000 Text book of Microbiology, 6th Edition. Orient Longman.
4. Vidyasekaran, B.P. 2004. Concise Encyclopedia of Plant Pathology. Viva Book Publishers, New Delhi.
5. Sharma, P.D. 2008 Plant pathology. Rastogi Publications, Meerut, India.
6. Singh, R.S. 2006 Introduction to principles of Plant Pathology. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

Web Resources

1. <http://www.malecentrum.sk/data/att/166377.pdf>
2. <https://labscientists.files.wordpress.com/2017/12/microbiology-immunology-1.pdf>
3. <https://alraziuni.edu.ye/uploads/pdf/MICROBIOLOGY-AND-IMMUNOLOGY.pdf>

CO 1	understand the various types of microbes in an environment and their importance.	K1
CO 2	demonstrate the role of microorganisms in food processing and spoilage , soil fertility and sewage disposal	K4
CO 3	assess role of microorganisms in industrial processing of microbial products	K5
CO 4	understand the disease cycle caused by the pathogens.	K3
CO 5	attain basic skills on aetiology and control of various plant diseases.	K4

Relationship matrix for CO, PO & PSO

Course Outcome (CO)	Programme Outcome (PO)					Programme Specific Outcome (PSO)					
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO 1	2	2	2	2	2	3	2	3	2	3	23
CO 2	3	2	2	2	2	2	3	2	2	3	23
CO 3	2	2	2	2	2	3	2	3	2	2	22
CO 4	2	2	2	2	2	2	3	2	3	2	22
CO 5	1	2	2	2	2	3	2	3	2	2	21
											111

Mean overall Relationship is 2.22 which is **High**

Title of the course: AGRI BASED MICROENTERPRISES

Category of the course: DSE

Course code: U6R2BODSE2:1

Nature of the course: Entrepreneurship

Marks: CIA: 25 + Ext: 75 = 100

Hrs / Week: 5

Credits: 3

Total Inst. Hrs: 60

Course Objectives

- To study the basics of organic manures and fertilizers.
- To expose the horticultural methods
- To inculcate the knowledge of processing methods of fruits and vegetables
- To study the basics of mushroom cultivation methods
- To learn the marketing knowledge on agribased products

Unit – I: Fertilizers - Composition of Fertilizers, Biological Control (12 hours)

Organic manures and fertilizers. Composition of fertilizers. NPK content of various fertilizers. Common organic manures bone meal, cow dung, poultry waste, oil cakes, organic mixtures and compost. Preparation of compost aerobic and anaerobic- advantages of both; vermicompost preparation, Vermiwash. Biofertilizers definition, types Trichoderma, Rhizobium, PGPR. Biopesticides- Panchakaviyam- Tobacco and Neem decoction. Biological control. Sustainable agriculture.

Unit – II: Soil components- Methods of plant propagation, growth regulators (12 hours)

Soil components. Preparation of potting mixture. Common Garden tools and implement. Methods of plant propagation by seeds, advantages and disadvantages. Vegetative propagation - advantages and disadvantages. Natural methods of vegetative propagation. Artificial methods cutting, grafting, budding and layering. Use of growth regulators for rooting.

Unit – III: Garden- Types of garden, Bonsai preparation, green house (14 hours)

Gardening Types of garden ornamental, indoor garden, kitchen garden, Terrace garden, vegetable garden for marketing. Rockery and artificial ponds. Ornamental garden designing garden components flower beds, borders, hedges, edges, drives and paths, garden adornments. Lawn - preparation by seeds, by transplanting seedling and by turfing. Annuals, Biennials, Shrubs, Trees, Cycads and Palms. Bonsai preparation. Pruning of plants. Types of Nurseries Management aspects and Maintenance. Plant growth structures advantages of green house, polyshed, fernery and orchidarium.

Unit – IV: Packaging- Causes of spoilage, Preservation, Preparation of wine (10 hours)

Packaging of fruits, vegetables, nursery products and flowers. Causes of spoilage. Preservation techniques asepsis, removal of microorganisms, anaerobic conditions and special methods by drying, by heat treatment, by low temperature storage and by chemicals (Food Additives). Preparation of wine, vinegar and dairy products.

Unit – V: Mushrooms- Types, life cycle, methods of identification (12 hours)

Significance of Mushrooms, General outline of life cycle. Types of mushrooms - button mushroom, oyster mushroom and milky mushroom, poisonous mushroom, methods of identification. Spawn isolation and preparation. Cultivation of oyster and milky mushrooms using paddy straw and saw dust by polybag. Farm design and control of pests and diseases. Value added products from mushroom, pickles, candies, dried mushrooms.

Books for References

1. Adams, M.R. and M.O. Moss. 1995 Food Microbiology. Panima Publishing.
2. Casida, L.E. (Jr.), 2005 Industrial Microbiology. New Age International.
3. Chandha, K.L. 2003 Handbook of Horticulture. ICAR. New Delhi.
4. Frazier and Westhoff. 1988 Food Microbiology. Tata McGraw Hill.
5. George Acquichah. 2004 Horticulture Principles and Practices. II Edn. Prentice Hall. India.
6. George J. Banwant. 2004 Basic Food Microbiology. CBS Publishers and Distributors.
7. GopalChandha De. 2002 Fundamentals of Agronomy. Oxford and IBH Publishing House.
8. Hudson. T., Hartmann., Dale E. Kester. 2001 Plant Propagation, Principles and Practices. 6th Edn. Prentice Hall. India.
9. James M. Jay. 2005 Modern Food Microbiology. CBS Publishers and Distributors.
10. Kaul, T.N. Biology and Conservation of Mushroom (2002) Oxford and IBH Publishing Co.

Web Resources

1. <https://www.manage.gov.in/publications/200%20Stories-MANAGE2019.pdf>
2. https://iixfoundation.org/wp-content/uploads/2011/08/OXFAM-SME-Report-November-2014_FINAL.pdf
3. <https://www.tasc.tas.gov.au/wp-content/uploads/pdf/courses/agr215117.pdf>

Course Outcomes		K Level
After the completion of the course, student will able to		
CO 1	get the knowledge about entrepreneurial skills	K1
CO 2	get knowledge about horticulture methods	K2
CO 3	get employability in nurseries	K4
CO 4	start self-employment in nursery	K3
CO 5	start self-employment in Mushroom cultivation	K4

Relationship matrix for CO, PO & PSO

Course Outcome (CO)	Programme Outcome (PO)					Programme Specific Outcome (PSO)					
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO 1	2	3	2	2	2	3	2	3	2	2	23
CO 2	2	2	2	2	2	2	3	2	2	3	22
CO 3	2	2	2	2	2	3	2	2	3	2	22
CO 4	3	2	2	2	2	2	3	2	2	2	22
CO 5	3	2	2	2	1	2	2	2	3	2	21
											110

Mean overall Relationship is 2.2 which is **High**

Title of the course: HERBAL ETHNOBOTANY

Category of the course: DSE

Course code: U6R2BODSE2:2

Nature of the course: Entrepreneurship

Marks: CIA: 25 + Ext: 75 = 100

Hrs / Week: 5

Credits: 3

Total Inst. Hrs: 60

Course Objectives

- To understand the uses of the plant resources
- To be aware of values of such resources
- To enlighten the students about economic again because of plant resources
- To learn traditional health care products
- To know about naturopathy treatment and its effectiveness

Unit – I: Herbal Botany- Indian systems, Classifications, Chemistry of drugs (12 hours)

Brief history of medicinal plants. Indian systems of medicines - Siddha, Ayurvedha and Unani systems. Classifications of crude drugs, Chemistry of drugs. Drugs from roots (*Catheranthus* and *Rauwolfia*). Drugs form bark(*Cinchona*). Drugs from wood (*Ephedra*).

Unit – II: Herbal Botany- Drugs from fruits, Seeds and Flower (12 hours)

Drugs from leaves (*Aloe*, *Atropa*, *Eucalyptus*, *Ocimum*, *Datura* and *Cassia*). Drugs from flower, (*Eugenia*). Drugs from fruits and seeds (wood apple and Coriander, *Trigonella*, Neem). Underground stem (Ginger).

Unit – III: Herbal Botany-drugs acting, Cultivation of medicinal plants (10 hours)

A brief account of drugs acting on the central nervous system, drugs used in disorders of gastrointestinal tract and cardiovascular drugs. Cultivation of medicinal plants in India. Breeding methods applied to medicinal herbs, plant tissue culture as source of biomedicine. Drug adulteration. Methods of drug evaluation.

Unit – IV: Ethnobotany- Introduction, Concept, Methodology (13 hours)

Ethnobotany: Introduction, concept, scope and objectives. Ethnobotany as an interdisciplinary science. The relevance of ethnobotany in the present context. Major ethnic groups in Tamil Nadu (Any five). Methodology of Ethnobotanical studies. a) Field work b) Herbarium c) Ancient Literature d) Temples and sacred places. Plants used by the tribals: a) Food plants b) intoxicants and beverages c) Resins and oils and miscellaneous uses.

Unit – V: Ethnobotany-Practices, Role, Source of Drug (13 hours)

Plants and Tribal medicine: Significance of the following plants in ethno botanical practices (along with their habitat and morphology) a) *Azadirachta indica* b) *Ocimum sanctum* c) *Vitex negundo* d) *Gloriosa superba* e) *Tribulus terrestris* f) *Pongamia pinnata* g) *Cassia auriculata*. Role of ethnobotany in modern medicine with special example *Rauwolfia serpentina*, *Trichopus zeylanicus*. Role of ethnic groups in conservation of plant genetic resources. Participatory forest management. Ethnobotany as a source of drug. a) Reserpine b) Artemisin c) Gugulipid d) Cocaine e) Strychnine.

Books for References

1. Dhavan, B.N. 1986, Ayurvedic Research on Medicinal plants in India INSA, New Delhi.
2. Gokhale, S.B. & C.K. Kokate and A.P. Purohit. Pharmacognosy Nirali Prakashan.
3. S.K. Jain, 1987. A Manual of Ethnobotany. Scientific Publishers - Jodhpur.
4. Agarwal, 1985 Drug Plants in India, Kalyari. Pubeshers, Ludhiyana.
5. Jain, 2001. Madicinal Plants. National Book Trust- New Delhi.
6. Arumugan. K.R and N. Murugesh Text Book of Pharmacognosy Sathya publishers.
7. S.K. Jain, 1995. Manual of Ethnobotany, Scientific Publishers, Jodhpur,.
8. S.K. Jain (ed.) 1981. Glimpses of Indian. Ethnobotny, Oxford and IBH, New Delhi.
9. S.K. Jain, 1990. Contributions of Indian ethnobotany. Scientific publishers, Jodhpur.
10. Cotton C.M. 1997. Ethnobotany – Principles and applications. John Wiley and sons
11. Chichester Rajiv K. Sinha 1996. Ethnobotany The Renaissance of Traditional Herbal Medicine – INA SHREE Publishers, Jaipur

Web Resources

1. <https://www.scielo.br/j/bjb/a/J7GVwk47hTfnVtTn3ZzgKKP/?format=pdf&lang=en>
2. <https://www.tandfonline.com/doi/pdf/10.1080/23311932.2020.1852716>
3. https://cms.galenos.com.tr/Uploads/Article_22435/TJPS-17-211-En.pdf

Course Outcomes		K Level
After the completion of the course, student will able to		
CO 1	Learn about the different types of medicinal plant raw materials used in the preparation of herbal-based treatments.	K1
CO 2	Learn about the present state of trade and the function of medicinal plants in socioeconomic development.	K2
CO 3	Investigate and study the disease-curing abilities of medicinal plants in a variety of diseases.	K3
CO 4	evaluate and analyse the pharmaceutical industry, the market value of herbal-based formulations and products.	K4
CO 5	For the sake of society's health, develop innovative medicine formulations incorporating therapeutically beneficial plant components.	K5

Relationship matrix for CO, PO & PSO

Course Outcome (CO)	Programme Outcome (PO)					Programme Specific Outcome (PSO)					
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO 1	2	2	2	2	2	2	3	2	3	2	22
CO 2	2	2	2	2	2	3	2	3	2	2	22
CO 3	2	2	2	2	2	2	3	2	3	2	22
CO 4	3	2	2	2	2	3	2	3	2	2	23
CO 5	1	2	2	2	1	2	3	2	3	2	20
											109

Mean overall Relationship is **2.18** which is **Medium**

1. Dwivedi, J. N. and Singh, R. B. (1985). Essential of Plant Technique. Scientific Publications, Jodhpur.
2. Jayaraman, J. Laboratory Manual in Biochemistry. Wiley Eastern Ltd., New Delhi.

- Jensen, W. A. (1962). Botanical Histochemistry: Principles and Practice. W.H. Freeman and Co., San Francisco, USA.
- Johansen, D. A. (1940). Plant Microtechnique. McGraw Hill, New York.
- Krishnamurthy, K. V. (1988). Methods in Plant Histochemistry. S. Viswanathan & Co., Madras.
- Sass, J. E. (1967). Botanical Microtechnique. 3rd ed. Oxford & IBH Publishing Co., New Delhi.
- Skoog, A. and West, M. (1980). Principles of Instrumental Analysis – W. B. Saunders

Web Resources

- <https://www.kau.edu.sa/Files/0017514/Subjects/principals%20and%20techniques%20of%20biochemistry%20and%20molecular%20biology%207th%20ed%20wilson%20walker.pdf>
- file:///C:/Users/jjc/Downloads/141_Sample_Chapter.pdf
- <https://di.uq.edu.au/files/3522/MolBiolWS08Immunofluorescence.pdf>

Course Outcomes		K Level
After the completion of the course, student will able to		
CO 1	have understood the basic concept of molecular biology and genetic engineering.	K1
CO 2	the cell organelles and their functions.	K3
CO 3	the mitosis and meiosis and its importance.	K2
CO 4	get knowledge on basic concept of evolution and theories.	K4
CO 5	get employment in biology instrumentation labs and Molecular Biology Research Centre.	K5

Relationship matrix for CO, PO & PSO

Course Outcome (CO)	Programme Outcome (PO)					Programme Specific Outcome (PSO)					
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO 1	2	2	2	2	3	3	2	3	2	3	24
CO 2	3	3	2	2	2	3	3	2	3	2	25
CO 3	2	2	2	2	3	2	2	2	2	2	21
CO 4	2	2	2	2	2	3	2	3	2	2	22
CO 5	2	2	1	2	2	2	2	2	3	2	20
											112

Mean overall Relationship is **2.24** which is **High**

Title of the course: SEAWEED TECHNOLOGY

Category of the course: DSE

Course code: U6R2BODSE3:2

Nature of the course: Employability

Marks: CIA: 25 + Ext: 75 = 100

Hrs / Week: 4

Credits: 3

Total Inst. Hrs: 48

Course Objectives

- To study the characters and seaweed resources in India and abroad.
- To learn the ecology distribution of seaweeds.
- To acquire the knowledge on cultivation methods.
- To study the commercial importance of seaweeds.
- To learn the environmental importance of seaweeds

Unit – I: Seaweeds- Structure, Reproduction and History (10 hours)

General characters of seaweeds. Structure, Reproduction and life history of Rhodophyta, Phaeophyta and Chlorophyta. Seaweed resources in India and abroad.

Unit – II: Seaweeds- Distribution and Nutrients (10 hours)

Ecology of Seaweeds: Distribution, Nutrients and Environment.

Unit – III: Biochemistry- Chemical constituents and Growth regulators (9 hours)

Biochemistry: Polysaccharides, Bioactive compounds, Chemical constituents and Growth regulators in Seaweeds.

Unit – IV: Seaweeds-Commercial Cultivation (9 hours)

Methods of commercial cultivation of Seaweeds. Economic importance of seaweeds

Unit – V: Seaweeds- Commercial uses (10 hours)

Commercial uses of Seaweeds – Agar, Carrageenan, Alginic acid and their uses in various industries. Common methods for extraction of various cell wall Polysaccharides in seaweeds.

Books for References

1. Lobban, C.S. and M.J. Wynne (Eds.) 1981 Biology of Seaweeds. Blackwell Scientific Publications, Oxford.
2. Barsanti, Laura and Paolo Gualtieri 2005 Algae-Anatomy, Biochemistry and Biotechnology. Taylor & Francis, London, New York.
3. Tait, R.V and F.A. Dipper 1998 Elements of Marine Ecology. Elsevier Ltd.
4. Krisnamurthy. V and M. Balusamy, 2010. Phaeophyceae of India and neighborhood. Madras Christian College publishing, Chennai, 193pp.
5. Dawes, C.J. 1988. Marine Botany. John Wiley & Sons, New York, 480 pp.

Web Resources

1. <https://www.icar.org.in/sites/default/files/ICAR-Technologies-High-Value-Seaweeds.pdf>
2. <https://www.fao.org/3/cb5670en/cb5670en.pdf>

3. <https://www.fao.org/3/CA1121EN/ca1121en.pdf>

Course Outcomes		K Level
After the completion of the course, student will able to		
CO 1	get knowledge about seaweed technology	K1
CO 2	get employability in seaweed cultivation industries	K3
CO 3	coastal areas also can start self-employability in seaweed cultivation.	K3
CO 4	get knowledge on value added products of sea weeds.	K4
CO 5	get knowledge on identify the economic importance of seaweeds	K5

Relationship matrix for CO, PO & PSO

Course Outcome (CO)	Programme Outcome (PO)					Programme Specific Outcome (PSO)					
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO 1	2	2	2	2	2	2	2	3	2	2	21
CO 2	2	2	2	2	2	3	2	2	2	3	22
CO 3	2	2	2	2	2	2	3	2	2	2	21
CO 4	2	2	2	2	2	3	2	2	2	2	21
CO 5	2	2	1	2	2	2	2	2	2	2	19
											104

Mean overall Relationship is **2.08** which is **Medium**

Title of the course: PLANT BREEDING & HORTICULTURE

Category of the course: SEC

Course code: U4R2BOSEC1:1

Nature of the course: Employability

Marks: CIA: 25 + Ext: 75 = 100

Hrs / Week: 2

Credits: 2

Total Inst. Hrs: 24

Course Objectives

- To study the basic principles and breeding techniques in horticulture crops
- To acquire knowledge as various vegetative propagation techniques
- To understand concept on various garden making
- To get knowledge on landscaping techniques and implication

Unit I: Plant Breeding- Objectives and Introduction, Mutation (5 hours)

Plant Breeding: Objectives, Plant introduction, selection, hybridization techniques, Hybrid Vigor, heterosis, Inter specific and inter generic. Mutation -Polyploidy and its applications in plant breeding. Breeding for crop improvement for Paddy, Groundnut and Sugarcane.

Unit II: Horticulture- Types of Gardens, Plant propagation Methods (5 hours)

Importance and scope of horticulture. Classification of horticultural crops –fruits and vegetables. Types of gardens: formal, informal, kitchen and Terrace. Plant propagation methods: cutting, layering, budding and grafting. Stock –scion relationship in important horticultural crops. Use of plant growth regulators in horticulture: Induction of rooting, flowering, fruit set, fruit development and control of fruit crops.

Unit III: Horticulture-Lawn making and Maintenance (5 hours)

After care of plants: weeding, top dressing methods of pruning and topiary. Lawn making: type of lawn grasses and maintenance. Plants suitable for hedges.

Unit IV – Floriculture: Cultivation and Commercial (4 hours)

Floriculture: cultivation of commercial flowers – Rose, Jasmine and *Chrysanthemum*. Nursery maintenance Cut flowers – flower arrangement, Ikebana.

Unit V – Horticulture- Green House, Landscape, Terrarium, Water Garden (5 hours)

A brief knowledge of annual, biennials and perennials with reference to ornamental gardens. Green house, Landscape, Terrarium, water garden, rockery plants, Bonsai techniques, Hydroponics.

Books for References

1. Allard, R.W. 1960 Principles of plant breeding. John Wiley, NY.
2. Choudhry H. K., 1988. Introduction to Principles of Plant Breeding, Oxford and IBH Co., New Delhi.
3. Randhava, G.S, 1973 – Ornamental horticultural in India Today and Tomorrow Printers and Publishers, New Delhi.

4. Yawalkar, K.S. 1961 – Vegetables crops of India – Agri, Horticultural Publishing House, Nagpur.
5. Chauhan, V.S. Vegetable Production in India, Ramprasad Publications–Agra.
6. Nayak, K.C. South Indian fruits and their culture P.L. Varadaraj & Co., & Lingichetti Street, Madras.
7. Kunte, Y.N. Introduction to principles of fruit growing – Agri – Horticultural Publishing house Dharmapath, Nagpur.
8. Kumar, H.D. Introduction to Horticulture.
9. Bharathidhasan University Publications, Tiruchirappalli.
10. Hand Book of Horticulture, Dr. Chadha – ICAR Publications. 2001.
11. Fundamentals of Horticulture – Edmunt Senn Andrews 1994 Tata McGraw Hill Publishing Co., Ltd., Delhi.

Web Resources

1. http://agritech.tnau.ac.in/horticulture/horti_landscaping.html.
2. https://agritech.tnau.ac.in/horticulture/horti_Landscaping_principles.html
3. http://apeda.gov.in/apedawebsite/SubHead_Products/Floriculture.html

Course Outcomes		K Level
After the completion of the course, student will able to		
CO 1	various methods of selection in plant breeding	K1
CO 2	asserts the mutation and level of ploidy	K2
CO 3	the landscape designing methods	K2
CO 4	get employment in agriculture and horticulture centres and plant breeding centre	K4
CO 5	entrepreneur by ornamental plant propagation	K5

Relationship matrix for CO, PO & PSO

Course Outcome (CO)	Programme Outcome (PO)					Programme Specific Outcome (PSO)					
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO 1	3	2	2	2	2	3	2	3	2	3	24
CO 2	2	3	2	2	2	2	2	3	2	2	22
CO 3	2	2	2	2	2	3	2	2	3	2	22
CO 4	3	2	2	2	2	2	2	3	2	3	23
CO 5	2	3	2	2	1	3	2	3	2	2	22
											113

Mean overall Relationship is 2.26 which is **High**

Title of the course: ORGANIC FARMING

Category of the course: SEC

Course code: U4R2BOSEC1:2

Nature of the course: Entrepreneurship

Marks: CIA: 25 + Ext: 75 = 100

Credits: 2

Hrs / Week: 2

Total Inst. Hrs: 24

Course Objectives

- To discuss on the impact of products of chemical based agriculture.
- To discuss on the importance of sustainable agriculture.
- To acquire knowledge on concepts of organic farming
- To study the Management of organic wastes and green manures
- To get knowledge on Bio fertilizer applications

Unit-I: Soil- Physical and Chemical Properties, Soil pollution (5 hours)

Soil – physical, chemical properties. Soil pollution – oil, chemicals –fertilizers, pesticide and herbicide, – non-degradable solids, bio-magnification, consequences of land pollution – damage to soil and crops, heavy metal contamination.

Unit-II: Organic Farming- Basic Concept, Sustainable Agriculture Practice (5 hours)

Organic farming – definition, basic concept of organic farming, integrated plant nutrient supply management, integrated insect pest and diseases management, integrated soil and water management. Sustainable agriculture practice – crop rotation, crop diversification, mixed cropping, biological nitrogen fixation.

Unit-III: Green Manures- Methods and Production of Vermicompost (5 hours)

Management of organic wastes and green manures: Farm manures, Composts, Mulches, Tillage and Pest control. Organic manures – organic residue, chemical nature of organic manure, green manure, importance of green manure, crops of green manure, oil cake. Animal based organic manure – cow dung, poultry waste, vermicompost – methods, production and utilization. Preservation of Panchakavya.

Unit-IV: Bio-fertilizers- Nitrogen Fixers, Pest and disease management (5 hours)

Biofertilizers–classification, nitrogen fixers– *Rhizobium*, *Azotobacter*, cyanobacteria, *Azolla*, *Frankia*. *Azospirillum* and Vesicular Arbuscular Mycorrhizae. Pest and disease management: classification of pest, integrated pest management components; cultural, mechanical, physical control of pest. Biopesticides against microbial parasites, predators and insects.

Unit-V: Organic Farming- Biosafety, GMO and Regulations: (4 hours)

IPR and Patenting issues, Principles of biosafety, GMO and regulations; organic produce – consumer confidence, conversion period. Inspection and certification. Accredited certifying agents (Natl and Intl), Quality assurance – logo and labeling.

Books for References

1. Sharma, A.K., 2003. Bio-fertilizers for sustainable agriculture, Agrobios.
2. NIIR Board, 2004. The Complete Technology Book on Bio-fertilizer and Organic Farming, National Institute of Industrial Research.
3. Gupta, O.P. 1998. Weed management principles and practices, Agro botanical Publishers. Bilaneers.
4. Hosmani, M.M. 1995. Integrated weed management in field crops, Hosmani Publishers, Dharward.
5. Rao, V.S. 1983. Principles of weed science. Oxford and IBH, New Delhi.

Web Links

1. http://www.fnca.mext.go.jp/english/bf/bfm/pdf/4_4_Phosphate_Solubilizers0403.pdf
2. http://www.fnca.mext.go.jp/english/bf/bfm/pdf/Biofertilizer_Manual.pdf
3. <https://www.springer.com/gp/book/9783030189327>

Course Outcomes		K Level
After the completion of the course, student will able to		
CO 1	Describe the regulations that govern organic farming and summaries the goals and objectives of organic farming.	K1& K2
CO 2	about the organic certification process and procedure	K3
CO 3	become an entrepreneur, incorporate the expertise.	K4
CO 4	Examine the procedures for preserving soil fertility and plant productivity.	K5
CO 5	Prepare a pest management strategy for a variety of crops.	K6

Relationship matrix for CO, PO & PSO

Course Outcome (CO)	Programme Outcome (PO)					Programme Specific Outcome (PSO)					
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO 1	2	3	2	2	2	3	2	3	2	3	24
CO 2	2	2	2	3	2	3	3	2	2	2	23
CO 3	3	2	2	2	2	3	2	3	2	3	24
CO 4	2	3	2	2	2	3	2	3	2	2	23
CO 5	2	1	2	2	2	2	3	2	3	2	21
											115

Mean overall Relationship is 2.3 which is **High**

Title of the course: MUSHROOM CULTURE TECHNOLOGY

Category of the course: SEC

Course code: U5R2BOSEC2:1

Nature of the course: Entrepreneurship

Marks: CIA: 25 + Ext: 75 = 100

Hrs / Week: 3

Credits: 2

Total Inst. Hrs: 36

Course Objectives

- To learn basic knowledge on mushroom.
- To develop the skills to differentiate the edible and poisonous mushrooms.
- To understand the values and value added products of mushroom.
- To know the various steps in mushroom cultivation.
- To learn the economic importance of mushrooms

Unit –I: Mushroom- History, Scope and Types (7 hours)

Introduction - history - scope of edible mushroom cultivation - Types of edible mushrooms available in India – *Volvariella volvacea*, *Pleurotus citrinopileatus*, *Agaricus bisporus*.

Unit –II: Mushroom-Medium Preparation and Sterilization (8 hours)

Pure culture - preparation of medium (PDA and Oatmeal agar medium) sterilization - preparation of test tube slants to store mother culture – culturing of *Pleurotus* mycelium on petriplates, preparation of mother spawn in saline bottle and polypropylene bag and their multiplication.

Unit –III: Mushroom-Cultivation and Bed Preparation (7 hours)

Cultivation Technology: Infrastructure- substrates (locally available) Polythene bag, vessels, inoculation loop, low cost stove, sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag, Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves. Factors affecting the mushroom bed preparation - Low cost technology, composting technology in mushroom production.

Unit –IV: Mushroom- Storage, Nutrition and Mineral elements (7 hours)

Storage and nutrition: Short-term storage (Refrigeration - upto 24 hours) Long term Storage (canning, pickles, papads), drying, storage in salt solutions. Nutrition - Proteins - amino acids, mineral elements nutrition -Carbohydrates, Crude fibre content - Vitamins.

Unit –V: Mushroom- Types of foods prepared and Marketing (7 hours)

Food Preparation- Types of foods prepared from mushroom; Soup, Cutlet, Omelette, Samosa, Pickles, Curry. Research Centres - National level and Regional level. Cost benefit ratio - Marketing in India and abroad, Export Value.

Books for Reference

1. Marimuthu, T. Krishnamoorthy, A.S. Sivaprakasam, K. and Jayarajan. R 1991 Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
2. Swaminathan, M. 1990 Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore -560018.
3. Tewari, PankajKapoor, S.C., 1988 Mushroom cultivation, Mittal Publications, Delhi.
4. Nita Bahl 1984-1988 Hand book of Mushrooms, II Edition, Vol. I &Vol.II.
5. Chang S.T. and P.G. Miles 2004 Mushrooms: Cultivation, Nutritional value, Medicinal effect and Environmental Impact (II Edition). CRC Press
6. Suman, B.C., V.P. Sharma 2007 Mushroom Cultivation in India. Daya Publication House.

Web Links

4. http://www.fnca.mext.go.jp/english/bf/bfm/pdf/4_4_Phosphate_Solubilizers0403.pdf
5. http://www.fnca.mext.go.jp/english/bf/bfm/pdf/Biofertilizer_Manual.pdf
6. <https://www.springer.com/gp/book/9783030189327>.

Course Outcomes		K Level
After the completion of the course, student will able to		
CO 1	start a mushroom cultivation firm on a small scale.	K1
CO 2	morphology and types of Mushrooms.	K3
CO 3	the identification of edible and poisonous Mushrooms	K4
CO 4	produce spawn on their own	K4
CO 5	understand diseases in mushroom post harvesting techniques.	K6

Relationship matrix for CO, PO & PSO

Course Outcome (CO)	Programme Outcome (PO)					Programme Specific Outcome (PSO)					
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO 1	3	2	2	2	2	3	2	3	2	3	24
CO 2	2	3	2	2	2	2	3	2	3	2	23
CO 3	2	2	2	2	2	3	2	3	2	2	22
CO 4	2	3	2	2	2	3	3	2	2	2	23
CO 5	1	2	2	2	2	2	2	2	2	3	20
											112

Mean overall Relationship is 2.3 which is **High**

Title of the course: COMPUTER APPLICATIONS IN BIOLOGY

Category of the course: SEC

Course code: U5R2BOSEC2:2

Nature of the course: Employability

Marks: CIA: 25 + Ext: 75 = 100

Hrs / Week: 3

Credits: 2

Total Inst. Hrs: 36

Course Objectives

- To study the basics of computer and classification of computer
- To study about the parts of the computer and its output devices
- To concentrate the operating system, input and output operations
- To study the basics of bioinformatics and applications
- To learn the basic principles of operating system

Unit – I: Computer Applications- Types, Classification of computer (8 hours)

Introduction to Computers: Introduction – Types of Computers – Characteristics of Computers. Generations of Computers - Classification of Computers – Programming Languages: Machine Language – Assembly Language – High level languages.

Unit – II: Computer Applications- Input and Storage Devices (7 hours)

Input Devices- Keyboard – Mouse - Types of mice – Connections – Mouse Pad - Trackball – Joystick -Output Devices – Dot Matrix Printer – Inkjet – Laser Printer – LCD & LED Printers– Line Printer Auxiliary Storage Devices : Hard Disk – CD –DVD – primary memory

Unit – III: Computer Applications- Operators and Expression (7 hours)

Operators and Expression – Evaluation of expressions – Type conversions in expressions – Operator precedence and associativity – Mathematical functions. Managing input and output operations: Reading and writing a character – Formatted input and output.

Unit – IV: Computer Applications- Components of Computer (7 hours)

Components of computer - fundamental of networking, internet, intranet, search engines- yahoo, Google, etc. telnet, ftp, introduction to databases.

Unit – V: Computer Applications- Bioinformatics and Biological Databases (7 hours)

Introduction to bioinformatics, scope, biological databases - NCBI, EMBL and DDBJ. Pair-wise sequence analysis, local and global alignment, BLAST and FASTA, DNA sequencing methods. Protein sequencing.

Books for References

1. Lodish H. et al 2000 Molecular cell Biology W.H.Freeman& West Company New York.
2. LeonF.andLean.M (2004) Fundamentals of Computer Science and communication Engineering Lean Tech World.
3. ParameswaranR (1997) Computer application in Business, S. Chand & Co., New Delhi.

4. Rajaraman V (1988) Fundamentals of Computer Practice Prentice Hall of India (P) Ltd. New Delhi.
5. Mittal C (2003) Fundamentals of Information Technology Pragathi Prakasam, Meerut.
6. Pierluigi Frisco, Marian Gheorghe... in Emergence, Complexity and Computation (2014). Applications of Membrane Computing in Systems and Synthetic Biology. Springer.
7. Lou Katz, Cyrus Levinthal (1971). Computer Graphics in Molecular Biology. Springer

Web Resources

1. <http://www.bio-nica.info/biblioteca/OksmanCaldentey2002PlantBiotechnology.pdf>
2. <http://epgp.inflibnet.ac.in/Home/ViewSubject?catid=3>
3. <https://www.cambridge.org/core/journals/genetics-research/article/principles-of-genemanipulation-and-genomics-7th-edition>

Course Outcomes		K Level
After the completion of the course, student will able to		
CO 1	the basic knowledge of computer and its uses	K1
CO 2	experienced about operating the input and output devices	K2
CO 3	employability in computer centres	K4
CO 4	understand the relationship between computer in biology	K5
CO 5	differentiate sorts of biological databases should be classified.	K6

Relationship matrix for CO, PO & PSO

Course Outcome (CO)	Programme Outcome (PO)					Programme Specific Outcome (PSO)					
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO 1	2	3	2	2	2	2	3	2	2	2	22
CO 2	3	2	2	2	2	3	2	3	2	2	23
CO 3	2	2	2	2	2	3	2	2	3	2	22
CO 4	3	2	2	2	2	2	2	3	2	2	22
CO 5	2	2	2	2	1	3	2	2	2	2	20
											109

Mean overall Relationship is **2.18** which is **High**

Title of the course: BIO-FERTILIZER PRODUCTION AND APPLICATIONS
Category of the course: SEC
Course code: U6R2BOSEC3:1
Nature of the course: Entrepreneurship
Marks: CIA: 25 + Ext: 75 = 100
Credits: 2

Hrs / Week: 2
Total Inst. Hrs: 24

Course Objectives

- To understand the microorganism can be used as bio-fertilizers
- To learn the technology of inoculums to the bio fertilizers production
- The acquire knowledge to produce the some bio fertilizers in large scale
- To motivate the students to become as entrepreneurs.
- To learn the economic importance of Bio-fertilizers

Unit – I: Bio-fertilizers- Classification, Isolation and Identification (5 hours)

an introduction to Bio-fertilizers – Microbes used as bio-fertilizer – Classification. Symbiotic N₂ Fixers: Rhizobium – Isolation, Identification and characterization - large scale production and field application.

Unit – II: Symbiotic N₂fixers-Isolation, Identification and Production (5 hours)

Symbiotic N₂fixers: Isolation, Identification large scale production, crop response, and field application of *Cyanobacteria* and *Azolla*. Isolation and characterization of Frankia – Actinorhizal nodules – non-leguminous crop symbiosis.

Unit – III:Non symbiotic N₂ fixers- Isolation, Identification and Production (5 hours)

Non symbiotic N₂ fixers: Isolation, Identification large scale production, crop response, and field application of *Azospirillum* and *Azotobacter*.

Unit – IV: Phosphate solubilizers - Isolation & characterization (5 hours)

Phosphate solubilizers: Isolation, characterization, mass inoculums production, field application of *Bacillus firmus* and *Pseudomonas* - Phosphate solubilisation mechanism.

Unit – V: MycorrhizalBio-fertilizers- Classification, Isolation & Identification (4 hours)

MycorrhizalBio-fertilizers: Classification, Isolation, Identification, Mass inoculum production, field application of Ecto and Endo mycorrhizae

Books for References

1. Kannaiyan S, 2003. Biotechnology of Bio-fertilizers, CHIPS, Texas.
2. SubbuRao, N.S, 2000. Bio-fertilizers in Agriculture, Oxford & IBH Publishing Co, New Delhi.
3. http://www.fnca.mext.go.jp/english/bf/bfm/pdf/4_4_Phosphate_Solubilizers0403.pdf
4. H. A. Modi, 2012. Microbial Inoculants And Biofertilizer Technology, Neha Publishers & Distributors
5. H.C. Lakshman, Channabasava A, Bio-fertilizers and Biopesticides, 2014. Neha Publishers & Distributors.

Web Links

1. http://www.fnca.mext.go.jp/english/bf/bfm/pdf/4_4_Phosphate_Solubilizers0403.pdf
2. http://www.fnca.mext.go.jp/english/bf/bfm/pdf/Biofertilizer_Manual.pdf
3. <https://www.springer.com/gp/book/9783030189327>.

Course Outcomes		K Level
After the completion of the course, student will able to		
CO 1	bio fertilizers are only source for recovery the soil fertility	K2
CO 2	the organism identity and their applications	K3
CO 3	methods for large scale production of biofertilizers	K4
CO 4	get employment in biofertilizers companies and they could become as entrepreneurs	K6
CO 5	Examine the procedures for keeping soil fertility and plant productivity in good shape.	K6

Relationship matrix for CO, PO & PSO

Course Outcome (CO)	Programme Outcome (PO)					Programme Specific Outcome (PSO)					
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO 1	2	3	2	2	2	2	2	3	2	2	22
CO 2	2	2	3	2	2	3	2	2	3	2	23
CO 3	2	3	2	2	2	3	2	3	2	2	23
CO 4	3	2	2	2	1	2	3	2	2	2	21
CO 5	2	2	2	2	2	3	2	2	2	3	22
											111

Mean overall Relationship is 2.22 which is **High**

Title of the course: GREEN NANOTECHNOLOGY

Category of the course: SEC

Course code: U6R2BOSEC3:2

Nature of the course: Skill development

Marks: CIA: 25 + Ext: 75 = 100

Hrs / Week: 2

Credits: 2

Total Inst. Hrs: 24

Course Objectives

- To study the basic elements of interface, concepts between biology and nanotechnology.
- To study the microbial synthesis of nano particles
- To explain the natural rubbers, fibres and their biodegradability
- To learn the economic importance of green nanotechnology
- To study the importance of food industries

Unit – I: Green Nanotechnology-Green Chemistry, Synthesis (4 hours)

Nano technology processes – Nano Engineering materials for Pollution Prevention, Green Chemistry, Energy efficient resources and materials, Nano technology products- Nanomaterials (nanostructures) Nanodevices and Nanosystems. Synthesis of Nanomaterials

Unit – II: Green Nanotechnology-Microbial Synthesis and Biomaterials (5 hours)

Nano particles and Microorganisms, Microbial Synthesis of Nano materials, Biological Methods for Synthesis of nano-emulsions using bacteria, Fungi and Actinomycetes, Plants based nanoparticle synthesis, Nano composite biomaterials – Fibres, Devices and Structures, Nano Bio systems.

Unit– III: Green Nanotechnology-Commercial Plastics, Nanocomposites (5 hours)

Introduction to commercial plastics and elastomers -Natural Rubber (NR), modified NR and blends -Polyesters from microbial and plant biofactories (polylactic acid and poly hydroxyalkanoates) -Plastics from vegetable oils -Cellulose and starch based materials -Natural fillers, fibers, reinforcements and clay nanocomposites -Biodegradability, life cycle assessment and economics of using natural materials.

Unit– IV: Green Nanotechnology-Optical Microscopy (5 hours)

Optical Microscopy, Scanning Electron Microscopy, Transmission Electron Microscopy, Atomic Force Microscopy, Scanning Tunneling Microscopy, Optical Absorption and Emission Spectroscopy, Thermo gravimetric Analysis, Differential Scanning Calorimetry, Thermo mechanical Analysis, X-Ray, neutron diffraction.

Unit – V: Green Nanotechnology-Food industry and Contaminant detection (5 hours)

Nanotechnology in Agriculture -Precision farming, Smart delivery system – Insecticides using nanotechnology – Potential of nano-fertilizers - Nanotechnology in Food industry - Packaging, Food processing - Food safety and biosecurity – Contaminant detection – Smart packaging

Books for References

1. Nabok A., "Organic and Inorganic Nanostructures", Artech House, 2005.
2. Dupas C., Houdy P., Lahmani M., "Nanoscience: Nanotechnologies and Nanophysics", Springer-Verlag Berlin Heidelberg, 2007.
3. Pradeep T., "A Textbook of Nanoscience and Nanotechnology", Tata McGraw Hill Education Pvt. Ltd., 2012.
4. Hari Singh Nalwa, "Nanostructured Materials and Nanotechnology", Academic Press, 2002.

Web Resources

1. <https://www.cambridge.org/core/journals/genetics-research/article/principles-of-genemanipulation-and-genomics-7th-edition>
2. <http://epgp.inflibnet.ac.in/Home/ViewSubject?catid=3>
3. <http://www.bio-nica.info/biblioteca/OksmanCaldentey2002PlantBiotechnology.pdf>

Course Outcomes		K Level
After the completion of the course, student will able to		
CO 1	basic elements of interface, concepts between biology and nanotechnology.	K2
CO 2	Construct various types of nanomaterial for application and evaluate the impact on environment.	K3
CO 3	Explain the synthesis approaches for nanomaterial and its characterization.	K4
CO 4	applications of green nanotechnology	K5
CO 5	evaluate the impact on environment.	K6

Relationship matrix for CO, PO & PSO

Course Outcome (CO)	Programme Outcome (PO)					Programme Specific Outcome (PSO)					
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO 1	2	3	2	2	2	3	2	3	2	2	23
CO 2	3	2	2	2	2	2	3	2	3	2	23
CO 3	2	2	2	2	2	3	2	3	2	3	23
CO 4	3	2	2	2	2	2	3	2	2	2	22
CO 5	2	2	2	2	1	3	2	2	3	2	21
											112

Mean overall Relationship is 2.24 which is **High**

Title of the Course : **GENDER STUDIES**
Category of the Course : **Ability Enhancement Compulsory Course-III**
Course Code : **U6R2AECC3**
Nature of the Skill : **Life Skills**

Marks : CIA: 25 +Ext: 75 = 100

Hrs / Week : 02

Credits : 02

Total Inst. Hrs: 24

Course Objectives

1	To help learners to see their strength and weakness in gender relations.
2	To develop sensitivity to gender-issues in order to lead an ethically enriched life.
3	To enable the learners to realize the discrimination existing in society based on gender, class, caste, and religion.
4	To help learners to re-examine and analyze the gender bias in the society, in the family and in everyday activities.
5	To promote attitudinal change to assure in a gender balanced ambience and women empowerment.

UNIT I

(Inst. Hrs: 05)

Concept of Gender: Sex Gender – Biological Determinism – Patriarchy – Feminism – Gender Discrimination – Gender Division of Labour – Gender Stereotyping – Gender sensitivity Gender Equality – Gender mainstreaming – empowerment.

UNIT II

(Inst. Hrs: 04)

Women's studies Vs Gender studies: UGC's Guidelines – VIII to XI Plans, Gender studies Beijing Conference and CEDAW – Exclusiveness and inclusiveness.

UNIT III

(Inst. Hrs: 05)

Areas of Gender discrimination: Family, Sex ratio, literacy, Health, Governance, religion, Work Vs employment – Market, Media, Politics, Law, Domestic violence, Sexual Harassment, State politics and planning.

UNIT IV

(Inst. Hrs: 04)

Women development and gender empowerment: initiatives, International Women's decade, International women's year, National policy for Empowerment of women, Women Empowerment year 2011, Mainstreaming global policies.

UNIT V

(Inst. Hrs: 06)

Women's Movements: In India National / State Commission for Women (NCW), all women police station, Family court, Domestic violence Act, Prevention of Sexual Harassment at work place - Supreme Court guidelines, Maternity Benefit Act, PNDT Act, Hindu Succession Act 2005, Eve teasing prevention Act, Self help groups, 73rd and 74th amendment for PRIS.

Web Source:

<https://www.boisestate.edu/genderstudies/why-gender-studies/>

<https://www.smilefoundationindia.org/blog/women-empowerment-and-gender-justice-in-india/>

REFERENCE

1. Bhasin kamala, Understanding Gender: Gender basics, New Delhi: Women Unlimited, 2004.
2. Rajadurai, S. V., Geetha V, Themes in caste Gender and Religion, Trichy, Bharathidasan University, 2007.
3. Pauldi, A Michele (ed...) Prager guide to the Psychology of Gender.

OUTCOME:

Course Name: Gender Studies		Course Code: U6R2AECC3	Knowledge Level
On completion of the course, students will be able to			
1	perceive gender roles objectively.		K6
2	practise gender equity in family and social relations		K4
3	assess degrees of inclusion and exclusion in the socio-political fabric.		K5
4	evaluate familial/social roles to avert marginalization of any sort.		K5
5	develop a healthy and constructive attitude towards gender issues.		K6

Relationship Matrix for CO, PO, PSO

Title of the Course : Gender Studies						Course code : U6R2AECC3					
Course Outcome (CO)	Programme Outcome (PO)					Programme Specific Outcome (PSO)					Mean Score of COs
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO – 1	3	2	2	3	1	3	3	3	2	3	2.5
CO – 2	3	1	1	2	3	3	2	2	3	1	2.1
CO – 3	2	3	1	2	2	3	3	2	3	2	2.3
CO – 4	2	1	3	3	2	2	3	2	3	2	2.3
CO – 5	1	3	2	2	3	3	1	2	3	3	2.3
	Mean Overall Score										2.30
	Result										HIGH

Title of the course: VERMI-TECHNOLOGY

Category of the course: GEC

Course code: UR2BOGEC1

Nature of the course: Entrepreneurship

Marks: CIA: 25 + Ext: 75 = 100

Hrs / Week: 2

Credits: 2

Total Inst. Hrs: 24

Course Objectives

- Provide basic understanding of biological, chemical and environmental concepts pertaining to vermitechnology.
- To create knowledge on Environmental degradation.
- To get the theoretical knowledge on vermicompost bed preparation
- To create knowledge on Self -Employment Opportunity

Unit – I: Vermiculture- Scope, Importance and Common Species (5 hours)

Vermiculture: definition, scope and importance - common species for culture - Environmental requirements - culture methods – Benefits and constraints of vermicomposting.

Unit – II: Earthworms- Types - morphology and physiology (5 hours)

Earthworms: Taxonomic position and diversity – Types - morphology and physiology of earthworm - Ecological roles and needs for earthworm culture- wormery breeding techniques - indoors and out door cultures - monoculture and polyculture - relative merits and demerits.

Unit – III: Vermiculture-Composting, Management & Forest Regeneration. (5 hours)

Applications of Vermiculture: Vermin-composting, use of vermicastings in organic farming / horticulture - earthworms for management of biomedical solid wastes - feed / bait for capture / culture fisheries – forest regeneration.

Unit – IV: Vermiculture-Marketing, Packaging & Transport (5 hours)

Marketing the products of vermiculture - quality control, market research, marketing techniques - creating the demand by awareness, demonstration, and advertisements - packaging and transport - direct marketing.

Unit – V: Vermiculture-Cost-benefit Analysis (4 hours)

Future perspectives - Predator / pathogen control in wormeries - Cost-benefit analysis of vermicomposting - Potentials and constraints for vermiculture in India.

Books for References

1. Sultan Ahmed Ismail, 2005. The Earthworm Book, Second Revised Edition. Mother India Press, Goa.
2. Edwards, C.A. and Bohlen, P.J 1996, ecology of earthworms – 3 rd Edition, Chapman and hall.
3. Jsmail, S.A., 1970, Vermicology, The biology of earthworms, Orient Longman, London.
4. Lee, K.E., 1985. Earthworms - Their ecology and Relationship with Soil and Land use, Academic Press, Sydney.
5. Shukla, G.S 1994. Economic Zoology. Meerut Rastogi publication.

Web Links

1. http://www.fnca.mext.go.jp/english/bf/bfm/pdf/4_4_Phosphate_Solubilizers0403.pdf
2. http://www.fnca.mext.go.jp/english/bf/bfm/pdf/Biofertilizer_Manual.pdf
3. <https://www.springer.com/gp/book/9783030189327>.

Course Outcomes		K Level
After the completion of the course, student will able to		
CO 1	the biology of earthworm and its application	K1
CO 2	basic knowledge on vermicompost bed preparation	K2
CO 3	understand has to recycle house made wastes and cattle wastes	K4
CO 4	become as entrepreneur	K6
CO 5	technology of vermicomposting and their applications.	K6

Relationship matrix for CO, PO & PSO

Course Outcome (CO)	Programme Outcome (PO)					Programme Specific Outcome (PSO)					
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO 1	3	2	2	2	2	3	2	2	3	2	23
CO 2	2	3	2	2	2	3	2	3	2	3	24
CO 3	3	2	2	2	2	3	3	2	2	2	23
CO 4	2	3	2	2	2	3	2	2	2	3	23
CO 5	2	2	2	2	2	2	3	2	3	2	22
											115

Mean overall Relationship is 2.3 which is **High**

Title of the course:	FLOWER DECORATION AND BOUQUET PREPARATION	
Category of the course:	GEC	
Course code:	UR2BOGEC2	
Nature of the course:	Entrepreneurship	
Marks: CIA: 25 + Ext: 75 = 100		Hrs / Week: 2
Credits: 2		Total Inst. Hrs: 24

Course Objectives

- Provide basic understanding of basic concepts pertaining to flower decoration and bouquet preparation
- To create knowledge on flower arrangement.
- To get the theoretical knowledge on tools equipment's
- To learn the technical uses of tools and equipments
- To create knowledge on Self –Employment Opportunity

Unit- I: Flower Decoration-History & Flower Arrangement (4 hours)

The History of Floral Design- The History Of Floral Design- Flower And Its Characteristics: Seasonal flowers and their Characteristics (Seasonal Flowers, Wedding Flowers, Funeral and Sympathy Flowers, Flowers and Occasions, Flower For All Season) – Basic Elements of Art in Flower Arrangement: Line, Form or Shape, Texture, Colour, General Guidelines)

Unit -II: Flower Decoration-Basic Principles and Types (5 hours)

Basic Principles of Art in Flower Arrangement: Design Principles, Balance, Proportion And Scale, Focal Point, Rhythm, Harmony - Flowers And Foliages Suitable For Flower Arrangement: Types of Flowers, Types of Foliage.

Unit- III: Flower Decoration-Mechanics and Accessories (5 hours)

Mechanics/Equipments And Tools Required: Flower Holders/Pin Holders, ContainersFloral Form, Accessories- Conditioning cut flowers and foliage: Picking and Collecting Flowers, Conditioning Methods, Care of Flowers, Specific Care and Treatment for Specific Flower, Care Before Arranging

Unit –IV: Flower Decoration-Types of Flower Arrangement (5 hours)

Types of Flower Arrangement; Line Arrangements, Mass Arrangements, Line - Mass Arrangements - Basic Shapes of Flower Arrangements: The Equilateral Triangle, Circular Arrangements, The Fan Arrangement, Conical Design, Crescent Arrangements, The vertical Arrangement, The Miniature Arrangement, Horizontal Arrangement, Hogarth Curve Arrangement

Unit –V: Bouquet- Floral Arrangement (5 hours)

Define bouquets - Plan the floral arrangement according to client's requirements and costs - design patterns- Design floral arrangement for the bouquets - Selection of flower /flora /

foliage/other materials of necessary for the arrangement of the bouquets - Arrange flower /flora / foliage/other materials as per the selected design/ design patterns.

Books for References

1. Charles Griner, 2005, Floriculture- Designing and Merchandising, Delmar Publishers, An International Thomson Publishing Company.
2. Anna Hong Rutt, 1960,"The Art of Flower and Foliage Arrangement" Macmillan company, New York

Web links

1. <http://www.flower-arrangement-advisor.com/type-of-foliage.html>
2. <http://www.theflowerexpert.com/content/giftflowers/flow>

Course Outcomes		K Level
After the completion of the course, student will able to		
CO 1	Identification, characterization and storage of seasonal flowers.	K1
CO 2	Identification, characteristics and storage of bulbs	K3
CO 3	Selection and preparation, drying and preservation of flowers and foliage.	K4
CO 4	Application of flower arrangements for different areas and occasions.	K5
CO 5	Preparation of permanent flowers and Preparation of bouquets, garlands etc.	K6

Relationship matrix for CO, PO & PSO

Course Outcome (CO)	Programme Outcome (PO)					Programme Specific Outcome (PSO)					
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO 1	3	2	2	2	2	3	2	3	2	2	
CO 2	2	2	3	2	2	2	2	2	2	2	
CO 3	3	2	2	2	2	3	2	2	3	2	
CO 4	2	2	2	2	2	3	2	2	2	2	
CO 5	2	2	2	2	1	2	3	2	2	2	

Mean overall Relationship is **2.16** which is **Medium**