B.Sc. BOTANY

SYLLABUS - 2017

SCHOOLS OF EXCELLENCE
with
CHOICE BASED CREDIT SYSTEM (CBCS)

SCHOOL OF BIOLOGICAL SCIENCES
St. JOSEPH'S COLLEGE (Autonomous)
Special Heritage Status Awarded by UGC
Accredited at 'A' Grade (3rd cycle) by NAAC
College with Potential for Excellence Conferred by UGC
DBT-STAR & DST-FIST Sponsored College
TIRUCHIRAPPALLI - 620 002, INDIA

SCHOOLS OF EXCELLENCE
WITH CHOICE BASED CREDIT SYSTEM
(CBCS)

UNDERGRADUATE COURSES

St. Joseph's College (Autonomous), a pioneer in higher education in India, strives to work towards the academic excellence. In this regard, it has initiated the implementation of five "Schools of Excellence" from the academic year 2014 – 15, to standup to the challenges of the 21st century.

Each School integrates related disciplines under one roof. The school system allows the enhanced academic mobility and enriched employability of the students. At the same time this system preserves the identity, autonomy and uniqueness of every department and reinforces their efforts to be student centric in curriculum designing and skill imparting. These five schools will work concertedly to achieve and accomplish the following objectives:

- Optimal utilization of resources both human and material for the academic flexibility leading to excellence.
- Students experience or enjoy their choice of courses and credits for their horizontal mobility.
- The existing curricular structure as specified by TANSCHE and other higher educational institutions facilitate the Credit-Transfer Across the Disciplines (CTAD) - a uniqueness of the choice based credit system.
- Human excellence in specialized areas
- Thrust in internship and / or projects as a lead towards research and
- The multi-discipline nature of the newly evolved structure (School System) caters to the needs of stake-holders, especially the employers.

What is Credit system?

Weightage to a course is given in relation to the hours assigned for the course. Generally one hour per week has one credit. For viability and conformity to the guidelines credits are awarded irrespective of the teaching hours. The following Table shows the correlation between credits and hours. However, there could be some flexibility because of practicals, field visits, tutorials and nature of project work.

For UG courses, a student must earn a minimum of 150 credits as mentioned in the table below. The total number of minimum courses offered by a department are given in the course pattern.

SUMMARY OF HOURS AND CREDITS
UG COURSES

Part	Semester	Specification	No. of Courses	Hours	Credits	Total Credits
I	I-IV	**Languages** (Tamil/Hindi/French/Sanskrit)	4	16	12	**12**
II	I-IV	**General English**	4	20	12	**12**
III	I-VI	**Core**				
		Theory	11-16			
		Practicals	3-6			
	V-VI	Project Work	1	90	60	
	IV-VI	**Core Electives**	3	12	12	
	V	Self-paced Learning (Partial Online Course)	1	-	2	
	VI	Comprehensive Examination	1	-	2	
	I-VI	**Allied**	4/6	24	20	
	III & V	**Extra Credit Courses**	**2**	**-**	**(4)**	
	VI	**Internship**	1	-	2	**98**
1V		**Skilled Based Electives:**				
	V	Between Schools (BS)	1	2	2	
	VI	Within School (WS)	1	2	2	
	V	**Inter Departmental Courses (IDC)** Soft Skills / NCC	1	2	2	
		Non-Major Courses (NMC)				
	I	Communicative English	1	-	5	
	II	Computer Literacy	1	2	2	
	III	Environmental Studies (Partial Online Course)	1	2	2	
	I-IV	**Value Education**	4	8	8	**23**
V	I-V	**SHEPHERD & Gender Studies**	-	-		
	I-V	**AICUF, Fine Arts, Nature Club, NCC, NSS**	-	-	-	
	V	**Career Guidance & Training**	**-**	**-**	**-**	**5**
		TOTAL		**180**	**150**	**150 (+4 extra credits)**

Course Pattern

The Undergraduate degree course consists of five vital components. They are as follows:

Part -I : Languages (Tamil / Hindi / French / Sanskrit)
Part-II : General English
Part-III : Core Course (Theory, Practical, Core Electives, Allied, Project, Internship and Comprehensive Examinations)
Part-IV : SBE, NMC, Value Education, Soft Skills/National Cadet Corps and Environmental Studies (EVS)
Part-V : Community Service (SHEPHERD) and Gender Studies, AICUF, Fine Arts, Nature Club, NCC, NSS, etc.

Non-Major Courses (NMC)

There are three NMC's – Communicative English, Computer Literacy and Environmental Studies offered in the I, II & III Semesters respectively.

Extra Credit Courses

In order to facilitate the students gaining extra credits, the extra credit courses are given. There are two extra credit courses – Massive Open Online Courses (MOOC) and Skill-based Course – offered in the III and V Semesters respectively.

According to the guidelines of UGC, the students are encouraged to avail this option of enriching by enrolling themselves in the MOOC provided by various portals such as SWAYAM, NPTEL, etc. Skill based course is offered by the department apart from their regular class hours.

Value Education Courses

There are four courses offered in the first four semesters for the First & Second UG students.

Non-Major Elective / Skill Based Elective

These courses are offered in two perspectives as electives "Within School" (WS) and "Between School" (BS).

Subject Code Fixation

The following code system (11 characters) is adopted for Under Graduate courses:

Year of Revision	UG Code of the Dept	Semester	Specification of the Part	Subject Category	Running no. in that part
↓	↓	↓	↓	↓	↓
17	U##	*x*	*x*	*xx*	*xx*
17	**UBO**	**1**	**3**	**2**	**01**

For Example :

I B.Sc. Botany, first semester **Algae and Bryophytes**
The code of the paper is 17UBO130201.
Thus, the subject code is fixed for other subjects.

Subject Category

00 - Languages (Tamil / Hindi / French / Sanskrit)
01 - General English
02 - Core (Theory, Practical, Comprehensive Exams, Internship and Project)
03 - Core Electives
04 - Allied
05 - Extra Credit Courses
06 - Skill Based Electives (BS) & (WS)
07 - Soft Skill
08 - NMC (Communicative English, Computer Literacy/SAP)
09 - EVS (Environmental Studies)
10 - Value Education
11 - Community Service (SHEPHERD) and Gender Studies
12 - AICUF / Nature Club / Fine Arts / NCC / NSS etc.

EXAMINATION: Continuous Internal Assessment (CIA)

UG - Distribution of CIA Marks	
Passing Minimum: 40 Marks	
Library Referencing	5
3 Components	35
Mid-Semester Test	30
End-Semester Test	30
CIA	**100**

MID-SEM & END–SEM TEST

Centralised – Conducted by the office of COE

1. Mid-Sem Test & End-Sem Test: (2 Hours each); will have Objective + Descriptive elements; with the existing question pattern PART-A, PART-B, and PART-C.
2. CIA Component III for UG & PG will be of 15 marks and compulsorily objective multiple choice question type.
3. The CIA Component III must be conducted by the department / faculty concerned at a suitable computer centres.
4. The 10 marks of Part-A of Mid-Sem and End-Sem Tests will comprise only: **Objective Multiple Choice Questions**; **True / False**; and **Fill-in the Blanks**.
5. The number of hours for the 5 marks allotted for Library Referencing work would be 30 hours per semester. The marks scored out of 5 will be given to all the courses of the semester.
6. English Composition once a fortnight will form one of the components for UG General English.

SEMESTER EXAMINATION

Testing with Objective and Descriptive questions

Part-A: Objective MCQs only (30 Marks)

Answers are to be marked on OMR score-sheet. The OMR score-sheets will be supplied along with the Main Answer Book. 40 minutes after the start of the examination the OMR score-sheets will be collected

Part-B & C: Descriptive (70 Marks)

Part-B: 5 x 5 = 25 marks (Inbuilt Choice);
Part-C: 3 x 15 = 45 marks; 3 out of 5 questions (Open Choice).

The Accounts Paper of Commerce will have
Part-A: Objective = 25
Part-B: Descriptive 3 x 25 = 75 marks.

Duration of Examination must be rational; proportional to teaching hours 90 minute-examination / 50 Marks for courses of 2/3 hours/week (all Part IV UG Courses) 3-hours examination for courses of 4-6 hours/week.

Grading System

1. Grading

The total marks will be calculated by adding both CIA and the end-semester examinations for each of the courses. The total marks thus obtained will then be graded as per details provided in the following Table-1.

From the second semester onwards, the total performance within a semester and the continuous performance starting from the first semester are indicated by Semester **Grade Point Average (GPA)** and **Cumulative Grade Point Average (CGPA)** respectively. These two are calculated by the following formulae:

GPA = $\frac{\sum_{i=1}^{n} C_i G_i}{\sum_{i=1}^{n} C_i}$, WAM (Weighted Average Marks) = $\frac{\sum_{i=1}^{n} C_i M_i}{\sum_{i=1}^{n} C_i}$

where, 'C_i' is the Credit earned for the Course-*i,*
'G_i' is the Grade Point obtained by the student for the Course '*i*',
'M' is the marks obtained for the course '*i*', and
'*n*' is the number of Courses **Passed** in that semester.

CGPA: Average GPA of all the Courses starting from the first semester to the current semester.

2. Classification of Final Results

i) For each of the three parts, there shall be separate classification on the basis of the CGPA, as indicated in the following Table-2.

ii) For the purpose of declaring a candidate to have qualified for the Degree of Bachelor of Arts/Science/Commerce/Management/Literature as Outstanding/Excellent/Very Good/Good/Above average/Average, the marks and the corresponding CGPA earned by the candidate in Part-III alone will be the criterion, provided he/she has secured the prescribed passing minimum in the LCs and the ELCs.

iii) Grade in Part-IV and Part-V shall be shown separately and it shall not be taken into account for classification.

iv) Absence from an examination shall not be taken as an attempt.

Table-1: Grading of the Courses

Marks Range	Grade Point	Corresponding Grade
90 and above	10	O
80 and above but below 90	9	A+
70 and above but below 80	8	A
60 and above but below 70	7	B+
50 and above but below 60	6	B
40 and above but below 50	5	C
Below 40	0	RA

Table-2: Final Result

CGPA	Classification of Final Results	Corresponding Grade
9.00 and above	O	Outstanding
8.00 to 8.99	A+	Excellent
7.00 to 7.99	A	Very Good
6.00 to 6.99	B+	Good
5.00 to 5.99	B	Above Average
4.00 to 4.99	C	Average
Below 4.00	RA	Re-appearance

Credit based weighted Mark System isadopted for individual semesters and cumulative semesters in the column 'Marks Secured' (for 100).
A Pass in SHEPHERD will continue to be mandatory although the marks will not count for the calculation of the CGPA.

Declaration of Result:

Mr./Ms. _____ has successfully completed the Under Grduate in _____ programme. The candidate's Cumulative Grade Point Average (CGPA) in Part-III is _____ and the class secured is _____ by completing the minimum of 150 credits. The candidate has acquired _____ (if any) more credits from SHEPHERD / AICUF/ Fine Arts / Sports & Games / NCC / NSS / Nature Club etc. The candidate has also acquired _____ (if any) extra credits offered by the parent department courses.

B.Sc. BOTANY

Course Pattern - 2017 Set

Sem	Part		Code	Subject Title	Hr	Cr
I	I	Language	17UGT110001	Language – I: (Tamil/Hindi/French/Sanskrit)	4	3
	II	English	17UGE120101	General English I	5	3
	III	Core	17UBO130201	Algae and Bryophytes	5	3
			17UBO130202	Fungi, Plant Pathology and Lichens	5	3
			17UBO130203	Lab Course 1	3	2
		Allied	17UBO130401	Allied I: Zoology I: General Zoology	4	3
			17UBO130402	Allied I: Lab. Course: Zoology 1	2	2
	IV	NMC	17UCE140801	Communicative English	-	5
		Val. Edn.	17UFC141001	Essentials of Humanity	2	2
				Total for Semester I	**30**	**26**
II	I	Language	17UGT210002	Language – II: (Tamil/Hindi/French/Sanskrit)	4	3
	II	English	17UGE220102	General English II	5	3
	III	Core	17UBO230204	Pteridophytes, Gymnosperms and Paleobotany	4	3
			17UBO230205	Anatomy and Embryology	4	3
			17UBO230206	Lab Course 2	3	2
		Allied	17UBO230403	Allied I: Zoology II: Agricultural Entomology	4	3
			17UBO230404	Allied I: Lab. Course: Zoology II	2	2
	IV	NMC	17UCE240802	Computer Literacy	2	2
		V. Edn.	17UFC241002	Fundamentals of Human Rights	2	2
				Total for Semester II	**30**	**23**
III	I	Language	17UGT310003	Language – III: (Tamil/Hindi/French/Sanskrit)	4	3
	II	English	17UGE320103	General English III	5	3
	III	Core	17UBO330207	Taxonomy of Angiosperms	5	3
			17UBO330208	Plant Breeding and Evolution	3	2
			17UBO330209	Lab Course 3	3	2
		Allied	17UBO330405A	Allied II: Chemistry for Biologists I (or)	4	3
			17UBO330405B	Allied II: Biometrics & Computer Applications I		
			17UBO330406	Allied II: Lab. Course 1	2	2
		Extra Credit Course	17UBO330501	Massive Open Online Course	-	(2)
	IV	NMC	17UCE340901	Environmental Studies	2	2
		Val. Edn.	17UFC341003A	Formation of Youth-I (or)	2	2
			17UFC341003B	Religious Doctrine-I		
				Total for Semester III	**30**	**22+(2)**

IV	I	Language	17UGT410004	Language – IV: (Tamil/Hindi/French/Sanskrit)	4	3
	II	English	17UGE420104	General English IV	5	3
	III	Core	17UBO430210	Cell Biology and Genetics	5	4
			17UBO430211	Molecular Biology	5	3
			17UBO430212	Lab Course 4	3	2
		Allied	17UBO430407A	Allied II: Chemistry for Biologists II (or)	4	3
			17UBO430407B	Allied II: Biometrics & Computer Applications II		
			17UBO430408A	Allied II: Lab Course 2 (or)	2	2
			17UBO430408B	Allied II: Lab Course 2		
	IV	Val. Edn.	17UFC441004A	Formation of Youth-II (or)	2	2
			17UFC441004B	Religious Doctrine-II		
				Total for Semester IV	**30**	**22**
V	III	Core	17UBO530213	Biophysics and Biostatistics	6	3
			17UBO530214	Ecology and Climate Change	5	3
			17UBO530215	Lab. Course 5	3	2
			17UBO530216	Microbiology and Immunology	5	3
			17UBO530217	Lab. Course 6	3	2
			17UBO530218	Self-Paced Learning: Economic Botany	-	2
		Extra Credit Course	17UBO530502	Extra Credit Course	-	(2)
		Core Elec.	17UBO530301A	Biopesticides (or)	4	4
			17UBO530301B	Medicinal Botany		
	IV	SB Elec.	17UBO540601	(BS): Mushroom Culture	2	2
	IV	IDC	17USS540701A	Soft Skills	2	2
			17USS540701B	NCC		
				Total for Semester V	**30**	**23+(2)**
VI	III	Core	17UBO630219	Internship	-	2
			17UBO630220	Plant Physiology	5	3
			17UBO630221	Lab. Course 7	3	2
			17UBO630222	Genetic Engineering & Biotechnology	5	3
			17UBO630223	Biochemistry	4	3
			17UBO630224	Lab. Course 8	3	2
			17UBO630225	Comprehensive Examination	-	2
			17UBP630226	Project Work (Group)	-	2
		Core Elec.	17UBO630302A	Bio-instrumentation (or)	4	4
			17UBO630302B	Bionanotechnology		
			17UBO630303A	Biological Techniques (or)	4	4
			17UBO630303B	Wood Technology		
	IV	S B Elec.	17UBO640602	(WS) Herbal Technology	2	2
				Total for Semester VI	**30**	**29**
I-V	V		17UCW651101	Community Work (SHEPHERD) & Gender Studies		5
				Total for all Semesters	**180**	**150+(4)**

Programme Outcomes (POs):

1. Undergraduate students are to be passionately engaged in initial learning with an aim to think differently as agents of new knowledge, understanding and applying new ideas in order to acquire employability/ self-employment.
2. Undergraduate students are trained to take up higher learning programmes.
3. Undergraduate students are made to be competent and socially responsible citizen of India.
4. Undergraduate students are to be exposed to technical, analytical and creative skills.
5. Undergraduate students are to be imparted with a broad conceptual background in the Biological sciences / Computing sciences / Languages and culture / Management studies / Physical sciences.

Programme Specific Outcomes (PSOs):

1. Graduates will develop the basic knowledge needed to make substantial contributions to the conservation and sustainable exploitation of the planet.
2. Will learn about of role of genetics which play a role in shaping the future of medicine, health care and food production.
3. Identify and analyze the morphological and anatomical features of plants and plant structures as they enable plant function and reveal plant evolutionary history.
4. Gather, critically assess and utilize primary scientific literature to research a topic.
5. Use interdisciplinary approaches to work on biological problems.
6. Work safely and effectively in the laboratory to generate reproducible and reliable results.
7. Acquire knowledge on various techniques of breeding economically important crops.
8. Exploiting the potentiality of micro organisms for the welfare of human beings by genetic engineering principles.

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பருவம்: 1 **மணி நேரம்: 4**

17UGT110001 **புள்ளிகள்: 3**

பொதுத்தமிழ்-I

பாடத்தின் விளைவு

- சமூக மாற்றச் சிந்தனைகளை உள்ளடக்கிய தற்கால இலக்கியப்பரப்பை அறிதல்
- புதுக்கவிதை, சிறுகதை, உரைநடை ஆகியவற்றின் இலக்கியத்திறன் கண்டறிதல்.
- சந்திப்பிழையின்றி எழுதும் திறன் பெறுதல்.
- வாழ்க்கை வரலாற்றுக் கட்டுரைகளை வாசிக்கும் திறன் பெறுதல்.
- அன்றாடப் பயன்பாட்டிலுள்ள ஆங்கிலச்சொற்களுக்குப் பொருத்தமான சொற்களை உருவாக்கச்செய்தல்
- அரசுப்போட்டித் தேர்வுகளுக்கேற்ப தமிழ்மொழியில் பயிற்சி அளித்தல்.

அலகு-1 மகாகவி பாரதியார் கவிதைகள்
பாரதிதாசன் கவிதைகள்
நாமக்கல் கவிஞர் கவிதைகள்
உரைநடை - முதல் மூன்று கட்டுரைகள் (12 மணி நேரம்)

அலகு-2 பாவலரேறு பெருஞ்சித்திரனார் பாடல்கள்
கண்ணதாசன் கவிதைகள்
இலக்கிய வரலாறு (பக். 239- 300)
இலக்கணம் -வலிமிகும் இடங்கள் (14 மணி நேரம்)

அலகு-3 சமூகக்கவிதைகள்
இலக்கிய வரலாறு (பக்.300 -362)
சிறுகதை - முதல் ஆறு சிறுகதைகள் (14 மணி நேரம்)

அலகு-4 அரசியல் கவிதைகள்
இலக்கணம் - வலி மிகா இடங்கள் (10 மணி நேரம்)

அலகு-5 மொழிபெயர்ப்புக்கவிதைகள்
சிறுகதை- 7 முதல் 12 முடிய உள்ள சிறுகதைகள்
உரைநடை- 4முதல் 6 முடிய உள்ள கட்டுரைகள்
(10 மணிநேரம்)

பாடநூல்

1. பொதுத்தமிழ்- செய்யுள் திரட்டு- தமிழாய்வுத்துறை வெளியீடு-2017-2020
2. சமூகவியல் நோக்கில் தமிழ் இலக்கிய வரலாறு, தமிழாய்வுத்துறை வெளியீடு, தூய வளனார் கல்லூரி, திருச்சிராப்பள்ளி-2
3. உரைநடை நூல் - தமிழாய்வுத்துறை வெளியீடு.
4. சிறுகதைத்தொகுப்பு : (நாட்டுடைமையாக்கப்பட்ட படைப்பாளர்களின் சிறுகதைகள்), தமிழாய்வுத்துறை வெளியீடு.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester I	Course Code 17UGT110001			Title of the Paper பொதுத்தமிழ்-1									Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	5	5	4	3	5	5	4	4	4	3	3	4	5	4.2
CO2	5	5	5	3	4	5	4	5	4	3	3	4	5	4.2
CO3	4	4	5	4	3	4	3	5	4	3	3	4	5	3.9
CO4	5	5	4	4	4	5	5	5	4	3	5	5	5	4.5
CO5	5	5	5	4	4	4	4	5	4	3	4	5	5	4.0
CO6	5	5	5	3	4	4	4	4	4	5	4	3	5	3.8
													Mean Overall Score	4.1

Result: The Score for this Course is 4.1 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

***Values Scaling*:**

Mean Score of COs = $\frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}}$	**Mean Overall Score for COs** = $\frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$

Semestre: I **Hours/Week: 4**
17UGH110001 **Credits : 3**

HINDI

Course Outcomes

At the end of the course, a student should be able to demonstrate…

* Knowledge and understanding of Hindi Conversations
* Improvement of the writing skills.
* Knowledge of Grammar forms
* Effective communicative skills in Hindi.
* The introduction of socially relevant subjects in Modern Hindi Literature
* Appreciation the features of Modern Hindi Prose.

Unit-I **8 hours**

Dr Abdul Kalam, Ling Badaliye, Vachan Badaliye, Baathcheeth-Aspathal Mein

Unit-II **12 hours**

Hamara Rajchinha, Noun Ling, Kaarak Chinha, Chaar Baayee, Baathcheeth, Dookan Mein

Unit-III **12 hours**

Moun hee mantra hai, Vachan, Kaarak, Vishwamitra Ka yagna, Baathcheeth, Hotel mein

Unit-IV **14 hours**

Veer Shivaji, Pronoun, Danush Yagna, Baathcheeth-Maidaan mein

Unit-V **14 hours**

Rajatilak Kee Thaiyaree, Adjectives, Baathcheeth-Pareeksha ke baare mein

Books Recommended

1. Dakshina Bharathi Hindi Prachar Sabha, Thiagaraya Nagar, Chennai – 600 017, Subhodh Hindi Patamala-2, Bharath Milap, Bharath-1, 2016.
2. Ramdev, Vyakaran Pradeep, Hindi Bhavan, 63, Tagore Nagar, Allahabad 2, 2016.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester I	Course Code 17UGH110001					Title of the Paper Hindi-I						Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6		
CO1	4	4	4	3	4	2	2	2	3	4	4		3.2
CO2	3	3	2	3	2	4	4	4	3	3	2		3.0
CO3	3	2	2	3	4	2	2	2	3	4	4		2.8
CO4	3	2	2	3	2	4	4	4	4	2	2		2.9
CO5	3	3	3	3	3	3	4	4	3	3	3		3.2
CO6	4	4	4	4	3	4	3	2	4	3	3		3.4
											Mean Overall Score		3.1

Result: The Score for this Course is 3.1 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semestre: I **Heures /Semaine: 4**
17UGF110001 **Points : 3**

FRANÇAIS-I

Course Outcomes

* Introduire la langue et la culture française aux étudiants
* Comparer la culture de l'Inde et de la France
* Familiariser l'étudiant avec le vocabulaire
* la grammaire et les conversations se présenter
* Donner des informations en Français
* Conjuguer des verbes, Avoir Etre Aller Faire

Unit-I : Al'aéroport Kamaraj domestic de Chennai (10 heures)

Saluer, demander et dire le nom, présenter quelqu'un, se présenter, souhaiter la bienvenue a quelqu'un, demander et dire l'identité de quelqu'un.
Grammaire : Etre, s'appeler, pronoms sujets, interrogation

Unit-II : A l'Université (10 heures)

Demander comment on se porte, présenter quel qu'un, prendre congé, exprimer, l'appréciation.
Grammaire : Articles définis et indéfinis, genre des noms, adjectifs, présent de l'indicatif : verbes réguliers en er, être avoir, apprendre, prépositions a, en, au, aux.

Unit-III : Au café (10 heures)

Dire ce qu'on aime, donner des informations, exprimer l'admiration, demander des informations sur quelqu'un.
Grammaire : Adjectifs interrogatifs, présent de l'indicatif : avoir, verbes en er , savoir, qu'est ce que c'est?, adjectifs possessifs, négation ,adjectifs irréguliers

Unit-IV : A la plage (15 heures)

Proposer une sortie, accepter, refuser la proposition
Grammaire : phrases au singulier et au pluriel, pronom indéfini- on, il y a, adjectifs démonstratifs, négation, interrogation, présent de l'indicatif : faire, voir, aller, sortir, connaitre

Unit-V : Un concert et chez Nalli (15 heures)

Inviter, accepter, exprimer son incapacité d'accepter, complimenter, parlé au téléphone, demander le prix, protester contre le prix.

Grammaire : Présent de l'indicatif : verbes en er, venir, pouvoir, vouloir, articles contracte, avec, a chez, le futur, interrogation est ce que, adverbes

interrogatifs, adjectifs possessifs, accord de l'adjectif, adjectifs exclamatifs, très/trop, présent de l'indicatif : acheter-regarder, l'impératif.

Manuel:

1. K.Madanagobalane, **Synchronie-1**, Samhitâ Publication, 2011.

Livre de référence:

1. Annie Berthet /B_atrix Sampsonis/ Catherine Hugot /V_ronnique M Kizirian / Monique Waendendries, **Alter Ego A1**, Hachette, 2006.
2. Yves Loiseau/R_gineM_rieux, Connexions 1, Didier, 2011.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester I	Course Code 17UGF110001					Title of the Paper French-I						Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6		
CO1	4	4	2	3	4	4	4	2	2	3	3		3.2
CO2	3	3	3	3	4	4	4	3	3	3	2		3.2
CO3	3	2	3	2	4	3	2	4	4	3	3		3.0
CO4	3	3	4	3	4	2	2	3	3	2	2		2.8
CO5	3	3	4	3	4	3	3	3	4	5	2		3.4
CO6	3	4	3	3	3	3	3	3	2	4	3		3.1
										Mean Overall Score			3.1

Result: The Score for this Course is 3.1 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

***Values Scaling*:**

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester: I **Hours/Week: 4**
17UGS110001 **Credits : 3**

SANSKRIT-I

Course Outcomes

At the end of the course, a student should be able to demonstrate…

* Knowledge and understanding of basic Sanskrit grammar
* Knowledge and understanding of essential Sanskrit vocabulary
* Introduction of the writing skills
* Introduction of Sanskrit Aksharas.
* Introduction of Present tense forms
* Implementation of good thoughts from Subashitani

Unit-I **8 hours**

Akharavivaranam – Svaras & Vyanjanaani – Samyukta Aksharani.

Unit-II **12**

Shabdadayah – Aakaaraanta, ikaar aantah. ukaaraantah.

Shabdadayah – Aakaaraanta, iikaar aantah. uukaaraantah.

Unit-III **12**

Anuvaada Prayogah.

Unit- IV **14**

Lat Lakarh – Parasmai – Pada Prayogah = Vakyarupah.

Unit-V **14**

Subhaashitaani

Books Recommended

1. Kulapathy, K. M., Saral Sanskrit Balabodh, Bharathiya Vidya Bhavan, Munshimarg, Mumbai-400 007, 2014
2. R.S. Vadhyar & Sons, Book-Sellers and Publishers, Kalpathi, Palghat-678003, Kerala, SOuth India, Shabdha Manjari, 2014
3. Balasubramaniam R., Samskrita Akshara Siksha, Vangals Publication, 14th Main Road, JP Nagar, Bangalore -78, 2015.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester 1	Course Code 17UGS110001					Title of the Paper Sanskrit-I						Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6		
CO1	5	3	5	4	4	3	3	3	3	3	4		3.1
CO2	4	3	4	4	4	4	4	4	4	3	4		3.3
CO3	4	3	3	4	4	3	4	4	3	3	4		3.1
CO4	4	3	3	4	3	3	4	4	3	3	4		3.0
CO5	4	4	4	3	4	4	3	3	3	4	4		3.1
CO6	5	4	4	4	4	3	3	3	3	3	4		3.1
										Mean Overall Score			3.1

Result: The Score for this Course is 3.1 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester: I **Hours/Week: 5**
17UGE120101 **Credits: 3**

GENERAL ENGLISH-I

Course Outcome

* Introduce themselves to the others
* Narrate simple experiences in a coherent manner
* Understand the underlying meaning in the text
* Describe accurately what he/she observes and experiences
* Converse with friends about their likes and dislikes
* Write leave letters using the appropriate format and language

Unit-I:

01. Personal Details
02. Positive Qualities
03. Listening to Positive Qualities
04. Relating and Grading Qualities
05. My Ambition
06. Abilities and Skills
07. Self-Improvement Word Grid
08. What am I doing?
09. What was I doing?
10. Unscramble the Past Actions
11. What did I do yesterday?

Unit-II:

12. Body Parts
13. Actions and Body Parts
14. Value of Life
15. Describing Self
16. Home Word Grid
17. Unscramble Building Types
18. Plural Form of Naming Words
19. Irregular Plural Forms
20. Plural Naming Words Practice
21. Whose Words?

Unit-III:

22. Plural Forms of Action Words

23. Present Positive Actions
24. Present Negative Actions
25. Un/Countable Naming Words
26. Recognition of Vowel Sounds
27. Indefinite Articles
28. Un/Countable Practice
29. Listen and Match the Visual
30. Letter Spell - Check
31. Drafting Letter

Non-Detailed:

"The Merchant of Venice" from *Six Tales From Shakespeare*

Unit-IV:

32. Friendship Word Grid
33. Friends' Details
34. Guess the Favourites
35. Guess Your Friend
36. Friends as Guests
37. Introducing Friends
38. What are We Doing?
39. What is (s)he / are they Doing?
40. Yes / No Question
41. What was s/he doing?
42. Names and Actions
43. True Friendship
44. Know your Friends
45. Giving Advice/Suggestions
46. Discussion on Friendship
47. My Best Friend

Non-Detailed:

"The Taming of the Shrew" from *Six Tales From Shakespeare*

Unit-V:

48. Kinship Words
49. The Odd One Out
50. My Family Tree

51. Little Boy's Request
52. Occasions for Message
53. Words denoting Place
54. Words denoting Movement
55. Phrases for Giving Directions
56. Find the Destination
57. Giving Directions Practice
58. SMS Language
59. Converting SMS
60. Writing Short Messages
61. Sending SMS
62. The family debate
63. Family Today

Non-Detailed: **"The Tempest" from *Six Tales From Shakespeare***

Textbook

1. Joy, J.L. & Peter, F.M. *Let's Communicate 1*, New Delhi, Trinity Press, 2014. Print.

Non-Detailed Text

1. Dodd, E F. *Six Tales From Shakespeare*. London: Macmillan, 1987. Print. (First three tales)

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester 1	Course Code 17UGE120101					Title of the Paper General English-I								Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	3	4	4	4	5	4	4	4	3	3	4	4	3.80	
CO2	4	3	4	4	4	5	5	4	4	4	4	4	4	4.10	
CO3	4	3	4	4	4	3	3	4	4	3	3	4	4	3.60	
CO4	4	3	2	4	4	4	4	3	3	5	5	4	4	3.80	
CO5	4	3	4	4	4	4	4	3	3	4	4	5	5	3.90	
CO6	5	4	4	3	3	4	4	3	4	4	5	4	4	3.90	
													Mean Overall Score		3.85

Result: The Score for this Course is 3.85 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\textbf{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \textbf{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester I **Hours/Week: 5**
17UBO130201 **Credit: 3**

ALGAE AND BRYOPHYTES

Course Outcomes

1. To understand the salient features of algae and Bryophytes
2. To comprehend the structure and reproduction of various genera mentioned in the syllabus
3. To acquire the basic knowledge of the evolutionary relationship between algae and bryophytes
4. To understand the economical importance of algae and bryophytes
5. To learn the mass culture technique of commercially important algae
6. To conserve them in their natural environment.

Unit-I

General characteristics of algae. Classification (F.E. Fritsch). General characteristics of the various classes as per Fritsch's system. Cell structure of prokaryotic algae (cyanophyceaen cell) and eukaryotic algae (chlorophycean cell).

Unit-II

Thallus organization, mode of reproduction, algal life cycle patterns (haplontic, diplontic, haplo-diplontic and diplobiontic). Mass culture (*spirulina*), economic importance and BGA in *Azolla* as fodder and biofertilizer.

Unit-III

Detailed study of the following genera: occurrence, distribution, common species, structure and reproduction of *Oscillatoria, Oedogonium, Caulerpa, Cyclotella, Sargassum* and *Polysiphonia* (developmental studies on sex organs not required).

Unit-IV

General characteristics. Classification (Rothmaler, 1951), vegetative reproduction and economic importance. Evolution of gametophytes and sporophytes among bryophytes.

Unit-V

Detailed study of the following genera: occurrence, distribution, common species, structure and reproduction of *Marchantia, Anthoceros* and *Funaria* (developmental studies on sex organs not required).

Text Book

1. Pandey, BP. 2005. Simplified Course in Botany. S. Chand and Company, New Delhi.

Reference

1. Sharma, OP. 1992. Text Book of Algae. Tata Mc Graw Hill, New Delhi.
2. Gangulee, HC. & Kar, AK.1989. College Botany, Vol-II, Books & Allied Pvt. Ltd., Calcutta.
3. Prem Puri. 1981. Bryophytes - Morphology growth and differentiation. Atma Ram & Sons. Lucknow.
4. Singh V, Pande PC and Jain OK. A text book of Botany, Rostogi Publications, Meerut.
5. Smith, GM. 1955. Cryptogamic Botany Vol-1&II, Mc Graw Hill, New York.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester I	Course Code 17UBO130001					Title of the Paper ALGAE AND BRYOPHYTES								Hours 5	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	3	5	3	2	1	4	5	3	4	2	4	3		3.3
CO2	5	3	5	3	4	3	4	4	2	3	3	4	5		3.7
CO3	4	3	2	5	3	3	2	3	2	2	3	3	2		2.9
CO4	5	4	3	3	2	2	5	3	3	5	4	3	3		3.5
CO5	4	3	5	2	3	2	2	3	3	3	2	4	3		3.0
CO6	5	3	5	4	3	4	3	2	4	3	3	3	4		3.5
														Mean Overall Score	3.3

Result: The Score for this Course is 3.3 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester I **Hours/Week: 5**
17UBO130202 **Credit: 3**

FUNGI, PLANT PATHOLOGY AND LICHENS

Course Outcomes

1. To understand the general characteristics of fungi and lichens
2. To acquire knowledge on the structure and reproduction of genera mentioned in syllabus
3. To acquire basic skills on etiology and control of various plant diseases.
4. To understand the disease cycle caused by the pathogens
5. To understand the ecological importance of lichens
6. To learn the economic importance of fungi and lichens.

Unit-I: Fungi: General characteristics - range of thallus organization, architecture of fungal cells and modes of nutrition. Classification (Alexopoulos and Ainsworth, 1972) and general characteristics of the Divisions and Classes in Fungi. Economic importance.

Unit II: Fungi: detailed study of morphology and reproduction of the following genera: *Penicillium, Albugo, Peziza, Puccinia, Rhizopus*, *Cercospora.*

Unit III: Plant Pathology: classification of diseases – general symptoms and methods of control of plant diseases: mechanical, chemical and biological. Defense mechanism in plants: structural morphological and biochemical.

Unit IV: Plant Pathology: Detailed study of the following plant diseases with reference to causes, symptoms, dissemination, control and preventive measures - mosaic disease of tobacco, citrus canker, late blight of potato, red rot of sugarcane, paddy blast, bunchy top of banana and little leaf of brinjal.

Unit V: Lichens: occurrence, distribution, classification, structure, vegetative and sexual reproduction (with reference to fruticose lichen - *Usnea*). Economic importance and role in succession and pollution monitoring.

Books

1. Singh V, Pande PC & Jain DK 2015. **A Text Book of Botany** (4th ed), Rastogi, Meerut

Reference

1. Sharma OP 1989. Text Book of fungi. Tata Mc Graw Hill, New York.
2. Vasishta BR & Sinha AK. 2003. Botany for degree students Fungi. S Chand New Delhi.
3. Mehrotra R S 1991. Plant Pathology, Tata McGraw-Hill Publishing, New Delhi
4. Hale ME, 1983 The Biology of Lichens, New Age International publishers, New Delhi.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester I	Course Code 17UBO130002			Title of the Paper FUNGI, PLANT PATHOLOGY AND LICHENS									Hours 5	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	3	3	5	2	4	5	3	2	4	2	3	5	2	3.3
CO2	5	3	4	5	3	3	2	5	2	2	3	4	2	3.3
CO3	3	5	5	3	3	3	3	2	5	2	3	3	4	3.4
CO4	5	3	3	5	2	4	2	5	3	4	5	3	3	3.8
CO5	3	5	3	5	3	5	3	3	4	3	5	3	4	3.2
CO6	4	5	3	4	5	2	2	3	3	2	2	4	3	3.4
												Mean Overall Score		3.9

Result: The Score for this Course is 3.9 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

***Values Scaling*:**

Mean Score of COs = $\frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}}$	**Mean Overall Score for COs** = $\frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$

Semester I **Hours/Week: 3**
17UBO130203 **Credit: 2**

LABORATORY COURSE-I

(Algae, Fungi, Bryophytes, Plant Pathology and Lichens)

Course Outcomes

1. To study the internal structures of lower plant groups.
2. To compare the external and internal structure of the plants.

Detailed study of the following genera:

Algae:

Oscillatoria, Oedogonium, Caulerpa, Cyclotella, Sargassum and *Gracilaria.*

Bryophytes:

Marchantia, Anthoceros and *Funaria.*

Fungi:

Plasmodiophora, Albugo, Peziza, Puccinia and *Cercospora.*

Plant Pathology:

Tobacco Mosaic Virus, Citrus canker, Late blight of Potato, Red rot of Sugarcane, Bunchy Top of Banana, Little leaf of Brinjal, Paddy blast

Lichen:

Usnea

Semester I **Hours/Week: 4**
17UBO130401 **Credit: 3**

Allied: ZOOLOGY-I
(General Zoology)

Course Outcomes

1. To acquire basic knowledge on animal organization
2. To study the morphology and physiology of various organs of animals
3. To acquire knowledge on differences between the functions of various organs of animals and human beings
4. To study the salient features of all phyla of animal kingdom
5. To understand the mode of action of various hormones
6. To understand blood and its composition and mechanism of blood clotting

Unit I

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

Unit II

Type study of *Plasmodium vivax, Leucosolenia, Aurelia aurita,Taenia solium, Ascaris lumbricoids* and *Asterias rubensa* – morphology and life history. General topics – human diseases caused by protozoans; canal system of sponges.

Unit III

Principles of human physiology: Digestion - physiology of digestion, absorption and excretion of food – accessory glands and their role. Respiration: transport of oxygen and carbon dioxide, cellular oxidation, respiratory quotient, oxygen debt. Excretion: structure of a nephron, physiology of urine formation, physical characteristics and chemical composition of urine.

Unit IV

Circulation – structure and working of artery, vein and heart. Blood: haemopoesis, types of blood cells, structure of haemoglobin; mechanism of blood clotting, functions of plasma proteins. Blood grouping, lymph and its

functions. Muscles: contraction. proteins involved and theories of contraction.

Unit V

Hormones: Types, control - and general mode of action of water soluble and steroid hormones. Reproduction – male and female reproductive organs and formation of gametes, Pregnancy and birth. Nervous control: Structure of neuron; Types of neurons; nerve impulse transmission, synaptic transmission.

Books

1. Ekambaranantha Ayyar & Ananthakrishnan. 1985. Outlines of Zoology - Vol.I, S. Viswanathan Pvt. Ltd., Chennai.

Reference

1. Rajan K . 2016. Manual of Zoology. Theory and practicals, Dept. of Botany, St. Joseph's College, Tiruchirappalli.
2. Gerard, J. Tortord, R.L.Evans & Anagnostakos, NP. 1982. Principles of Human Physiology, Harpor Roul Publishers, New York.
3. Jordan, E.L. & Verma, P.S. 1976 Invertebrate Zoology, S.Chand & Co. Ltd., 6th e, New Delhi.
4. Kotpal, RL 1976. Modern text book of Zoology (Invertebrate), Rastogi Publications, Meerat.
5. Nagabhushan & Kodarkar. 1976. Text Book of Animal Physiology, Oxford & IBH.
6. Paul B. Weisz. 1975. The Science of Biology, Tata McGraw Hill, 4th Edn., New Delhi.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester I	Course Code 17UBO130401			Title of the Paper Allied-1: ZOOLOGY: GENERAL ZOOLOGY									Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	3	5	3	5	3	2	4	2	5	3	3	3	3	3.4
CO2	4	3	3	2	2	3	2	3	3	3	4	2	4	2.9
CO3	4	5	3	3	2	4	2	5	4	3	2	2	3	3.2
CO4	5	3	3	2	5	3	3	2	5	4	3	4	2	3.4
CO5	4	3	3	4	5	2	4	3	4	2	4	3	5	3.5
CO6	5	5	3	2	4	3	3	5	3	2	4	2	3	3.4
													Mean Overall Score	3.3

Result: The Score for this Course is 3.3 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

***Values Scaling*:**

$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}}$	$\text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$

Semester I **Hours/Week: 2**
17UBO130402 **Credit: 2**

Allied:
LABORATORY COURSE-I
(Zoology-I)

Course Outcomes

1. To dissect the various system of earthworm and pila.
2. To study the different tissues of human blood.

Earthworm

External features and dissection of digestive and nervous systems – Mounting of body and Penial setae, Ovary and Spermatheca

Pila

* Structure of shell – Dissection of mantle cavity and radula, dissection of digestive system.
* Representative animal for each class in vertebrate, and invertebrate phyla. Different tissues. human blood cell identification. Campus fauna identification.
* Visit to a vermin-compost farm and submission of report.

Semester I **Hours/Week:2**
17UFC141001 **Credits: 2**

ESSENTIALS OF HUMANITY

Course Outcome

1. To ensure creating awareness among the youth on human values.
2. To ensure educating the youth, the basic principles of value education.
3. To ensure the process of analyzing, appreciating and personalizing values as our own.
4. To ensure that students develop various dimensions of human personality.
5. To ensure the youth empowering the gender sensitization, gender differences and gender roles.
6. To ensure preparing the students for the smooth transfer from the stage of teenage to earlier adulthood.

Unit-I

Principles of Value Education - Introduction - Value Education- Characteristics of Values – Kinds of Values

Unit-II

Development of Human Personality - Personality traits - Theories of Personality - Discovering self- Defense mechanism - Power of positive thinking

Unit-III

Dimensions of Human Development - Physical development – Intellectual development - Emotional development - Social Development – Moral development - Spiritual development

Unit-IV

Responsible Parenthood - Human sexuality - Sex and love - Becoming a spouse - Responsible Parenthood

Unit-V

Gender Equality and Empowerment - Historical perspective - Education & economic development -Crimes against Women-Women's rights

Text Book:

Essentials of Humanity, Department of Foundation course, St.Joseph's College, Tiruchirappalli-2, 2016.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester I	Course Code 17UFC141001					Title of the Paper ESSENTIALS OF HUMANITY								Hours 2	Credits 2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	3	1	5	4	3	5	4	5	5	5	5	4	3	4.0	
CO2	2	1	5	5	3	5	4	5	5	5	5	4	3	4.0	
CO3	2	1	5	5	4	5	4	4	5	5	5	5	3	4.1	
CO4	2	2	5	4	2	5	4	4	5	4	5	5	5	4.0	
CO5	5	2	5	5	2	5	4	4	5	5	4	4	4	4.2	
CO6	2	1	5	5	4	4	4	5	5	4	4	4	3	3.8	
													Mean Overall Score		4.0

Result: The Score for this Course is 4.0 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

பருவம்: 2 **மணி நேரம்: 4**

17UGT210002 **புள்ளிகள்: 3**

பொதுத்தமிழ்-II

பாடத்தின் விளைவு

- சமூக மாற்றச் சிந்தனைகளை உள்ளடக்கிய தற்கால இலக்கியப்பரப்பை அறிதல்
- பக்தி இலக்கியங்களின் வழி இறையியல் கோட்பாடுகளை அறிதல்
- உரைநடைக் கட்டுரை எழுதும் திறன் பெறுதல்- இலக்கணமரபுகளை அறிதல்
- பல்வேறு சமயங்களின் வாழ்வியல் கருத்துக்களை அறிந்து பின்பற்றுதல்
- காப்பியங்களில் உள்ள சமுதாயக் கருத்துக்களை அறிந்துகொள்ளுதல்.
- இதிகாசங்கள் உணர்த்தும் நீதிகளை அறியச்செய்தல்.
  அரசுப்போட்டித் தேர்வுகளுக்கேற்ப பொதுக்கட்டுரைகளும் மொழிப்பயிற்சியும் மாணவர்களுக்கு அளித்தல்.

அலகு: 1 **(12 மணி நேரம்)**

சிலப்பதிகாரம் - அந்திமாலைச் சிறப்பு செய்காதை
இலக்கிய வரலாறு - சைவம் வளர்த்த தமிழ் முதல் புராணங்கள் முடிய.
இலக்கணம் - எழுத்திலக்கணம்

அலகு: 2 **(12 மணி நேரம்)**

மணிமேகலை - உலக அறவி புக்க காதை
பெரியபுராணம் - தடுத்தாட்கொண்ட புராணம்

அலகு: 3 **(12 மணி நேரம்)**

கம்பராமாயணம் - கும்பகர்ணன் வதைப்படலம்
உரைநடை - 7 முதல் 9 முடிய உள்ள கட்டுரைகள்

அலகு: 4 **(12 மணி நேரம்)**

சீறாப்புராணம் - மானுக்குப் பிணை நின்ற படலம்
இலக்கணம் - சொல்லிலக்கணம்
இலக்கிய வரலாறு - தமிழ் இலக்கண நூல்கள் முதல் சிற்றிலக்கியங்கள் முடிய.

அலகு: 5 **(12 மணி நேரம்)**

இரட்சணிய யாத்திரிகம் - மரணப்படலம்
உரைநடை - 10 முதல் 12 வரையிலான கட்டுரைகள்

பாடநூல்:

1. செய்யுள் திரட்டு, தமிழாய்வுத்துறை வெளியீடு, 2017-10
2. சமூகவியல் நோக்கில் தமிழ் இலக்கிய வரலாறு, தமிழாய்வுத்துறை வெளியீடு, தூய வளனார் கல்லூரி, திருச்சிராப்பள்ளி-2
3. உரைநடை நூல் - தமிழாய்வுத்துறை வெளியீடு.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester II	Course Code 17UGT210002					Title of the Paper பொதுத்தமிழ்-II								Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	5	4	4	4	4	5	5	5	4	4	2	4	4	4.2	
CO2	4	5	5	4	5	5	5	5	5	4	3	4	3	4.4	
CO3	5	5	4	4	5	5	5	5	4	3	3	4	3	4.3	
CO4	5	5	4	3	4	5	5	5	4	3	3	4	3	4.1	
CO5	5	5	4	3	4	5	5	5	4	3	3	4	3	4.1	
CO6	5	5	5	5	4	5	5	5	4	3	3	4	3	4.1	
													Mean Overall Score		4.2

Result: The Score for this Course is 4.2 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\textbf{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \textbf{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semestre: II **Hours/Week: 4**
17UGH210002 **Credits : 3**

HINDI-II

Course Outcomes

At the end of the course, a student should be able to demonstrate…

- their effective communicative skills in Hindi
- the introduction of socially relevant subjects in Modern Hindi Literature
- to appreciate the features of Modern Hindi one act plays and short stories
- the ability to fill in application forms Hindi
- use Hindi vocabulary and grammar patterns in a culturally proper ways.
- the ability to write about famous Hindi authors .

Unit-I **8 hours**

Paeeksha, Lekak Parichaya, Khani kee Basha – Shyli, Verb, Dhathu, Artha likiye ulte Shabda likiye.

Unit- II **12 hours**

Lekak Parichaya Ekanki kee, Basha Shyli, Ander Nagaree, Sankalan Traya, Pareek shaka Khani ke paatra, Kal, Vachya.

Unit-III **12 hours**

Chief Kee daavath, Ekanki ke Paatra, Ekankikaar, Ne ka Prayog, Adverb

Unit- IV **14 hours**

Do Kalakar, Bahoo kee Vidha, Kahaanikaar, Prepositions, conjunctions

Unit-V **14 hours**

Kahani ke paatra, Ekanke ke paatra, lekak parichaya, Interjunctions, Avikari Shabda

Books Recommended

1. Dakshina Bharath Hindi Prachara Sabha, Thiagaraya Nagar, Chennai - 600 017, Subodh Hindi Patamala-2, Ekanki, Hindi, 2016.
2. Ram Dev Hindi Bhavan, Vyakaran Pradeep, 63, Tagore Nagar, Alahabad, 2, 2013.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester II	Course Code 17UGH210002					Title of the Paper Hindi-II						Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6		
CO1	4	4	4	3	4	3	2	3	4	4	4		3.5
CO2	3	3	2	3	2	4	4	3	3	2	2		2.8
CO3	3	2	2	3	4	2	4	4	2	3	4		3.0
CO4	3	2	2	3	3	4	3	3	4	3	3		3.0
CO5	3	3	3	3	3	3	3	4	3	4	3		3.1
CO6	4	4	4	4	3	4	3	3	3	3	2		3.3
										Mean Overall Score			3.1

Result: The Score for this Course is 3.1 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semestre: II **Heures /Semaine: 4**
17UGF210002 **Points : 3**

FRANÇAIS-I

Les résultats d'apprentissage: L' étudiant peut …

* Faire connaissance des journaux, des courriels, des lettres
* Comprendre les conversations téléphoniques.
* Décrire quelque chose
* Demander son chemin
* Parler des activités du week-end
* Accepter, refuser, exprimer la certitude.

Unit-I: Nouvelles de L'inde **(10 heures)**

Montrer son inquiétude, s'excuser, exprimer son appréciation, décrire quelqu'un, décrire quelque chose

Grammaire: Présent : verbes en er,-ir, le futur, interrogation totale, féminin d'autres adjectifs.

Unit-II: A la gare Central station **(10 heures)**

Réserver des billets, demander des renseignements, donner des renseignements

Grammaire: pronoms compléments d'objet direct, présent l'impératif :payer ,partir/sortir, l'impératif, expression du temps, construction avec infinitif

Unit-III : Un lit dans la Cuisine **(10 heures)**

Donner des ordres, localiser, bire qu'une proposition est stupide ou bizarre

Grammaire : Verbes en er-ranger, mettre impératif, il faut, devoir +infinitif, prépositions de lieu

Unit-IV: Pierre apprend a conduire et mangez –vous correctement ? **(15 heures)**

Rassurer, exprimer l'indirection exprimer l'autorisation, avertir, demander des informations sur les habitudes de quelqu'un, offrir a manger ou a boire, accepter, refuser, exprimer la certitude.

Grammaire: impératif-être, avoir, savoir, pronoms compléments d'objet indirect, le passe compose avec avoir expression de la quantité-articles partitifs, adverbes, pronoms directs et indirects, pronom en, présent des verbes –manger, boire ,offrir ,prendre, la condition avec si.

Unit-V: Ils ont eu tort tous les deux !et Comment as-tu passe le weekend **(10 heures)**

Demander son chemin, indiquer le cheminin a quelqu'un, reprocher / conseiller, parler des activités du week-end, demander a quelqu'un de se taire

Grammaire: le passe compose, adverbes mots interrogatifs, le passe compose avec être, faire du….pouvoir, vouloir.

Manuel:

1. K. Madanagobalane, **Synchronie -1**, Samhitâ publication, 2011.

Livre de référence:

1. Annie Berthet / B_atrix Sampsonis / Catherine Hugot / V_ronnique M kizirian / Monique Waendendries, **Alter Ego A1**, Hachette, 2006
2. Yves Loiseau / R_gine M-rieux, Connexions 1, Didier ,2011

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester II	Course Code 17UGF210002					Title of the Paper French-II						Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6		
CO1	4	4	2	3	4	3	3	2	2	3	3		3.0
CO2	3	3	3	3	4	3	3	2	2	2	3		2.8
CO3	3	2	3	2	4	3	3	2	2	3	3		2.7
CO4	3	3	4	3	4	3	3	3	3	3	3		3.2
CO5	3	3	4	3	4	2	4	4	4	4	5		3.6
CO6	3	4	3	3	3	3	4	4	3	4	4		3.5
											Mean Overall Score		3.1

Result: The Score for this Course is 3.1 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester: II **Hours/Week: 4**
17UGS210002 **Credits : 3**

SANSKRIT-II

Course Outcomes

At the end of the course, a student should be able to demonstrate…

* knowledge and understanding of basic Sanskrit grammar
* knowledge and understanding of essential Sanskrit vocabulary
* knowledge and understanding of the appropriateness of basic Sanskrit structures and expressions in a given context
* the ability to understand short passages in written Sanskrit on everyday topics
* the ability to produce short passages in written Sanskrit on everyday topics
* introduction of basic grammar (Avyaya Imperfect tense and Sandirules. Samasah.)

Unit-I **8 hours**

Visheshanaah
Saravanaama shabdas.

Unit-II **12 hours**

Sandhi Niyamaah Abhyaasah.(Guna, Visarga, Dirgha, Vrddhi)

Unit-III **12 hours**

Lang lakaarah. Kriyapadaani

Unit-IV **14 hours**

Gopala Vimshathi. (1-10) slokas.

Unit-V **14 hours**

Avyayas, Tatpurusha, Karma dhaaraya samaasah.

Books Recommended

1. Paundrapuram Ashram, Srirangam -620 006. Gopalavimshathi, 2014
2. R.S. Vadhyar & Sons, book – Sellers and Publishers, Kalpathi, Palghat-678 003, Kerala, Southe India, Shabdha Manjari, 2014
3. Kulapthy, K. M., Saral Sanskrit Balabodh, Bharathiya Vidya Bhavan, Munshimarg, Mumbai - 400007, 2014

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester II	Course Code 17UGS210002	Title of the Paper Sanskrit-II									Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	Mean Score of COs
CO1	5	3	5	4	4	3	3	3	4	4	3	3.2
CO2	4	3	4	4	4	3	3	3	3	4	3	3.0
CO3	4	3	3	4	4	3	3	3	4	4	3	3.0
CO4	4	3	3	4	3	3	3	4	4	4	3	3.0
CO5	4	4	4	3	4	3	4	4	4	3	4	3.2
CO6	5	4	4	4	4	3	3	3	4	4	3	3.2
											Mean Overall Score	3.1

Result: The Score for this Course is 3.1 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

***Values Scaling*:**

Mean Score of COs = $\frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}}$	**Mean Overall Score for COs** = $\frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$

Semester: II **Hours/Week: 5**
17UGE220102 **Credits: 3**

GENERAL ENGLISH-II

Course Outcome

* Ask open-ended questions in real-life situations
* Use polite expressions in appropriate ways
* Use correct punctuation marks and capital letters
* Use appropriate vocabulary
* Put ideas into a cohesive paragraph
* Develop positive self-esteem and thereby communicate effectively

Unit-I

01. Education Word Grid
02. Reading Problems and Solutions
03. Syllabification
04. Forms for Expressing Quality
05. Expressing Comparison
06. Monosyllabic Comparison
07. Di/polysyllabic Comparison
08. The best monosyllablic Comparison
09. The best di/polysyllabic Comparison
10. Practising Quality Words

Non-Detailed:

"Julius Caesar" from *Six Tales From Shakespeare*

Unit –II:

11. Wh Words
12. Yes/No Recollection
13. Unscramble Wh Questions
14. Wh Practice
15. Education and the Poor
16. Controlled Role play
17. Debate on Education
18. Education in the Future
19. Entertainment Word Grid
20. Classify Entertainment Wordlist
21. Guess the Missing Letter

22. Proverb-Visual Description
23. Supply Wh Words
24. Rearrange Questions
25. Information Gap Questions

Unit-III:

26. Asking Questions
27. More about Actions
28. More about Actions and Uses
29. Crime Puzzle
30. Possessive Quiz
31. Humourous News Report
32. Debate on Media and Politics
33. Best Entertainment Source

Unit-IV:

34. Career Word Grid
35. Job-Related Wordlist
36. Who's Who?
37. People at Work
38. Humour at Workplace
39. Profession in Context
40. Functions and Expressions
41. Transition Fill-in
42. Transition Sord Selection
43. Professional Qualities
44. Job Procedures
45. Preparing a Resume
46. Interview Questions
47. Job Cover Letter Format
49. E-mailing an Application
50. Mock Interview

Non-Detailed:

"King Lear" from *Six Tales From Shakespeare*

Unit-V:

51. Society Word Grid

52. Classify Society Wordlist
53. Rearrange the Story
54. Storytelling
55. Story Cluster
56. Words Denoting Time
57. Expressing Time
58. What Can You Buy?
59. Noise Pollution
60. Positive News Headlines
61. Negative News Headlines
62. Matching Conditions
63. What Whould You Do?
64. If I were the Prime Minister
65. My Dream Country

Non-Detailed: "Macbeth" from *Six Tales From Shakespeare*

Textbook

1. Joy, J.L. & Peter, F.M. *Let's Communicate 2*, New Delhi: Trinity Press, 2014. Print.

Non-Detailed Text

1. Dodd, E F. *Six Tales From Shakespeare*. London: Macmillan, 1987. Print. (Last three tales)

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester II	Course Code 17UGE120102			Title of the Paper General English-II									Hours 5	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	5	4	4	4	4	5	4	4	3	3	3	4	4	3.9
CO2	4	3	4	4	4	5	5	4	4	4	4	4	3	4.0
CO3	4	3	4	4	4	3	3	4	4	3	3	4	4	3.6
CO4	4	3	3	4	4	4	4	3	3	5	5	4	4	3.8
CO5	4	3	4	4	4	4	4	3	3	4	4	5	5	3.9
CO6	5	4	4	3	3	4	4	3	4	4	5	4	4	3.9
													Mean Overall Score	3.8

Result: The Score for this Course is 3.8 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

***Values Scaling*:**

Mean Score of COs = $\frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}}$	**Mean Overall Score for COs** = $\frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$

Semester II **Hours/Week: 4**

17UBO230204 **Credit: 3**

PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY

Course Outcome

1. To understand the salient features of pteridophytes and gymnosperms
2. To trace the evolutionary relationship between pteridophytes and gymnosperms
3. To study the morphology, anatomy and reproduction of various genera mentioned in the syllabus
4. To acquire knowledge on fossils and fossilization process
5. To study the geological time scale along with some fossil representatives
6. To study the economic importance of pteridophytes and gymnosperms.

Unit I

Pteridophytes: general characteristics, classification (Reimer's System, 1954). General characteristics of major subdivisions: Psilopsida, Lycopsida, Sphenopsida and Pteropsida. Stelar evolution, homospory, heterospory, seed habit and economic importance.

Unit II

Pteridophytes: a detailed study of morphology, anatomy and reproduction of *Lycopodium, Selaginella, Equisetum, Adiantum* and *Marsilea.*

Unit III

Gymnosperms: general characteristics, distribution and classification (Sporne, 1965). Salient features of Pteridospermales, Bennettitales, Cycadales, Cordaitales, Coniferales and Gnetales. Economic importance.

Unit IV

Gymnosperms: detailed study of morphology, anatomy, reproduction of the following genera: *Cycas, Pinus* and *Gnetum.*

Unit V

Paleobotany: fossils, fossilization process, types (compression, impression, petrifaction, coal balls). Geological time scale. A detailed study of external and internal morphology and reproduction in *Rhynia, Lepidodendron, Calamites,* and *Medullosa.*

Books

1. Vasishta BR, Sinha AK & Anilkumar. 2005. Botany for degree students: Pteridophytes. S Chand And Company Ltd., New Delhi.
2. Vasishta PC, Sinha AK & Anilkumar. 2005. Botany for degree students: Gymnosperms. S Chand And Company Ltd., New Delhi.
3. Pandey et al., 1998. A text book of Botany Vol. II. S. Chand & Co. Ltd. 1980

Reference

1. Rashid, A. 1976. An Introduction to Pteridophytes. Vikas Publishing House, New Delhi.
2. Sporne, KR.1967. The Morphology of Gymnosperms, Hutchinson & Co., London.
3. Sporne, KR.1975. The Morphology of Pteridophytes, Hutchinson & Co., London.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester II	Course Code 17UBO230204	Title of the Paper PTERIDOPHYTES, GYMNOSPERMS AND PALAEOBOTANY											Hours 4	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	5	3	5	5	4	3	5	2	4	3	4	4	4	3.9
CO2	3	4	3	4	2	5	3	4	2	4	2	5	4	3.5
CO3	5	5	4	2	2	4	2	4	3	4	5	3	5	3.7
CO4	3	4	5	3	5	2	2	5	4	4	5	3	4	3.8
CO5	5	5	4	4	3	4	3	4	3	4	3	4	5	3.9
CO6	3	4	3	5	4	5	4	4	5	3	4	4	4	4.0
													Mean Overall Score	3.8

Result: The Score for this Course is 3.8 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester II **Hours/Week: 4**
17UBO230205 **Credit: 3**

ANATOMY AND EMBRYOLOGY

Course Outcome

1. To understand various types of tissues present in plants
2. To acquire knowledge about the tissues of stem, root and leaves
3. To understand the primary and secondary structure of dicots and monocots with reference to root, stem and leaves
4. To acquire basic knowledge of the structure and development of male and female gametophytes in plants
5. To acquire knowledge on the structure and development of dicot and monocot embryos
6. To study apomixis and polyembryony and their significances.

Unit I

Tissues - definition, types - simple tissue - parenchyma, collenchyma, sclerenchyma. Fibres and scleriods - structure and functions. Complex tissues: xylem and phloem. Meristems - classifications. Vegetative shoot apex: and the theories: apical cell, histogen and tunica-corpus. Root apex: Korper – Kappe theory. Concept of totipotency, differentiation, dedifferentiation and redifferentiation.

Unit II

The stem - primary and secondary structure of dicotyledonous and monocotyledonous stems. Nodal anatomy: unilacunar, trilacunar and multilacunar. Leaf anatomy: monocot and dicot. The root: primary and secondary structure of dicotyledonous and monocotyledonous roots. Anomalous secondary growth.

Unit III

Wood anatomy – component of secondary xylem. Physical and chemical properties of wood. Classification of wood. Commercial wood species of South India (teak wood, rose wood, sandal wood and red sanders wood).

Unit IV

Microsporangium: microsporogenesis, development of male gametophyte. Megasporangium: megasporogenesis, development of female gametophyte. Monosporic (*Polygonum*), bisporic (*Allium*) and tetrasporic (*Peperomia*).

Unit V

Fertilization. Double fertilization. Development of dicot embryo (*Capsella*) & development of monocot embryo (*Sagittaria*). Endosperm function and types. Apomixis and polyembryony – types and significance. Parthenogenesis and its significance.

Books

1. Pandey B.P. 2007 Plant Anatomy, S. Chand & Co. De, New Delhi.
2. Bhojwani, S S. & Bhatnagar, SP. 2008. Embryology of Angiosperms, Vikas Publishing House (P) Ltd., New Delhi.
3. Brown *et al*., 1981. Text book of Wood Technology, Mc Graw Hill Inc. New York.
4. Pullaiah, T., Lakshminarayana, K. and Hanumantha Rao, K. 2001. Text Book of Embryology of Angiosperms, Regency Publications, New Delhi.

References

1. Cutter, EG. 1969. Plant Anatomy - Part I Cells & Tissue. Edward Arnold Ltd., London.
2. Esau K. 1985. Plant Anatomy (2nd ed.) Wiley Eastern Ltd. New Delhi.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester II	Course Code 17UBO230205			Title of the Paper ANATOMY AND EMBRYOLOGY									Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	4	4	5	3	3	5	3	5	4	3	5	4	4	4.0
CO2	4	4	3	5	5	3	4	5	4	5	3	4	3	4.0
CO3	5	3	4	3	4	5	5	4	3	3	5	2	4	3.8
CO4	5	3	4	5	4	5	3	5	5	4	4	4	5	4.3
CO5	5	4	5	4	5	4	5	4	5	3	5	4	5	4.5
CO6	5	3	5	4	3	4	5	5	5	4	5	3	4	4.2
													Mean Overall Score	4.1

Result: The Score for this Course is 4.1 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

***Values Scaling*:**

Mean Score of COs = $\frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}}$	**Mean Overall Score for COs** = $\frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$

Semester II **Hours/Week: 3**
17UBO230206 **Credit: 2**

LABORATORY COURSE-II

(Pteridophytes, Gymnosperms,Anatomy & Embryology)

Course Outcome

1. To learn morphological and anatomical features of Pteridophytes and Gymnosperms.
2. To learn anomalous secondary thickening in dicots and monocots

Detailed study:

Pteridophytes:

Lycopodium, Selaginella, Adiantum and *Marsilea.*

Gymnosperms:

Cycas, Pinus and *Gnetum.*

Fossils: *Rhynia, Lepidodendron, Calamites* and *Medullosa.*

Anatomy

Study of simple and complex tissue.

Internal structure of young and old dicot and monocot stem.

Internal structure of dicot and monocot root.

Anomalous secondary thickening in *Aristolochia, Bignonia, Boerhaavia, Thunbergia* and *Dracaena.*

Nodal anatomy: Uni, tri and multi lacunar.

Embryology

TS of mature anther. Types of ovule, dissection and isolation of developmental stages of dicot embryos.

Semester II **Hours/Week: 4**
17UBO230403 **Credit: 3**

Allied: ZOOLOGY-II
(Agricultural Entomology)

Course Outcomes

1. To acquire knowledge on classification of insects
2. To study the morphology and physiology of common selective insects
3. To understand the economical important insects
4. To study the destructive insects and the methods of pest control
5. To learn about integrated pest management
6. To study the pest of stored food materials and their control.

Unit I

General classification of insects. Morphology of insects: head, external structure. Mouth parts, tentorium, compound eye, types of antennae- thorax-tergum, sternum, pleuron. Wing structure and coupling mechanism, wing venation, Legs and their modification, Abdomen- abdominal appendages, Male and female external genitalia.

Unit II

Physiology of digestive, respiratory, circulatory, nervous and reproductive systems, Immature stages of insects – metamorphosis, types and hormonal regulation.

Unit III

Economically important insect (orders): Coleoptera, Dictyoptera, Diptea, Hemiptera, Hymenoptera, Isoptera and Lepidoptera. General characters and classification (upto Orders). Social behavior/life of insects.

Unit IV

Economic classification of insects: beneficial insects (predators, parasites, pollinators, weed killers and scavengers). Destructive insects, a general knowledge of apiculture, sericulture and lac culture. Recent trends in Integrated Pest Management. Plant protection - physical, chemical and biological methods of pest control.

Unit V

Pests of stored food materials (*Sitophilus oryzae, Rhizopertha dominica, Tribolium castaneum, Sitotroga cerealella, Oryzaephilus surinamensis, Trogoderma granarium*) and their control, Study of Bionomics and control

of pests of Paddy (*Tryporyza incertulas*, *Chilo polycharysa, Spodoptera mauritia*), Sugarcane (*Chilo infuscatellus,*

C. sacchariphagas, Tryporyza nivella), Cotton (*Aphis gossypii, Amarasca biguttula, Thrips tabaci*), Coconut (*Orycytes rhinoceros, Rhycholophorus ferruqineus, Nephanthis serinopa*) and Spices pests.

Books

1. Ambrose, PD. 2004. The Insect: Structure, function and biodiversity, First edition. Kalyani Publishers, New Delhi.

Reference

1. Imms, AD. 1963. General Text Book of Entomology, Asia Publ House, New Delhi.
2. Daly, HV., Doyen, JT. & Ehrlich, PR. Introduction to Insect Biology Diversity, First Edition, McGraw Hill Book, New York.
3. Rajan, K & McConnell, MS. 2006. Manual of agricultural entomology - theory and practicals, Dept. of Plant biology & Plant biotechnology, St. Joseph's College, Trichy.
4. Nayar, KK., Ananthakrishnan, TN. & David, BV. 1976 General and Applied Entomology, Tata McGraw Hill, New Delhi.
5. Vasantharaj D B & Kumaraswami, T. 1978. Elements of Economic Entomology, Popular Book Department, Chennai.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester II	Course Code 17UBO230403				Title of the Paper Allied Zoology-II: AGRICULTURAL ENTOMOLOGY								Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	5	3	5	5	5	3	5	3	5	3	5	4	4	4.2
CO2	4	5	4	5	4	5	4	3	4	5	4	5	5	4.4
CO3	5	4	4	3	5	5	3	5	4	4	4	5	5	4.3
CO4	5	4	5	4	4	5	5	3	5	3	5	3	4	4.2
CO5	4	4	5	4	5	4	4	5	3	5	4	5	3	4.2
CO6	3	5	5	4	3	5	5	4	5	3	3	4	4	4.1
												Mean Overall Score		4.2

Result: The Score for this Course is 4.2 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester II **Hours/Week: 2**
17UBO230404 **Credit: 2**

Allied:
LABORATORY COURSE-II
(Zoology-II)

Course Outcomes

1. To study the classification of insects
2. To study beneficial and harmful insects and various control measures of harmful insects.

Detailed study:

* Study of distinguishing features of insects studied in theory and making sketches.
* Field collection, identification and preservation of insects of agricultural importance, predators, pollinators, and weed killers – plant galls.
* Study of different categories of insect pests and types of damage done by them in the field, go-down and warehouses.
* Dissection of Cockroach to study the mouthparts, digestive, nervous and reproductive systems, Salivary gland, Haemocytes. Modification of Antenna, legs, mouth parts.
* Light trap collection and identification.
* Visit to a local sericulture center and submission of report.

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Semester II **Hours/Week: 2**
17UCE240802 **Credit: 2**

COMPUTER LITERACY

Course Outcomes

1. Understand the basics of Computer Systems
2. Familiar with the applications of MS-Office / HTML & CSS
3. Know the statistical data analysis using R
4. Aware the latest trends and technologies such as Mobile Computing, Big Data and Analytics, Cloud Computing.
5. Understand the concepts of social networking sites.
6. Knowledge in Cyber Crime and Cyber Ethics.

Unit-I: Computer System

Computer - An Introduction - Hardware Components - Input and Output Technologies - Computer Hierarchy- Software Fundamentals - Systems Software and Os- Application Software- Software Licensing - Open Systems- Open Source Software- Programming Languages- Information Systems- General It Trends.

Unit-II: (For Non-CS)

Microsoft Word: Introduction - Word Environment - Opening and Creating a New Document - Saving Documents - Proofing Features - Printing a Document - Formatting Text - Working with Shapes and Lists - Line and Paragraph Spacing- Working with Tables - Columns and Ordering- Working with Pictures- Working with Headers and Footers - Using Indents and Tabs - Using Mail Merge.

Microsoft Excel: Introduction - Document Creation - Renaming a worksheet - Office user interface - Open a New Workbook - Columns, Rows, and Cells - Selecting a cell - - Basic data entry, fill handle - - Insert columns - Arithmetic Calculations & Formulas - Excel Formulas- Calculate with Functions - Function Library - Graphs and Charts - Printing the Document.

Microsoft Powerpoint: Starting PowerPoint - Working with Slides - Applying Theme - Animation- Transitions – Views.

Unit-II: (For CS)

HTML: Introduction - HTML generations – HTML Tags – Headings – Paragraphs – Comments – Line Breaks – Formatting Tags – Hyperlinks – Images – Lists – Tables – Frames – Forms.

CSS: Introduction – Use of External Style Sheet – Defining Styles – Use Relative Sizing – Use Numbered Value for Color.

Unit-III: Statistical Data Analysis

Introduction - R Programming Language - Basic R Commands - Univariate and Bivariate Statistical Measures - Graphic Representation of Statistical Data - Lab Exercise.

Unit-IV: SMAC

Introduction - Understanding the Enterprise of Tomorrow - Social Networking - Mobile Computing - Big Data and Analytics - Cloud Computing

Unit-V: Cyber Crime

Definition - List of Cyber Crimes - Cyber Ethics- Unethical Behaviour - Securing information privacy and confidentiality - Internet Ethics - Indian Information Technology Act - Advantages of Cyber Laws - National e-Governance Plan (NeGP) - eCommerce - Electronic Fund Transfer (EFT)

Book for Study

1. Department of Foundation Course, “Computer Literacy”, St. Joseph’s College, 2017.

Books for Reference

1. Alexis Leon, “Introduction to computers”, Vikas Publishing House Pvt. Ltd., New Delhi, 2008.
2. Alexis Leon and Mathew Leon, “Introduction to computers with Ms Office 2000”, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2005.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester II	Course Code 17UCE240802A					Title of the Paper COMPUTER LITERACY								Hours 2	Credits 2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	5	5	4	4	5	5	4	3	4	3	4	4	4	4.15	
CO2	5	5	4	4	4	4	4	4	4	3	4	4	4	4.08	
CO3	4	3	3	4	4	4	4	4	4	3	4	4	4	3.77	
CO4	5	5	4	4	4	5	4	4	4	3	4	4	4	4.15	
CO5	4	4	3	4	4	4	4	4	4	3	4	4	4	4.15	
CO6	5	5	5	4	4	5	4	4	4	4	4	4	4	4.31	
Mean Overall Score														4.10	

Result: The Score for this Course is 4.1 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester II **Hours/Week: 2**
17UFC241002 **Credits: 2**

FUNDAMENTALS OF HUMAN RIGHTS

Course Outcome

1. To ensure acquiring the knowledge about the historical background of human rights.
2. To ensure sensitizing the young the values of human rights.
3. To ensure the importance of human rights in the Indian context.
4. To ensure learning the fundamental duties in the constitution of India.
5. To ensure educating the youth in respecting and protecting the rights of every other human being.
6. To ensure teaching the youth on the vulnerabilities of women and children.

Unit-I

Introduction, Classification of Human Rights, Scope of Human Rights, Characteristics of Human Rights, and Challenges for Human Rights in the 21stCentury.

Unit-II

Human Rights in Pre-World War Era, Human Rights in Post-World War Era, Evolution of International Human Rights Law - the General Assembly Proclamation, Institution Building, Implementation and the Post Cold War Period. The ICC.

Unit-III

Introduction, Classification of Fundamental Rights, Salient Features of Fundamental Rights, and Fundamental Duties

Unit-IV

Women's Human Rights, Issues related to women's rights, and Rights of Women's and Children

Unit-V

Human Rights Violations, Human Rights Violations in India - the Human Rights Watch Report, January 2012, Human Rights Organizations.

Text Book:

1. **Techniques of social Analysis: Fundamentals of Human Rights,** Department of Foundation course, St.Joseph's College, Tiruchirappalli, 2015.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester II	Course Code 17UFC241002					Title of the Paper FUNDAMENTALS OF HUMAN RIGHTS							Hours 2	Credits 2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	5	1	5	5	2	4	4	5	5	4	4	5	5	4.2
CO2	4	1	5	4	2	4	4	4	4	5	5	5	5	4.0
CO3	5	1	5	5	2	5	5	4	4	4	5	5	5	4.2
CO4	4	1	5	5	2	2	4	3	5	5	4	4	5	3.8
CO5	5	1	5	4	1	5	5	5	5	5	4	4	4	4.1
CO6	3	1	5	4	1	4	3	5	5	3	4	4	5	3.6
													Mean Overall Score	3.9

Result: The Score for this Course is 3.9 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

பருவம்: 3 **மணி நேரம்: 4**

17UGT310003 **புள்ளிகள்: 3**

பொதுத்தமிழ்-III

பாடத்தின் விளைவு

- செம்மொழியாம் தமிழ் மொழியின் சிறப்பை அறிதல்.
- பண்டை இலக்கியங்கள் உணர்த்தும் அறக்கருத்துகளை அறிதல்
- புதினம் வாயிலாகத் தற்காலச் சமுதாயச் சிக்கல்களையும், அதற்கான தீர்வுகளையும் ஆராயும் திறன் பெறுதல்
- மானுட வாழ்வில் அகம், புறம் பற்றிய பாகுபாட்டை தமிழ்ச்செய்யுள் வாயிலாக அறிதல்.
- தமிழர்களின் ஈகையும் வீரமும் எடுத்துரைக்கும் புறச்செய்திகளை அறிதல்
- நீதிநூல்கள் மனித வாழ்வை செம்மைப்படுத்தும் பாங்கினை உணர்த்துதல்.

அலகு: 1 **(12 மணி நேரம்)**

நெடுநல்வாடை (முழுமையும்)

அலகு: 2 **(12 மணி நேரம்)**

குறுந்தொகை - பாடல்கள் - (32, 323, 305, 290, 168)
யாப்பிலக்கணம் (வெண்பா, ஆசிரியப்பா)

அலகு: 3 **(12 மணி நேரம்)**

கலித்தொகை - பாடல்கள் - (குறிஞ்சிக்கலி-15, பாலைக்கலி-9, மருதக்கலி-15, நெய்தற்கலி-22, முல்லைக்கலி-07)
இலக்கிய வரலாறு - முதற்பாகம் ('தமிழ் மொழியின் தொன்மையும சிறப்பும' முதல் 'சங்க தொகை நூல்கள்' முடிய) புதினம்.

அலகு: 4 **(12 மணி நேரம்)**

பதிற்றுப்பத்து - பாடல்கள் (12, 24,)
புறநானூறு - பாடல்கள் (46, 86, 122, 214, 246)
அணியிலக்கணம்

அலகு: 5 **(12 மணி நேரம்)**

திருக்குறள் - ஈகை, ஆள்வினை உடைமை, நிறை அழிதல் ஆகிய அதிகாரங்கள்
நாலடியார் - இளமை நிலையாமை(11), பிறன்மனை நயவாமை(82), பெருமை(185), அறிவின்மை(254), காமநுதலியல்.(391).
இலக்கிய வரலாறு - சங்க இலக்கியங்களின் தனித்தன்மைகள் முதல் இரட்டைக் காப்பியங்கள் முடிய

பாடநூல்கள்:

1. செய்யுள் திரட்டு, தமிழாய்வுத் துறை வெளியீடு (2017-2020).
2. சமூகவியல் நோக்கில் தமிழிலக்கிய வரலாறு, தமிழாய்வுத்துறை வெளியீடு, 2014.
3. புதினம் (ஒவ்வொரு கல்வியாண்டும் ஒவ்வொரு புதினம்). காணாமல் போன கவிதை (2017-18).

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester III	Course Code 17UGT310003					Title of the Paper பொதுத்தமிழ்-III								Hours 5	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	5	5	5	4	5	5	4	5	5	5	4	4	5	4.6	
CO2	5	5	4	3	4	5	4	5	5	5	4	4	5	4.4	
CO3	5	5	5	3	4	5	5	5	5	5	4	3	5	4.5	
CO4	5	5	5	5	4	5	5	5	5	5	4	5	5	4.8	
CO5	5	4	4	4	4	5	5	5	5	5	3	3	5	4.3	
CO6	5	5	5	3	4	5	5	5	5	5	4	3	5	4.5	
													Mean Overall Score		4.5

Result: The Score for this Course is 4.5 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semestre: III **Hours/Week: 4**
17UGH310003 **Credits: 3**

HINDI-III

Course Outcomes

At the end of the course, a student should be able to demonstrate…

* the ability to enable the students to complete the pre-reading task to comprehend the local and global issues in the lessons.
* the ability to enable the students to complete the post-reading task centering on Grammar and Skill Development.
* the relevance of Bhakthi Movement in Hindi Literature.
* the ability to imagine and write poems.
* the ability to quote poetry in Speeches.
* the ability to write friendly and formal letters.

Unit-I **8 hours**

Tera Sneh Na Kho oon, Kavi Parichaya, Patra Likne ke Kaaran, Patra Kee Avashyakatha, Sandhi keeiye, Vigrah Keejiye

Unit-II **12 hours**

Ek boondh, Tera Sneh Na Kho oon kavitha kee manovygnaik stiti, Chutti Patra, Sandhi

Unit-III **12 hours**

Ekloondh Kavitha Ka Uddeshya, Kabir Ke Dohe, Nagar Palika ko Patra, Samas

Unit-IV **14 hours**

Vimal Indu Kee Vishal Kiranen, Rahim Ke Dohe, Naukari Keliye Avedan Patra, Upasarga

Unit-V **14 hours**

Thulasi ke Dohe, Kitab Maangne Keliye Patra, Pratyaya, Kaviparichaya

Books Recommended

1. Dakshina Bharath Hindi Prachara Sabha, Thiagaraya Nagar, Subodh Hindi, Paatamala-3, Chennai-600 017, Hindi, 2016.
2. DBHP Sabha, T.Nagar, Chennai-600 017, Abihav Patralekhan, 2016
3. Ram Dev, Vyakaran Pradeep, Hindi Bhavan, 63 Tagore Nagar, Alahabad 2, 2016.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester III	Course Code 17UGH310003					Title of the Paper Hindi-III						Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	Mean Score of COs	
CO1	4	4	4	3	4	3	3	3	4	4	4	3.6	
CO2	3	3	2	3	2	3	3	3	5	3	5	3.0	
CO3	3	3	3	3	4	3	3	4	3	3	3	3.2	
CO4	3	2	2	3	3	3	3	3	3	3	4	2.9	
CO5	3	3	3	3	3	3	4	3	3	3	4	3.2	
CO6	4	4	4	4	3	3	3	3	3	3	3	3.3	
											Mean Overall Score	3.2	

Result: The Score for this Course is 3.2 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No.of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semestre: III **Heures /Semaine: 4**
17UGF310003 **Points : 3**

FRANÇAIS-III

Les résultats d'apprentissage: L' étudiant peut …

* Comparer la culture de l'Inde et de la France
* Familiariser l'étudiant avec le vocabulaire, la grammaire et les conversations
* Connaître des journaux, des courriels, des lettres
* Parler des projets de vacances
* Exprimer l'étonnement
* Parler de ses projets d'avenir, exprimer l'opposition.

Unit-I: Un entretien et Au restaurant (10 heures)

Demander des informations personnelles à quelqu'un, donner des informations, répondre à une proposition. Réserver une table, demander la carte, commander, apprécier les plats, demander l'addition.

Grammaire: Imparfait, Imparfait et passé composé, expression du temps, expression de la conséquence.Le futur, présent des verbes peser, rejoindre, le passé récent, le présent progressif, le futur proche, Restriction-ne…que, moi aussi…

Unit-II : Enfin les vacances ! et Un autre institut (10 heures)

Raconter son emploi du temps quotidien, parler des projets de vacances, exprimer l'étonnement. Rassurer/consoler, s'indigner

Grammaire: Verbes pronominaux, pronom y, quelqu'un/ne…personne, quelque chose/ne…rien, ne…jamais, Déjà/ne…pas encore, chacun, adjectifs indéfinis.Pronoms relatifs, impératif, indicateurs de temps : de…a, a partir de….jusqu'a, depuis, pendant.

Unit-III : Un Indien célèbre visite la France et Qui dépense plus? (10 heures)

Demander des informations sur quelqu'un, demander une opinion, donner son opinion. Dire à quelqu'un d'être prudent, faire des reproches à quelqu'un, se justifier.

Grammaire: Pronoms relatifs composés, pronoms compléments d'objet directs et indirectes, opposition savoir/Connaitre, connecteurs chronologiques, nombre ordinaux.Le comparatif, c'est+ nom+ qui, il reste, encore, il y a, souvent.

Unit-IV: Penser à son avenir - (15 heures)

Parler de ses projets d'avenir, exprimer l'opposition.

Grammaire : Style direct/indirect, proposition introduite par que, mots d'enchaînement – donc, pourtant.

Unit-V: L'astrologie **(15 heures)**

Exprimer des conditions, dire quelque chose n'a pas d'importance, proposer quelque chose.

Grammaire: Le conditionnel – la condition.

Manuel:

1. K.Madanagobalane, **Synchronie-II**, Samhitâ Publication, 2011.

Livre de référence :

1. Annie Berthet /B_atrix Sampsonis/ Catherine Hugot /V_ronnique M Kizirian / Monique Waendendries, **Alter Ego A1**, Hachette, 2006.
2. Yves Loiseau/R_gineM_rieux, Connexions 1, Didier, 2011.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester III	Course Code 17UGF310003					Title of the Paper French-III						Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6		Mean Score of COs
CO1	4	4	2	3	4	4	2	3	3	2	2		3.0
CO2	3	3	3	3	4	4	2	3	4	2	3		3.1
CO3	3	2	3	2	4	3	4	3	3	3	3		3.0
CO4	3	3	4	3	4	2	3	3	3	4	4		3.3
CO5	3	3	4	3	4	2	3	3	4	4	4		3.4
CO6	3	4	3	3	3	3	3	3	4	4	4		3.4
									Mean Overall Score				3.2

Result: The Score for this Course is 3.2 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester: III **Hours/Week: 4**
17UGS310001 **Credits : 3**

SANSKRIT-III

Course Outcomes

At the end of the course, a student should be able to demonstrate…

* Knowledge and understanding of essential Sanskrit vocabulary in a given topic
* Knowledge and understanding of the appropriateness of basic Sanskrit structures in Slokas
* Knowledge of the basic Sanskrit poetry.
* An idea on Epics and Puranas.
* The usage of – Upasargas.
* The familiarization the history of Sankrit literature Vedas – Puranas and Natakas.

Unit-I **8 hours**

Romodantam. Balakandam. 1-15

Unit-II **12 hours**

Romodantam. Balakandam. 15-30

Unit-III **12 hours**

Vedas – Vedangas. vivaranam.

Unit-IV **14 hours**

Puranas. Upanishads.

Unit-V **14 hours**

Upasargas. Bhavishyat Kaalah

Books recommended:

1. Parameshwara, Ramodantam, LIFCO, Chaennai, 2015.
2. R.S. Vadhyar & Sons, Book-Sellers and Publishers, Kalpathi, Palghat-678003, Kerala, South India, History of Sanskrit Literature, 2015.
3. Kulapathy, K.M., Saral Sanskrit Balabodh, Bharathiya Vidya Bhavan, Munshimarg, Mumbai-400 007, 2015.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester III	Course Code 17UGS310003					Title of the Paper Sanskrit-III						Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6		
CO1	5	3	5	4	4	3	3	3	3	3	4		3.1
CO2	4	3	4	4	4	4	3	3	3	4	4		3.1
CO3	4	3	3	4	4	4	4	4	3	3	4		3.1
CO4	4	3	3	4	3	4	4	4	3	4	4		3.1
CO5	4	4	4	3	4	3	3	4	3	4	4		3.1
CO6	5	4	4	4	4	3	3	3	3	4	3		3.1
									Mean Overall Score				3.1

Result: The Score for this Course is 3.1 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester: III **Hours/Week: 5**
17UGE320103 **Credits: 3**

GENERAL ENGLISH-III

Course Outcome

* Comprehend the local and global issues through the lessons
* Do the tasks centering on skill development and enhance their Grammar Using and Writing Skills
* Use interactive skills
* Train and develop the Listening and Reading Skills of the learners through teacher-led reading practice
* Enhance their Listening, Reading, Speaking, and Writing Skills
* Develop their Creative and Critical Thinking and Speaking Skills

Unit-I: *Suggestions to Develop Your Reading Habit

1.0 Introduction
1.1 Objectives
1.2 Listening and Reading Skills through Teacher-led Reading Practice
1.3 Glossary
1.3.1 Words
1.3.2 Phrases
1.4 Reading Comprehension
1.5 Critical Analysis
1.6 Creative Task
1.7 General Writing Skill: Letter Writing: Informal
1.8 Grammar: Simple Present Tense
1.9 **Non-Detailed Text:** Dickens, Charles. *Hard Times.*

Unit-II: *The Secret of Success: An Anecdote

2.0 Introduction
2.1 Objectives
2.2 Listening and Reading Skills through Teacher-led Reading Practice
2.3 Glossary
2.3.1 Words
2.3.2 Phrases
2.4 Reading Comprehension
2.5 Critical Analysis
2.6 Creative Task

2.7 General Writing Skills: Letter Writing: Formal
2.8 Grammar: Present Continuous Tense
2.9 **Non-Detailed Text:** Dickens, Charles. *Hard Times.*

Unit-III: ***The Impact of Liquor Consumption on the Society**

3.0 Introduction
3.1 Objectives
3.2 Listening and Reading Skills through Teacher-led Reading Practice
3.3 Glossary
3.3.1 Words
3.3.2 Phrases
3.4 Reading Comprehension
3.5 Critical Analysis
3.6 Creative Task
3.7 General Writing Skills: Letter to Newspaper
3.8 Grammar: Simple Past Tense
3.9 **Non-Detailed Text:** Dickens, Charles. *Hard Times.*

Unit-IV: * Dr. A.P.J. Abdul Kalam: A Short Biography

4.0 Introduction
4.1 Objectives
4.2 Listening and Reading Skills through Teacher-led Reading Practice
4.3 Glossary
4.3.1 Words
4.3.2 Phrases
4.4 Reading Comprehension
4.5 Critical Analysis
4.6 Creative Task
4.7 General Writing Skill: Write a letter applying for a job
4.8 Grammar: Past Continuous Tense
4.9 **Non-Detailed Text:** Dickens, Charles. *Hard Times.*

Unit-V: *Golden Rule: A Poem

5.0 Introduction
5.1 Objectives
5.2 Listening and Reading Skills through Teacher-led Reading Practice
5.3 Glossary

5.3.1 Words
5.3.2 Phrases
5.4 Reading Comprehension
5.5 Critical Analysis
5.6 Creative Task
5.7 Grammar: Simple Future Tense
5.8 General Writing Skill: Circular-Writing
5.9 **Non-Detailed Text: Dickens, Charles. *Hard Times.***

Unit-VI: *Hygiene

6.0 Introduction
6.1 Objectives
6.2 Listening and Reading Skills through Teacher-led Reading Practice
6.3 Glossary
6.3.1 Words
6.3.2 Phrases
6.4 Reading Comprehension
6.5 Critical Analysis
6.6 Creative Task
6.7 General Writing Skill: Writing an Agenda for a Meeting
6.8 Grammar: Future Continuous Tense
6.9 **Non-Detailed Text: Dickens, Charles. *Hard Times.***

Textbook

1. Jayraj, S. Joseph Arul et al. *Trend-Setter: An Interactive General English Textbook for Under Graduate Students*. New Delhi: Trinity, 2016. Print.

Non-Detailed Text:

1. Dickens, Charles. *Hard Times.* Wordsworth: Printing Press, 1854. Print.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester III	Course Code 17UGE320103					Title of the Paper General English-III								Hours 5	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	5	5	5	5	4	5	5	5	5	5	5	5	4		4.84
CO2	5	5	5	5	5	5	5	5	5	5	5	5	4		4.92
CO3	5	5	5	5	5	5	5	5	5	5	5	5	4		4.92
CO4	5	5	5	5	4	5	5	5	5	5	5	5	4		4.84
CO5	5	5	5	5	4	5	5	5	5	5	5	5	4		4.84
CO6	5	5	5	5	4	5	5	5	5	5	5	5	4		4.84
												Mean Overall Score			4.86

Result: The Score for this Course is 4.86 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester III **Hours/Week: 5**
17UBO330207 **Credit: 3**

TAXONOMY OF ANGIOSPERMS

Course Outcome

1. To observe the variations among in angiosperms
2. To understand the basic principles guiding the plant classification
3. To acquire knowledge on morphology and nomenclature
4. To describe and identify plants in technical terms
5. To study the salient features of various families mentioned in the syllabus
6. To understand the economic and medicinal importance of plants.

Unit I

History of plant taxonomy. Plant collection and specimen preparation. Examination of plant specimen: technical terms of plant description- plant types (habit and habitat), vegetative (root, stem and leaf) and reproductive (inflorescence, flower and fruit) parts, preparation of floral diagram and floral formula.

Unit II

Plant nomenclature: binomial nomenclature, elementary knowledge of ICBN: principles, rank of taxa, type method, principle of priority, effective and valid publication and author citation. Types and some important systems of classification: artificial (Carolus Linnaeus), natural (Bentham & Hooker) and phylogenetic (Engler & Prantle's). Brief account of cytotaxonomy, chemotaxonomy, molecular taxonomy and numerical taxonomy.

Unit III

Detailed study and economic importance of the following families: *Dicotyledons:* Annonaceae, Tiliaceae, Rutaceae, Anacardiaceae, Rosaceae, Fabaceae, Myrtaceae, Lythraceae.

Unit IV

Detailed study and economic importance of the following families: Cucurbitaceae, Apiaceae, Rubiaceae, Compositae, Sapotaceae, Apocynaceae, Asclepiadaceae, Solanaceae.

Unit V

Detailed study and economic importance of the following families: Labiatae, Amaranthaceae, Euphorbiaceae, Moraceae. *Monocotyledons:* Orchidaceae, Liliaceae, Ponteridaceae, Typhaceae, Gramineae.

Text Book

1. Sharma, OP. 2011. Plant Taxonomy, Tata McGraw-Hill Education New Delhi.

References

1. Clive AS.1989. Plant Taxonomy and Biosystematics, Chapman and Hall Inc. New York.
2. Lawrence, GH. 1967. Taxonomy of Vascular Plants, MacMillan Co., USA.
3. Samuel, BJ & Arlene, EL. 1987. Plant Systematics, McGrawHill Inc., New York.
4. Jeffrey, C. 1982. An Introduction to Plant Taxonomy, Cambridge University Press, UK.
5. Pandey, BP. 2013. Taxonomy of Angiosperms, S. Chand & Co. Ltd., New Delhi.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester III	Course Code 17UBO330207					Title of the Paper TAXONOMY OF ANGIOSPERM								Hours 5	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	3	4	4	5	3	5	3	4	5	4	5	4		4.1
CO2	5	2	5	4	4	5	4	4	5	4	5	3	4		4.2
CO3	4	5	3	5	5	4	5	2	5	4	4	2	5		4.1
CO4	5	3	5	4	4	3	4	4	4	5	4	5	3		4.1
CO5	5	3	4	5	2	5	4	4	4	5	4	4	5		4.2
CO6	4	3	5	4	4	5	5	5	4	3	4	5	4		4.2
													Mean Overall Score		4.1

Result: The Score for this Course is 4.1 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester III **Hours/Week: 3**
17UBO330208 **Credit: 2**

PLANT BREEDING AND EVOLUTION

Course Outcome

1. To understand the aim and objectives of plant breeding
2. To acquire knowledge on various techniques of plant breeding
3. To acquire knowledge on methods of breeding economically important crops
4. To learn hybridization and its applications
5. To understand the process of evolution
6. To learn the various theories pertaining to biological evolution.

Unit I

Plant Breeding: Historical aspect of plant breeding and genetic basis – objectives of plant breeding – modes of reproduction in relation to breeding methods, asexual, sexual and apomictic reproduction – Floral biology in relation to selfing and crossing techniques. Breeding Methods: plant Introduction – types and procedures. Centres of diversity and origin of cultivated plants.

Unit II

Selection: Mass selection - pure line selection and clonal selection, merits and demerits of selection. Hybridization: objectives, choice of parents, problems and causes of failure in hybridization. Incompatibility and sterility, methods to overcome. Methods of handling segregation material for isolation of superior strains – bulk method and pedigree method of selection – role of interspecific and intergeneric hybridization in plant improvement.

Unit III

Inbreeding depression and heterosis: genetic basis and application in plant breeding. Steps in the production of single cross, double cross, three-way cross. Polyploids: induced polyploidy in plant breeding; role of auto and allopolyploids. Mutation and crop improvement.

Unit IV

Back crossing: theory and procedure for transferring various types of character. Breeding for disease resistance and drought tolerance. Preservation and utilization of germplasm. Breeding techniques for rice, sugarcane, groundnut and maize.

Unit V

Evolution: origin of life, theories of evolution of life forms: Lamarckism and Darwinism. Variations – definition causes and types, mutation (principles of Hugo De'Vries). Role of mutation in speciation. Evolution through ages: human evolution. Evidences for evolution.

Text Book

1. Chaudhari, H.K., (1995) Revised Ed., Elementary Principles of Plant Breeding, Oxford & IBH, New Delhi.

References

1. Chopra, V. L., 1994. Plant breeding- Theory and Practice. Oxford & IBH.
2. Sharma J. R. (1996). Principles and Practice of Plant Breeding, Tata McGraw Hill
3. Sinha,U. and Sinha, S., (1992).Cytogenetics, Plant Breeding and Evolution, Vikas Publishing House Pvt. Ltd ,India

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester III	Course Code 17UBO330208					Title of the Paper PLANT BREEDING AND EVOLUTION								Hours 3	Credits 2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	5	3	5	3	4	5	4	5	3	4	4	5		4.2
CO2	3	5	4	4	5	3	4	5	4	5	3	5	3		4.1
CO3	5	3	5	4	4	3	5	3	5	4	4	5	4		4.2
CO4	4	5	5	4	3	5	4	4	3	4	4	3	5		4.1
CO5	4	4	5	5	4	3	4	5	2	5	3	5	2		3.9
CO6	5	3	4	5	4	4	5	4	4	5	5	4	4		4.3
													Mean Overall Score		4.1

Result: The Score for this Course is 4.1 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester III **Hours/Week: 3**
17UBO330209 **Credit: 2**

LABORATORY COURSE-III
(Taxonomy of Angiosperms and Plant Breeding)

Course Outcomes

1. To study the vegetative and floral characteristics of various families mentioned in the theory.
2. To learn plant breeding techniques.

Detailed Study:

* Description of plant in technical terms.
* A detailed study of the range of vegetative and floral characters of plants belonging to the families mentioned in the theory part except Orchidaceae.
* Field trip to any place within or outside the state to study the plants in their natural habitats.
* Spot identification (Binomial, Family) of plants included in the theory.
* Field note-book and 5 herbarium sheets of common angiosperms are to be prepared and submitted at the time of Practical Examination.
* Breeding techniques: Emasculation, Layering and Grafting.

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Semester III **Hours/Week: 4**
17UBO330405A **Credit: 3**

Allied:
CHEMISTRY FOR BIOLOGISTS - I

Course outcome

1. To understand various chemical reactions involved in biological process
2. To acquire knowledge on the concepts of chemistry in biological system
3. To study the structure and properties of different types of bonds
4. To understand the classification and importance of biopolymers
5. To acquire knowledge on various techniques in organic chemistry
6. To apply the concept of chemistry in biological system.

Unit I: Inorganic Chemistry **(12 Hours)**

Covalent bond – properties of covalent molecules, structure of BCl_2, BF_3, NH_3, H_2O, CH_4. SiH_4, CIF_3, AF_4 and PCl_5. Ionic bond – ionization energy, electro-negativity, electron affinity, lattice energy, properties of inonic molecules crystalline structure of inonic molecules. BCC, FCC, NaCl, CsCl. Coordinate bond – ligands, classification of ligands, nomenclature of complexes, oxalate, citrate tartrate, DMG, EDTA ligands and their importance. Structure of $[Ag(NH_3)_2]^+$ linear; $[Cu(NH_3)_4]^{2+}$ square planar; $[Ni(Cl)_4]^{2-}$ Td; $[Pt(CN)_4]^{2-}$ square planar; $[Fe(CVN)_6]^{2-}$ octahedral. Hydrogen bond – Kinds- intra and inter consequences of H-bond mp, bp, dimmer formation, importance of it in biopolymers (proteins and Nucleic acid).

Unit II: Organic Chemistry **(12 Hours)**

Hydrocarbons: Classification (Aliphatic Saturated / Unsaturated, cyclic / acyclic and Aromatic compounds) nomenclature. Substitution reactions: Free radical substitution reaction of alkane, Aromatic electrophilic substitution mechanisms (Halogenation and nitration only); Elimination reactions: 1. Dehydrohalogenation of alkyl halides to alkenes; 2. dehydration of alcohols to alkenes. Addition reaction: Electrophilic addition of HX to alkenes only; Markovnikov's and Anti- Markovnikov's additions.

Unit III: Quantitative Analysis **(12 Hours)**

Error Analysis: accuracy, precision, errors, determinate and indeterminate errors, eliminating and minimizing error, relative error, absolute error. Concentration units: mole, molarity, molality, formality, normality, ppm, mole fraction. Primary standard and secondary standard solutions, $V_1N_1 = V_2N_2$, acid-base titration, redox titration, complexometric titration, precipitation titration and example of each with indicators used.

Unit IV: Agricultural Chemistry **(12 Hours)**

Soil types-red soil, black soil, alluvial soil, desert soil, red soil; role of humus: Manures and their importance. Chemical fertilizers: Natural and synthetic fertilizers: NPK fertilizers: manufacture of NPK fertilizers, mixed fertilizers; role of macronutrients and micronutrients: Pesticides: classification-insecticides, herbicides and fungicides; Structure of important pesticides: DDT, BHC, 2,4-D, 2,4,5-T; biomass and sits utilization; triple revolution India (Green, Blue and White).

Unit V: Bioinorganic and coordination Chemistry **(12 Hours)**

Chemistry of chlorophyll, phorphyrin unit and photosynthesis. Nitrogen fixation, carbon cycle. Chemistry of haem proteins: haemoglobin, myoglobin. Oxygen transport and respiration. Metallo enzymes, vitamins containing metals.

TEXT BOOKS

1. Puri B.R., Sharma L.R., Kalia K.K., (1993) Principles of Inorganic Chemistry (23rd edition), New Delhi, Shoban Lal Nagin, S. Chand New Delhi.
2. Jayashree Ghosh, *Text Book of Pharmaceutical Chemistry*, S. Chand, New Delhi, 1999.

REFERENCE

1. Puri B.R., Sharma L.R., Pathania M.S., (1993 .Principles of Physical Chemistry (23rd edition), Shoban Lal Nagin, S. Chand, New Delhi.
2. Tiwari, Organic Chemistry, 2000 S. Chand & Company Pvt. Ltd., New Delhi.
3. R. Gopalan, 1999 Elements of Analytical Chemistry, S. Chand, New Delhi.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester III	Course Code 17UBO330405A					Title of the Paper CHEMISTRY FOR BIOLOGISTS-I							Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	2	5	3	4	5	3	4	4	2	3	2	4	4	3.00
CO2	3	4	4	3	5	3	4	4	3	4	3	3	4	3.13
CO3	2	4	3	4	4	4	3	4	3	4	3	4	4	3.07
CO4	3	5	4	3	5	3	4	5	3	3	3	4	4	3.27
CO5	2	4	4	5	4	4	3	5	3	4	3	3	4	3.20
CO6	3	4	3	2	5	3	4	4	2	3	3	3	4	3.30
													Mean Overall Score	3.13

Result: The Score for this Course is 3.13 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester III **Hours/Week: 4**
17UBO330405B **Credit: 3**

Allied:

BIOMETRICS AND COMPUTER APPLICATIONS-I

Course outcome

1. To learn the basics of statistics in biological context
2. To acquire basic knowledge on statistical principles in designing biological experiments
3. To acquire knowledge on mathematical modeling
4. To learn mean, media and mode
5. To find out statistical tools and means to explore a population
6. To study the standard deviation.

Unit I

Types of measurements – (Interval, ratio, rank order, categorical) logarithm, permutation and combination.

Unit II

Solving a simple linear equation involving one variable and two variables. Matrices - operation on matrices – Determinants – Inverse – Solving a system of equations of order 3xd3 using Cramer's rule, inverse method – Gauss Elimination method.

Unit III

Mathematical modeling: The simple function and their graphs revisited – principle of least squares (concepts only) – normal equations for curves, straight line, parabola – power curves, exponential curves, $y = a + bx$, $y = ax2 + bx + c$, $y = abx$, $y = aex$ – Solving the above system of equation.

Unit IV

Statistics – meaning – population and samples – reasons for using samples – Types of sampling (SRS, Stratified, systematic) – Describing a sample – Frequency table – Frequency graphs – Diagrammatic representation of data.

Unit V

Measures of location: Mean Median and Mode. Measures of variability: Range, Mean deviation, Standard deviation and coefficient of variation. Skewness and Kurtosis.

Book

1. Nageswara Rao G.: Statistics for Agricultural Science, Oxford & IBH publishing Co.

Reference

1. Olive Jean Dunn: Basic Statistics: A primer for the Biomedical Sciences, John Wiley .

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester III	Course Code 17UBO330405B					Title of the Paper BIOMETRICS AND COMPUTER APPLICATIONS - I								Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	2	5	3	4	5	3	4	4	2	3	2	4	4	3.00	
CO2	3	4	4	3	5	3	4	4	3	4	3	3	4	3.13	
CO3	2	4	3	4	4	4	3	4	3	4	3	4	4	3.07	
CO4	3	5	4	3	5	3	4	5	3	3	3	4	4	3.27	
CO5	2	4	4	5	4	4	3	5	3	4	3	3	4	3.20	
CO6	2	5	3	4	5	3	4	4	2	3	2	4	4	3.30	
													Mean Overall Score	3.16	

Result: The Score for this Course is 3.16 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester III **Hours/Week: 2**
17UBO330405B **Credit: 2**

Allied:

COMPUTER LAB (EXCEL)

Course Outcomes:

1. To find out the mean and variance of samples.
2. To test the fitness of result by various statistical test.

Using the Excel packages the students are asked to solve the following exercises:

1. Solving a system of equations – Inverse Matrix, Cramer's rule.
2. Curve fitting – Straight line, Regression line and second degree.
3. Construction of frequency table – Univariate, Bivariate and Cross tabs.
4. Drawing frequency graphs.
5. Pictorial presentation – Bar diagrams, Pie diagrams etc.

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Semester III **Hours/Week: 2**
17UFC340901 **Credits: 2**

ENVIRONMENTAL STUDIES

Course Outcome

1. To ensure understanding the significance of environment in which we live.
2. To ensure imparting knowledge on the recent issues associated with environment.
3. To ensure educating the youth the causes and consequences of various types of pollutions.
4. To ensure sensitizing the youth the increasing threats to nature and the misery mankind faces.
5. To ensure the limitations of the available natural resources and the need to sustain them.
6. To ensure imparting the knowledge on the concept of biodiversity and its advantages.

Unit-I: Environmental Studies

Environment - Scope and Importance - Environmental Movements in India - Eco-feminism - Public Awareness.

Unit-II: Natural Resources

Food Resources - L and Resources - Forest Resources - Mineral Resources - Water Resources - Energy Resources

Unit-III: Ecosystems, Biodiversity and Conservation

General structure - Functions of ecosystem - Energy flow and ecological pyramids - Biodiversity and conservation - Hot spots of Biodiversity - Endangered and Endemic Species - Value of Biodiversity - Threats to Biodiversity - Conservation of Biodiversity

Unit-IV: Environmental Pollution

Air pollution - Water pollution - Oil pollution - Soil pollution - Marine pollution - Noise pollution - Thermal pollution – Radiation pollution

Unit-V: Environment, Human Population & Social Issues

Human population growth - Urgent steps required for sustainable development - Conserving water - Current Environmental Issues

Text Book:

1. **Environmental studies,** Department of Foundation course, St.Joseph's College, Tiruchirappalli-2, 2015.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester III	Course Code 17UFC340901					Title of the Paper ENVIRONMENTAL STUDIES								Hours 2	Credits 2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	5	5	5	5	3	5	4	4	4	5	3	4	3		4.0
CO2	5	4	5	5	4	4	5	5	5	4	4	4	4		4.5
CO3	5	4	5	5	3	5	4	4	5	3	3	4	2		4.0
CO4	5	4	4	4	4	4	4	5	4	5	4	4	3		4.2
CO5	5	5	4	5	4	3	5	5	4	4	5	3	4		4.3
CO6	5	5	4	4	3	4	4	3	3	4	3	2	4		3.7
													Mean Overall Score		4.1

Result: The Score for this Course is 4.1 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester III **Hours/Week: 2**
17UFC341003A **Credits: 2**

FORMATION OF YOUTH-I

Course Outcome

1. To expose the students to the presence of unjust structures in society
2. To ensure that students to acquire social ethics and social responsibility.
3. To ensure the students learn to face the global challenges with determination.
4. To ensure living with integrity in personal life and the responsibilities in public life.
5. To ensure preparing the students to seek amicable solutions to common problems.
6. To ensure training the students to inculcate business ethics.

Unit-I:

Introduction to Social Ethics

Social ethics, Social ethics and Social responsibility, Social ethics play an important role of the areas, Religion influences social changes and vice versa, Social ethics and corporate dynamics, Forms of social ethics

Unit-II:

The Economic and Political Systems of Today

Planned Economy and Communism, Feudalism, Market Economy and Capitalism, Socialism, Mixed Economy, The Emerging Market Economy, Political System, Totalitarian System, Oligarchic System

Unit-III:

Characteristics of a New World

Global Challenges, The Future is with the Educated Youth, Cost of the Sacrifice, Crusaders against corruption, Responsibility of the Educated Youth, Positive Global Scenario, The right to education, Eradicating gender inequality, Sustainable human development, Social Integration, Elimination of crime, Integration with global markets

Unit-IV:

Integrity in Public Life and National Integration

What is integrity, Public Life, Integrity and Public Life, Integrity in a Democratic State, India as a Democratic State, Behaviour of an Elected Representative of India, Noticeable degradation acts of Elected Representatives, Suggestions to stem this rot, Types of integrity, Transparency can be a guarantee for integrity

Unit-V:

Business Ethics and Cyber Crime

Business Ethics, Business ethics permeates the whole organisation, Measuring business ethics, The Vital factors highlighting the importance of business ethics, Cyber Crime, Strategies in Committing Cyber Crimes, Factors aiding Cyber Crime, Computer Hacking, Cyber-Bullying, Telecommunications Piracy, Countermeasures to Cyber Crime, Ethical Hacking

Text Book:

1. **Formation of Youth,** Department of Foundation course, St.Joseph's College, Tiruchirappalli-2, 2016.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Course Code 17UFC441004A					Title of the Paper FORMATION OF YOUTH-II								Hours 2	Credits 2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	4	5	4	5	5	3	4	5	5	4	5	4		4.4
CO2	4	4	4	4	4	5	4	3	4	4	4	5	5		4.2
CO3	5	3	5	4	5	4	4	3	4	4	4	5	5		4.2
CO4	3	4	5	4	4	5	4	4	4	4	4	3	4		4.0
CO5	2	4	4	4	5	5	4	4	5	5	5	4	5		4.3
CO6	4	3	4	4	5	3	4	5	5	4	5	5	4		4.2
												Mean Overall Score			4.2

Result: The Score for this Course is 4.2 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\textbf{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \textbf{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester- III **Hours/Week: 2**
17UFC341003B **Credits: 2**

RELIGIOUS DOCTRINE-I

Course Outcome

1. To ensure the understanding of the salvation history and experience the God.
2. To ensure enrichment of the young minds with catholic teachings.
3. To ensure the understanding the spiritual truth that human hearts depend on God.
4. To ensure the knowledge of the person of Jesus and follow his footsteps.
5. To ensure the understanding the hand of God in establishing justice and love.
6. To ensure the edification of the youth in faith and love to transcend all human barriers.

Unit: I -Salvation History

Recognizing God - Human Beings: Their worth &Gifts - The Fall - Hope of Salvation - Prophets' Promises

Unit: II-The Gospel of Jesus Christ

Introduction - According to: St. Mathew - St. Mark - St.Luke-St. John-Symbols

Unit: III-The Holy Spirit

Introduction - Holy Spirit in the Old Testament- Holy Spirit in the New Testament- Holy Spirit in Tradition-Biblical Images of the Spirit—Gifts & Fruits of the Holy Spirit

Unit: IV- Social Justice in the Prophets

Introduction-Prophet and Prophecy-Role of Prophets

Unit: V-The Catholic Church

Mystical Body of Christ-Visible Church on Earth-The Marks or Identifying Characteristics of the Church - Hierarchical Constitution of the Church - The Magisterium or Teaching of the Church - The Church and Salvation

Text Book:

1. **Life in the Lord,** Department of Foundation course, St.Joseph's College, Tiruchirappalli-2, 2011.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Course Code 17UFC441004B					Title of the Paper RELIGIOUS DOCTRINE-II								Hours 2	Credits 2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	1	4	3	3	4	4	4	5	4	5	5	5	3.9	
CO2	4	1	4	3	3	4	4	4	5	4	5	5	5	3.9	
CO3	4	3	4	4	3	4	4	5	4	4	5	5	5	4.2	
CO4	4	1	4	3	3	4	4	4	5	4	5	5	5	3.9	
CO5	4	1	4	3	3	4	4	4	5	4	4	4	5	3.8	
CO6	4	1	4	3	3	5	5	5	5	4	5	4	4	4.0	
												Mean Overall Score		3.9	

Result: The Score for this Course is 3.9 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

பருவம்: 4 **மணி நேரம்: 4**

17UGT410004 **புள்ளிகள்: 3**

பொதுத்தமிழ்-IV

பாடத்தின் விளைவு

- நாடகத்தின் போக்குகள், உத்திகள், பாத்திரப்படைப்பு, உரையாடல் முறை, கற்பனைத்திறம் போன்றவற்றை அறிந்துகொள்ளுதல்.
- புதிய நாடகங்களைப் படைக்கும் திறனைப் பெறுதல்.
- நாடகங்களை நடிக்கும் திறன் பெறுதல்
- கிரேக்க, ஆங்கில நாடகங்களை அடியொற்றி தமிழ்நாடகம் தோன்றிய வரலாறு அறியச் செய்தல்.
- சங்ககாலம் தொட்டு இக்காலம் வரை காதல் பற்றிய உணர்வுகளை எடுத்துரைத்தல்.
- தமிழ் வரலாற்றின் மன்னர்களின் ஆட்சியின் சிறப்புகளையும் வீழ்ச்சிகளையும் எடுத்துக்காட்டுதல்.

அலகு-1 **(12 மணி நேரம்)**

மனோன்மணீயம், பாயிரம், அங்கம் - 1, களம் 1 - 5 வரை.

அலகு-2 **(12 மணி நேரம்)**

மனோன்மணீயம், அங்கம் - 2, களம் 1 - 3 வரை.

இலக்கிய வரலாறு நான்காம் பாகம் - தமிழும் பிற துறைகளும் பக்கம் (365-387).

அலகு-3 **(12 மணி நேரம்)**

மனோன்மணீயம், அங்கம் - 3, களம் 1 - 4 வரை.

உரைநடை நாடகம் (கௌதம புத்தர்)

அலகு-4 **(12 மணி நேரம்)**

மனோன்மணீயம், அங்கம் - 4, களம் 1 - 5 வரை.

இலக்கிய வரலாறு நான்காம் பாகம் - சமயத்தவரின் தமிழ்ப்பணி (பக்கம் 391-402)

அலகு-5 **(12 மணி நேரம்)**

மனோன்மணீயம், அங்கம் - 5, களம் 1 - 3 வரை.

இலக்கிய வரலாறு நான்காம் பாகம் - வெளிநாடுகள் தந்த தமிழ் இலக்கியம் (பக்கம் 410-435)

பாடநூல்கள் :

1. சுந்தரனார், மனோன்மணீயம், தமிழாய்வுத்துறை (பதிப்பு), தூய வளனார் கல்லூரி, திருச்சிராப்பள்ளி-2. (அங்கம் : 3 களம் : 4 நீங்கலாக)
2. பாலசுப்பிரமணியம். கு.வெ, கௌதம புத்தர், அய்யா நிலையம், தஞ்சாவூர்
3. சமூகவியல் நோக்கில் தமிழிலக்கிய வரலாறு, தமிழாய்வுத்துறை வெளியீடு, 2014.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Course Code 17UGT410004					Title of the Paper பொதுத்தமிழ்-IV								Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	3	4	5	5	5	5	5	4	4	5	5	5	4.5	
CO2	5	4	3	5	4	5	5	4	4	3	4	5	5	4.3	
CO3	4	3	3	5	4	3	3	4	3	3	4	5	5	3.7	
CO4	5	5	4	5	5	5	5	5	5	4	5	5	5	4.8	
CO5	3	4	4	5	5	4	4	4	5	4	4	4	4	4.1	
CO6	4	3	4	5	5	4	3	3	4	3	2	2	3	3.4	
													Mean Overall Score		4.1

Result: The Score for this Course is 4.1 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semestre: IV **Hours/Week: 4**
17UGH410004 **Credits: 3**

HINDI-IV

Learning Outcomes

At the end of the course, a student should be able to demonstrate…

* the ability to empower the students with globally employable soft skills
* the ability to translate Hindi passages to English
* the ideas on human values
* the ability to instruct the moral values given by the Bhakthi Saints
* the knowledge of Indian festivals .
* the knowledge of culture and tradition

Unit-I **8 hours**

Vidyarthi, Banking Shabda, Anuvad, Anuvad Lesson – 1, Adhikal, Premchand

Unit-II **12 hours**

Pusthakalaya, Nemikaryalaya Tippaniyan, Anuvadak, Anuvad lesson-2, Bakthikal-Gyan Marg, Mahadevivarma

Unit-III **12 hours**

Thyohar, Anuvad Ke Gun, Anuvad lesson – 3, Bakthi, Tippaniyaan, Prem Marg, Pant

Unit-IV **14 hours**

Yugpuresh Gandhi, Anuvadak Ke Gun, Anuvad Lesson – 4 Bakthikal, Bakthikal – Ram Bakthi Kal - Krishna Bakthi, Dinkar

Unit-V **14 hours**

Braman, Anuvad ek kala, Swarnayug Bakthikal, Anuvad Lesson - 5, Reetikal, Chayavad

Books Recommended

1. Kendriya Sachivalaya, Hindi Parishad New Delhi, Karyalaya Sahayika, 2016.
2. Dakshin Bharat Hindi Prachar Sabha Chennai-17, Niband Radhana, Hindi, 2016.
3. DBHP Sabha, Chennai-17, Anuvad Abyas-3, Hindi, 2016
4. Rajnath Sharma, Hindi Sahitya ka Itihas, Vinkod Pustak Mandir, Agra-2, 2016.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Course Code 17UGH410004					Title of the Paper Hindi-IV						Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6		
CO1	4	4	4	3	4	3	3	4	5	4	4		3.5
CO2	3	3	2	3	3	3	5	3	4	3	3		3.1
CO3	3	3	3	3	4	3	3	3	4	3	3		3.1
CO4	3	2	2	3	2	3	3	3	3	3	3		2.7
CO5	3	3	3	3	3	3	5	3	3	4	4		3.3
CO6	4	4	4	4	3	5	3	5	4	4	3		3.9
										Mean Overall Score			3.3

Result: The Score for this Course is 3.3 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semestre: IV **Heures /Semaine: 4**
17UGF410004 **Points : 3**

FRANÇAIS-IV

Les résultats d'apprentissage: L' étudiant peut …

* Comparer la culture de l'Inde et de la France
* Familiariser l'étudiant avec le vocabulaire, la grammaire et les conversations
* Connaître les auteurs français (20 auteurs) et leurs œuvres
* Dire qu'on aime quelqu'un/ quelque chose
* Demander des informations
* Exprimer une opinion personnelle et Justifier son opinion.

Unit-I : Prières du Nouvel An (10 heures)

Exprimer l'inquiétude, le regret, le souhait, l'obligation, la sympathie.

Grammaire : Le subjonctif, verbe craindre

Unit-II : Retrouvailles (10 heures)

Marquer la surprise

Grammaire : Le subjonctif, pronoms possessifs.

Unit-III : C'est lui le meilleur ! (10 heures)

Dire qu'on aime quelqu'un/ quelque chose, donner son opinion, insister.

Grammaire : Le superlatif, les pronoms démonstratif.

Unit-IV Sauvons notre Terre ! (15 heures)

Enchaînement de cause et d'effet, demander à quelqu'un de tenir compté de quelque chose.

Grammaire : Le plus-que-parfait, il y a.

Unit-V : Le jour des élections s'approche et les auteurs français (20 auteurs) et leurs œuvres (15 heures)

Demander des informations, dire qu'une action n'est pas utile, exprimer une opinion personnelle, Justifier son opinion.

Grammaire : Le participe présent – le gérondif, la voix passive.

Manuel:

1. K.Madanagobalane, **Synchronie-II**, Samhitâ Publication, 2011.

Livre de référence:

1. Annie Berthet /B_atrix Sampsonis/ Catherine Hugot /V_ronnique M Kizirian / Monique Waendendries, **Alter Ego A1**, Hachette, 2006.
2. Yves Loiseau/R_gineM_rieux, Connexions 1, Didier, 2011.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Course Code 17UGF410004					Title of the Paper French-IV						Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6		
CO1	4	4	2	3	4	4	2	3	2	2	3		3.0
CO2	3	3	3	3	4	4	2	4	3	2	3		3.1
CO3	3	2	3	2	4	3	4	3	3	3	4		3.1
CO4	3	3	4	3	4	1	2	2	4	3	3		2.9
CO5	3	3	4	3	4	3	2	2	4	4	5		3.4
CO6	3	4	3	3	3	4	4	2	4	3	4		3.4
										Mean Overall Score			3.2

Result: The Score for this Course is 3.2 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester: IV **Hours/Week: 4**
17UGS410004 **Credits : 3**

SANSKRIT-IV

Course Outcomes

At the end of the course, a student should be able to demonstrate…

* knowledge and understanding of the history of Sanskrit Drama.
* knowledge and understanding of the Nataka vivaranam.
* the introduction of Functional - Sanskrit conversation Letter writing.
* the ability to apply relevant theoretical perspectives to topics within the field of study
* the competence in academic writing and oral presentation skills.
* the ability to work both independently and in groups on presentations and/or development of Projects.

Unit-I **8 hours**

Paataah – Asta, Nava Dasha, Sankhya prayogah.

Unit-II **12 hours**

Lot lakaarah. Prqayaogah. Kartari Vaakyaani

Unit-III **12 hours**

Naatakasya Itihaasah.

Unit-IV **14 hours**

Karnabhaaram. Naatakam.

Unit-V **14 hours**

Kathaapaatra Vailaksharnyam.

Books recommended:

1. R.S.Vadhyar & Sons, Book-Sellers and Publishers, Kalpathi, Palghat 678003, Kerala, South India, History of Sanskrit Literature, 2014.
2. Samskritha Bharathi, Aksharam 8th Cross, 2nd Phase, Giri Nagar, Bangalore. Vadatu Sanskritam – Samskara Binduhu, 2014.
3. R.S. Vadhyar & Sons, Book-Sellers and Publishers, Kalpathi, Palghat 678003, Kerala, Soth India. Karnabharam, 2014.
4. Kulapathy, K.M., Saral Sanskrit Balabodh, Bharathiya vidya Bhavan, Munshimarg, Mumbai 400007, 2014.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Course Code 17UGS410004					Title of the Paper Sanskrit-IV					Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	
CO1	5	3	5	4	4	3	3	3	3	3	4	3.1
CO2	4	3	4	4	4	3	3	4	3	4	3	3.1
CO3	4	3	3	4	4	3	4	4	4	4	4	3.2
CO4	4	3	3	4	3	3	3	4	4	4	4	3.1
CO5	4	4	4	3	4	3	4	3	4	4	4	3.0
CO6	5	4	4	4	4	3	3	3	3	3	4	3.2
										Mean Overall Score		3.1

Result: The Score for this Course is 3.1 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester: IV **Hours/Week: 5**
17UGE420104 **Credits: 3**

GENERAL ENGLISH-IV

Course Outcome

* Comprehend the local and global issues through the lessons
* Do the tasks centering on skill development and enhance their Grammar Using and Writing Skills
* Use interactive skills
* Train and develop the Listening and Reading Skills of the learners through teacher-led reading practice
* Improve their General Writing Skills such as Note-Taking, Note-Making, Précis Writing, Paragraph Writing, and Writing Short Essays on Current Issues/General Topics
* Understanding the social background and human character of the period

Unit-VII:

***Women through the Eyes of Media**

7.0 Introduction
7.1 Objectives
7.2 Listening and Reading Skills through Teacher-led Reading Practice
7.3 Glossary
7.3.1 Words
7.3.2 Phrases
7.4 Reading Comprehension
7.5 Critical Analysis
7.6 Creative Task
7.7 General Writing Skill: Writing Minutes of a Meeting
7.8 Grammar: Present Perfect Tense
7.9 **Non -Detailed Poem:** Thomas Hood (1799–1845): "Silence"

Unit-VIII:

***Effects of Tobacco Smoking**

8.0 Introduction
8.1 Objectives
8.2 Listening and Reading Skills through Teacher-led Reading Practice
8.3 Glossary
8.3.1 Words
8.3.2 Phrases

8.4 Reading Comprehension
8.5 Critical Analysis
8.6 Creative Task
8.7 General Writing Skill: Note-Taking
8.8 Grammar: Present Perfect Continuous Tense
8.9 **Non -Detailed Poem:** Coventry Patmore (1823-1896): "The Toys"

Unit-IX:

*** Short Message Service (SMS)**

9.0 Introduction
9.1 Objectives
9.2 Listening and Reading Skills through Teacher-led Reading Practice
9.3 Glossary
9.3.1 Words
9.3.2 Phrases
9.4 Reading Comprehension
9.5 Critical Analysis
9.6 Creative Task
9.7 General Writing Skill: Note-Making
9.8 Grammar: Past Perfect Tense
9.9 **Non -Detailed Poem:** Stephen Spender (1909-1995): "Daybreak"

Unit-X:

***An Engineer Kills Self as Crow Sat on his Head: A News Paper Report**

10.0 Introduction
10.1 Objectives
10.2 Listening and Reading Skills through Teacher-led Reading Practice
10.3 Glossary
10.3.1 Words
10.3.2 Phrases
10.4 Reading Comprehension
10.5. Critical Analysis
10.6. Creative Task
10.7 General Writing Skill: Précis Writing
10.8 Grammar: Past Perfect Continuous Tense
10.9 **Non -Detailed Poem:** Gabriel Imomotimi Okara (1921): "Once Upon a Time"

Unit-XI:

***Traffic Rules**

11.0 Introduction
11.1 Objectives
11.2 Listening and Reading Skills through Teacher-led Reading Practice
11.3 Glossary
11.3.1 Words
11.3.2 Phrases
11.4 Reading Comprehension
11.5 Critical Analysis
11.6 Creative Task
11.7 General Writing Skill: Paragraph Writing
11.8 Grammar: Future Perfect Tense
11.9 **Non -Detailed Poem:** Robert Winner (1930-1986): "Opportunity"

Unit-XII:

***A Handful of Answers: A Zen Tale**

12.0 Introduction
12.1 Objectives
12.2 Listening and Reading Skills through Teacher-led Reading Practice
12.3 Glossary
12.3.1 Words
12.3.2 Phrases
12.4 Reading Comprehension
12.5 Critical Analysis
12.6 Creative Task
12.7 General Writing Skill: Writing Short Essays on Current Issues/General Topics
12.8 Grammar: Future Perfect Continuous Tense
12.9 **Non -Detailed Poem:** Ted Hughes (1930–1998): "The Harvest Moon"

Textbook

1. Jayraj, S. Joseph Arul et al. *Trend-Setter: An Interactive General English Textbook for Under Graduate Students*. New Delhi: Trinity, 2016. Print.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Course Code 17UGE420104						Title of the Paper General English-IV								Hours 5	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	5	4	5	5	4		4	4	5	5	5	4	5	5		4.61
CO2	5	4	5	5	3		4	5	5	5	5	5	5	5		4.69
CO3	4	4	5	4	4		3	4	4	5	5	4	4	5		4.23
CO4	4	4	5	4	4		3	4	5	5	5	4	4	5		4.30
CO5	5	4	5	4	4		4	4	4	5	5	4	4	5		4.38
CO6	5	5	5	5	4		4	4	5	5	5	4	4	5		4.61
													Mean Overall Score			4.47

Result: The Score for this Course is 4.47 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester IV **Hours/Week: 5**
17UBO430210 **Credit: 4**

CELL BIOLOGY AND GENETICS

Course outcome

1. To understand the organization of cells
2. To understand the structure and organization of various cell organelles
3. To understand cell cycle and methods of cell division
4. To study the structure of DNA and RNA
5. To understand the principles and applications of genetics
6. To acquire the basic knowledge on genomics and proteomics.

Unit I

Cell division (mitosis and meiosis)- Cell cycle. Structure, organization and functions of nucleus, mitochondria, chloroplasts, ER, ribosomes, golgi complex, lysosome and vacuole.

Unit II

Cytoplasmic membrane structure and functions. Organisation of cytoskeleton. cellular mechanisms in development and differentiation. Chemical structure of DNA and RNA. Primary, secondary and tertiary structures of DNA. Chromatin nucleosomes and chromosomal proteins, protamines and histones. Special types of chromosome – polytene & lampbrush.

Unit III

Mendel's laws of heredity, Modified Mendelian ratios. Multiple alleles. Linkage and crossing over. Sex linked inheritance. Sex determination mechanism. Cytoplasmic inheritance (plastid inheritance).

Unit IV

DNA is the genetic material: proof: Griffith's, Avery *et al*., and Hershy and Chase. RNA as genetic material. Population genetics: gene frequency, gene pool, Hardy–Weinberg equilibrium. Gene frequencies – conservation and changes.

Unit V

Basic knowledge and applications of genomics and proteomics. Genomics: structural and functional genomics. Plant genome (*Arabidopsis* and *Oryza*), animal (Homo sapien). Human Genome Project - objectives and the controversies.

Book

1. Verma, P.S. & V.K. Agarwal, 2003, Genetics. S. Chand & Co.Ltd., New Delhi.

References

1. Freifelder, D.1993. Essentials of Molecular Biology, Jones & Bartlett, Boston.
2. Gardner, EJ., Simmons, MJ. & Snustad, D. 1991. Principles of Genetics, John Wiley & Sons Inc., 8th Edn., New York.
3. Sinnott, EW., Dunn, LL. & Dobzhansky, T. 1997. Principles of Genetics, Tata Ma Graw Hill Publishing Co., New Delhi.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Course Code 17UBO430210					Title of the Paper CELL BIOLOGY AND GENETICS								Hours 5	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	4	5	5	4	3	5	2	5	3	4	3	3	3.8	
CO2	5	3	4	5	4	5	3	4	4	5	3	5	3	4.0	
CO3	4	5	2	5	4	3	4	3	5	2	5	5	4	3.9	
CO4	5	3	5	2	5	4	5	3	4	5	5	5	3	4.2	
CO5	5	5	4	4	3	5	3	5	3	5	4	2	5	4.1	
CO6	3	4	4	5	2	4	5	3	5	5	4	3	5	4.0	
													Mean Overall Score		4.0

Result: The Score for this Course is 4.0 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester IV **Hours/Week: 5**
17UBO430211 **Credit: 4**

MOLECULAR BIOLOGY

Course Outcome

1. To understand the basic structure of biomolecules and their mode of action
2. To understand the types of DNA molecules and their mechanism of replication
3. To study the process of transcription and translation
4. To study the regulation of gene expression in prokaryotes and eukaryotes
5. To comprehend the molecular mechanism of gene regulation
6. To differentiate the regulation of gene expression between the prokaryote and eukaryote.

Unit I

Organisation of genome – prokaryotic and eukaryotic. Linear and circular DNA molecules. Mutation – types, causes and detection, mutant types – lethal, conditional, biochemical, germinal vs somatic mutants, insertional mutagenesis. Basic idea about mobile genetic elements - IS elements and transposons.

Unit II

DNA replication: semiconservative model, DNA polymerase, chemistry of synthesis, mechanism of replication in *E. coli*. Replication of RNA genome – replicase and reverse transcriptase. DNA repair mechanisms - mismatch and proof reading, photoreactivation, excision, recombination and SOS mechanisms in *E. coli.*

Unit III

Gene expression and the Central Dogma, transcription: RNA polymerase, signals, chemistry of RNA synthesis, mechanism of initiation, elongation and termination in *E. coli*. Differences in eukaryotes, post-transcriptional processing.

Unit IV

Translation – organization of mRNA, genetic code and its characterization, ribosome and rRNA, amino acyl synthetase, tRNA and amino acid activation. Mechanism of initiation elongation and termination. Translation factors, post-translation processing.

Unit V

Regulation of gene expression: The principles, cooperative and on-off regulations. Molecular mechanism: Negative and positive, repressors and inducers. Mechanism of *lac* operon and *trp* operon in *E. coli*. Differences in gene regulation in eukaryotes.

Books

1. Freifelder, D.1993. Essentials of Molecular Biology, Jones & Bartlett, Boston.
2. Gupta PK 2005. Molecular Biology and Genetic Engineering, Rastogi Publications, Meerut.

References

1. De Robertis & De Robertis. 1990. Cell and Molecular Biology, Saunders College, Philadelphia, USA.
2. Elliott WH & Elliott DC. 2005. Biochemistry and Molecular Biology, 3rd Ed. Oxford University, Oxford.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Course Code 17UBO430211					Title of the Paper MOLECULAR BIOLOGY								Hours 5	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	4	3	3	4	3	3	4	3	5	5	3	4		3.7
CO2	5	5	4	4	3	4	5	3	2	3	4	3	5		3.9
CO3	4	5	4	4	5	3	3	4	3	4	5	3	4		3.9
CO4	5	4	2	5	4	5	3	3	4	2	5	3	4		3.8
CO5	5	3	5	2	5	3	4	4	4	3	3	5	4		3.8
CO6	5	4	2	5	3	4	3	5	3	4	2	4	4		3.7
													Mean Overall Score		3.8

Result: The Score for this Course is 3.8 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester IV **Hours/Week: 3**
17UBO430212 **Credit: 2**

LABORATORY COURSE- IV
(Cell Biology, Genetics and Molecular Biology)

Course outcome

1. To understand the chemistry of plant components and products so as to exploit chemistry in the improvement and production of phytochemicals.
2. To import knowledge in some basic techniques necessary to handle the above objective.

Detailed Study::

1. Ultra structure of cell organelles.
2. Study of mitosis in root tips
3. Study of meiosis in anthers
4. Inheritance Patterns – Mendelian and modified Mendelian ratios
5. Linkage Mapping.
6. Estimation of allele frequency in natural (random matting) populations.
7. Isolation and display of polytene chromosomes.
8. Extraction of human genomic DNA from saliva.
9. Estimation of DNA (Colorimetric).

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Semester IV **Hours/Week: 4**
17UBO430407A **Credit: 3**

Allied:
CHEMISTRY FOR BIOLOGISTS - II

Course outcome

1. To understand the chemistry of plant components.
2. To study the functional role of phytochemicals
3. To understand the plant based drugs and their curative roles
4. To elucidate various phytochemicals by natural methods
5. To experiment qualitative analysis of organic substances
6. To learn various chromatography techniques

Unit I: Physical Chemistry **(12 Hours)**

Chemical Kinetics - rate, order, molecularity of reactions. Zero order and first order reaction, rate constant derivation, examples, Importance of kinetic study, activation energy, activated complex, Arrhenius equation, factors affecting rate of the reactions. Thermodynamics of a chemical reaction - Terms DE, DH, DS, DG, endothermic, exothermic reactions, conditions for spontaneity of reactions. Laws of thermodynamics (I, II, III definition only).

Unit II: Pharmaceutical Chemistry **(12 Hours)**

Classification of drugs: Definitions of: Drug, pharmacophore, pharmacognory, pharmacy, pharmaco kinetics, pharmaco dynamics, pharmacopoeia (IP, BP, USP). Antibiotics: Pencillin: Anaesthetics-general and local anaesthetics: Inhalation anaesthetics (N_2O, $CHCl_3$, haloethane, ethylchloride). Intravenous anaesthetics (thiopental sodium); & sulphonamide drugs.

Unit III: Chemistry of Natural Products **(12 Hours)**

Vitamins-types of vitamins A_1 retinol, vitamine B complex (thiamine-B_1, riboflavin-B_2, cyanocobalamine-B_{12}), vitamine C, vitamine D and Vitamine E (Sources and deficiency disorders of vitamins only) (structures and structural elucidation not required) Alkaloids: Occurrence, Classification, physical properties and uses of coniine, piperine, nicotine, morphine and quinine alkaloids (structures of alkaloids not required)

Terpenoids: Classification, properties and uses of camphor, citral and á-pinene (structures of terpenoids not required).

Unit IV: Organic qualitative Analysis(12 Hours)

Qualitative analysis of organic substances: solubility test in $NaHCO_3$, NaOH, HCl, test for saturation and unsaturation; aliphatic & aromatic; acidic, basic

and neutral nature; elements test for N, S and halogens: functional groups like acid, phenol, aldehyde, ketone, carbohydrate, amine, amide and diamide.

Unit V Chromatography and electrophoresis (12 Hours)

Introduction, types of Chromatographic Techniques: Principles, instrumentation, sampling and applications of Paper, thin layer, column chromatography and electrophoresis

TEXT BOOKS:

1. Puri B.R., Sharma L.R., Pathania M.S., 1993. Principles of Physical Chemistry (23rd edition), New Delhi, ShobanLalNagin Chand & Co.
2. Jayashree Ghosh, 1999. Text Book of Pharmaceutical Chemistry, S. Chand & Company Pvt. Ltd., New Delhi

REFERENCES:

1. Tiwari, 2000 Organic Chemistry, S. Chand & Company Pvt. Ltd., New Delhi.
2. N. S. Gnanapragasam and G. Ramamurthy, Organic Chemistry – Lab Manual, S. Viswanathan & Co. Pvt.Ltd., 1998
3. R. Gopalan, 2000 Elements of Analytical Chemistry, S. Chand, New Delhi.
4. Puri B.R., Sharma L.R., Kalia K.K., 1993. Principles of Inorganic Chemistry (23rd edition), New Delhi, ShobanLalNagin Chand & Co.
5. Puri B.R., Sharma L.R., Pathania M.S., 1993. Principles of Physical Chemistry (23rd edition), New Delhi, ShobanLalNagin Chand & Co.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Course Code 17UBO430407A					Title of the Paper CHEMISTRY FOR BIOLOGISTS-II								Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	2	4	3	4	4	3	4	3	4	3	4	3	4	3.00	
CO2	2	5	3	4	4	2	4	5	3	3	4	3	4	3.07	
CO3	3	4	4	5	4	2	3	4	4	3	4	4	4	3.20	
CO4	2	4	3	5	4	3	3	4	4	3	3	4	3	3.00	
CO5	2	3	4	4	5	3	4	3	5	2	4	4	3	3.07	
CO6	2	4	3	4	4	3	4	3	4	3	4	3	4	3.03	
													Mean Overall Score	3.00	

Result: The Score for this Course is 3.0 (Moderate Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester III & IV **Hours/Week: 2**
17UBO430406A **Credit: 2**

Allied:

CHEMISTRY PRACTICAL FOR BIOLOGISTS

Course Outcome

1. To estimate various minerals by volumetric analysis.
2. To identify various biomolecules by standard biochemical methods.

Students learn the techniques of volumetric and organic qualitative analysis

I. Organic Analysis

a. Identification of acidic, basic, phenolic and neutral organic substances
b. Test for aliphatic and aromatic nature
c. Test for saturation and unsaturation
d. Detection of N, S and halogens.

II. Volumetric Analysis

Estimation of acid by titration using standard base – estimation of base titration using standard acid – estimation of iron by titration with potassium permanganate – estimation of oxalic acid by titration using potassium permanganate – estimation of potassium dichromate by titration of copper by titration using KI and standard thiosulphate – estimation of iron using potassium thiocyanate by spectrophotometry (demonstration only).

REFERENCES:

1. Experimental Chemistry, J. N. Gurtu and Kapoor, S. Chand and Co. 1987.
2. N. S. Gnanapragasam and G. Ramamurthy, Organic Chemistry – Lab Manual, S. Viswanathan& Co. Pvt.Ltd., 1998.

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Semester IV **Hours/Week: 4**
17UBO430407B **Credit: 3**

Allied:

BIOMETRICS AND COMPUTER APPLICATIONS- II

Course Outcome

1. To understand the various applications of statistics
2. To acquaint latest developments in field of information technology
3. To study the communicative tools in the field of information technology
4. To enable the students to analyze and handle biological data
5. To understand the testing of hypothesis using null hypothesis
6. To understand co-relation and regression, and their applications.

Unit I

Probability: normal distribution – definition – properties – areas under normal curve – interpreting areas as probabilities – importance of normal distributions. Confidence interval: confidence interval for means – between two means, variance and proportion.

Unit II

Testing of hypothesis: null hypothesis – two kinds of errors – testing of hypothesis based simple mean – difference between mean – population proportion – difference between the population proportion – the Chi-square test – goodness of fit – test for independence – f test: equality of variances.

Unit III

Correlation and regression: correlation: types of correlation – scatter diagram – Pearson's coefficient of correlation – rank correlation. Simple regression: meaning of regression lines – regression equations y on x and x on y only – regression coefficient – simple problems.

Unit IV

Theory of attribute: introduction – notations – dichotomy – classes and class frequencies – consistency of data – criteria of independence – Yule's coefficient of association – coefficient of colligation.

Unit V

Comparison between Parametric and Non-parametric tests. Non-parametric tests – Single test, Run test for randomness, Wald-Wolfowitze run test, Median test, Wilcoxon single rank test, Mann Whitney U test – (no derivations – conceptual and applications understanding are to be tested).

Book

1. Nageswara Rao G.: Statistics for Agricultural Science OXFORD & IBH publishing Co.

Reference

1. Olive Jean Dunn: Basic Statistics: A primer for the Biomedical Sciences – John Wiley and Sons.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Course Code 17UBO330407B					Title of the Paper BIOMETRICS AND COMPUTER APPLICATIONS - II								Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	2	4	3	4	4	3	4	3	4	3	4	3	4	3.00	
CO2	2	5	3	4	4	2	4	5	3	3	4	3	4	3.07	
CO3	3	4	4	5	4	2	3	4	4	3	4	4	4	3.20	
CO4	2	4	3	5	4	3	3	4	4	3	3	4	3	3.00	
CO5	2	3	4	4	5	3	4	3	5	2	4	4	3	3.07	
CO6	2	4	3	4	4	3	4	3	3	3	4	3	4	3.03	
													Mean Overall Score	3.03	

Result: The Score for this Course is 3.0 (Moderate Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester IV **Hours/Week: 2**
17UBO430408B **Credit: 2**

Allied:

COMPUTER LAB - II

(Statistical Software Package)

Course Outcome

1. To find out the mean and variance of samples.
2. To test the fitness of result by various statistical test.

Detailed study:

1. Finding Mean and Variance.
2. Finding correlation coefficient, Rank Correlation.
3. T- test
4. F-test
5. Chi-square test
6. Non-parametric tests.

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Semester IV **Hours/Week: 2**
17UFC441004A **Credits: 2**

FORMATION OF YOUTH-II

Course Outcome

1. To ensure preparing the students to live in harmony with nature.
2. To ensure the youth the significance of public health and the related issues.
3. To ensure sensitizing the youth about addictions and their consequences.
4. To ensure educating the youth on disaster management and First-Aid.
5. To ensure enlightening on the developmental issues and challenges of youth today.
6. To ensure the value of counselling for attaining positive mental health.

Unit-I: Harmony with Nature

What is environment, Why should we think of harmony, Longing for human well-being, Principles to conserve environmental resources, Causes of disharmony, The fruits of harmony with nature, Forest resources, Water resources, Mineral resources, Food resources, Fruits of dishormony, Economic values and growth, Environmental Ethics, Guidelines to live in harmony with nature, Towards life-centered system for better quality of life

Unit-II: Public Health

Health related issues, Health Care in India vs Developed Countries, Health and Heredity, Public Health - The Indian Scenario, Objectives of public health in India, Public Health System in India, Failure on the public health front, Role of the central government, Hospitals Services in India, Health and Abortion, Health and Drug Addiction, Drug abuse

Unit-III: Disaster Management and First-Aid

Disaster Management, Types of disaster, Plans of disaster management, Technology to manage natural disasters and catastrophes, Disaster Management, Rehabilitation and Reconstruction, Human-induced disaster, First Aid, The importance of First-aid, Disaster Declaration and Response

Unit-IV: Issues Dealing with Science

What is Science, Science and Religion, Social Relevance of Science and Technology, Science and technology for social justice, Difference caused by Science and Technology, Need for indigenous technology, Science,

Technology and Innovation Policy of India, Harnessing the forces of science and technology for the future

Unit-V: Counselling for the Adolescents

High Risk Behaviours, Developmental Changes in Adolescents, Key Issues of the Adolescents, Need for Counselling, Nature of Counselling, Counselling Goals, Does helping help? The Good and the Bad news.

Text Book:

1. **Formation of Youth,** Department of Foundation course, St.Joseph's College, Tiruchirappalli-2, 2016.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Course Code 17UFC441004A					Title of the Paper FORMATION OF YOUTH-II								Hours 2	Credits 2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	4	5	4	5	5	3	4	5	5	4	5	4		4.4
CO2	4	4	4	4	4	5	4	3	4	4	4	5	5		4.2
CO3	5	3	5	4	5	4	4	3	4	4	4	5	5		4.2
CO4	3	4	5	4	4	5	4	4	4	4	4	3	4		4.0
CO5	2	4	4	4	5	5	4	4	5	5	5	4	5		4.3
CO6	4	3	4	4	5	3	4	5	5	4	5	5	4		4.2
												Mean Overall Score			4.2

Result: The Score for this Course is 4.2 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester IV **Hours/Week: 2**
17UFC441004B **Credits: 2**

RELIGIOUS DOCTRINE-II

Course Outcome

1. To ensure appreciation of the harmony of religion.
2. To ensure training the youth in the power of prayer.
3. To ensure the understanding of Mary's role in salvation history and Marian Dogmas.
4. To ensure enlightening the graces and invisible effects of the sacraments.
5. To ensure the youth with the promise that God forgives failings on repentance.
6. To ensure understanding the concept of salvation and the promise of eternal life.

Unit: I Harmony of Religions

Introduction - Religions of India - Buddhism - Jainism - Sikhism - Judaism - Confucianism - Christianity - Zoroastrianism - Islam

Unit: II The Christian Prayer

Prayer Defined - Reasons to pray - The Way to Pray - Types of Prayer - Obstacles for Prayer - Prayer in Old -The Lord's Prayer

Unit: III Mary, the Blessed Virgin, Mother of God

Introduction - Marian Dogmas - Mary in need of Redemption - Mary in the New Testament - Apparitions of Mary - Devotion to Mary

Unit: IV Sacraments of Initiation

Introduction - An Overview - Baptism - Confirmation - Holy Eucharist

Unit: V Sacraments of Healing & at the Service of the Community

Reconciliation - Anointing of the Sick - Holy Orders – Matrimony

Text Book:

1. **Life in the Lord,** Department of Foundation course, St. Joseph's College, Tiruchirappalli-2, 2011.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Course Code 17UFC441004B					Title of the Paper RELIGIOUS DOCTRINE-II								Hours 2	Credits 2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	1	4	3	3	4	4	4	5	4	5	5	5	3.9	
CO2	4	1	4	3	3	4	4	4	5	4	5	5	5	3.9	
CO3	4	3	4	4	3	4	4	5	4	4	5	5	5	4.2	
CO4	4	1	4	3	3	4	4	4	5	4	5	5	5	3.9	
CO5	4	1	4	3	3	4	4	4	5	4	4	4	5	3.8	
CO6	4	1	4	3	3	5	5	5	5	4	5	4	4	4.0	
													Mean Overall Score		3.9

Result: The Score for this Course is 3.9 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester V **Hours/Week: 6**
17UBO530213 **Credits: 3**

BIOPHYSICS AND BIOSTATISTICS

Course Outcome

1. To understand the physical principles applicable to biological systems
2. To learn the emerging field of biophysics with reference to bioenergetics
3. To understand photobiology and its biological significance
4. To learn the principles of statistics and their applications in biology
5. To understand measures of central value and standard deviation
6. To learn various probability tests of significance.

Unit I

Biophysics: bioenergetics **- e**nergy and work. Laws of thermodynamics – concept of entropy and enthalpy – Gibb's free energy – energy transduction in biological systems – high energy compounds – ATP bioenergetics and energy coupled reactions. Radioactivity **- s**tructure of an atom - isotopes – types of radiations – detection of radiation - autoradiography – application of radioactive isotopes in biological studies.

Unit II

Photobiology **- e**lectromagnetic spectrum – visible rage of spectrum – dual nature of light (wave & particle nature) – solar energy and photosynthesis – energy states of atom – spin property – absorption spectra of molecules – energy states – excitation – singlet and triplet states – de excitation – heat emission – light emission. Bioluminescence.

Unit III

Biostatistics: Data: primary & secondary; variable: discrete & continuous – population & sample. Sampling techniques – classification of data **-** frequency distribution: discrete, continuous and cumulative – parts of a statistical table – advantages of classification of data. Presentation of data **-** histogram, frequency polygon, frequency curve, Ogive curve, bar charts: simple, multiple, subdivided, pie diagram.

Unit IV

Measures of central values: mean, median, mode. Measures of dispersion: range, mean deviation, standard deviation, coefficient of variation – Skewness. Correlation **-** definition – types – methods of studying correlation: scatter diagram method and Karl Pearson's coefficient of correlation for simple and linear data. Regression: definition – regression lines.

Unit V

Probability **- d**efinition, binomial, poison and normal distributions. Tests of significance. General procedure – large sample testing & small sample testing: t-Test, Chi-squire test and F test.

Books

1. Bose, 1981. Elementary Biophysics, Vijaya Printers, Chennai.
2. Nageswara Rao, G. 1983. Statistics for Agricultural Science Oxford & IBH.

References

1. S.P. Gupta, 2008. Elementary Statistical Methods, Sultan Chand & Sons, New Delhi
2. Casey, E.J., 1969. Biophysics Concepts and Mechanisms, East & West Press, New Delhi.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester V	Course Code 17UBO530213					Title of the Paper BIOPHYSICS AND BIOSTATISTICS								Hours 6	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	5	3	3	4	5	3	4	4	3	4	4	5	4		3.9
CO2	4	5	3	5	3	4	3	4	5	4	3	4	5		4.0
CO3	5	4	4	3	4	4	3	5	2	3	2	5	5		3.8
CO4	4	5	4	2	4	4	4	3	5	3	5	3	4		4.3
CO5	5	5	3	5	3	4	5	4	5	4	4	4	5		3.2
CO6	4	3	2	4	2	3	5	3	3	3	4	2	4		3.3
													Mean Overall Score		3.7

Result: The Score for this Course is 3.7 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester V **Hours/Week: 5**
17UBO530214 **Credits: 3**

ECOLOGY AND CLIMATE CHANGE

Course Outcome

1. To understand the fundamentals of ecology
2. To learn various ecosystems and their components
3. To learn various biogeochemical cycles and their significance
4. To understand techniques of community studies
5. To learn the center of origin of cultivated plants
6. To understand various factors and concepts of climate change

UNIT I

Introduction to ecology and ecosystem, biosphere and biomes. Autecology: definition and its various aspects. Synecology: definition, classification units of vegetation, community composition, classification of community, study of plant community structure. Basic idea of biodiversity – species, genetic, ecosystem and habitat diversity.

UNIT II

Biogeochemical cycles - C, N & P. Plant succession*:* definition, primary and secondary succession, autogenic and allogenic succession, pioneers and climax communities. Mechanism of plant succession - xerosere and hydrosere. *Population interactions*: symbiosis, mutualism, parasitism.

UNIT III

Sampling techniques in plant community studies – quadrat and transect methods – species area curve – density, frequency, abundance, dominance of populations – importance value index – construction of phytographs. Phytogeographical zones of India.

UNIT IV

Centres of origin and distribution of species. Patterns of plant distribution - continuous and discontinuous. Continental drift - evidences and impact; endemic distribution, theories on endemism, age and area hypothesis.

UNIT V

Carbon emissions, global warming, climate change, carbon credit, carbon sequestration, blue carbon, alternative energy sources and green energy. Climate change conferences and the role of IPCC and UNFCCC.

Text Book

1. Sharma, P.D. (1995) Ecology and Environment

References

1. Melchias G. 2001. Biodiversity and Conservation. Science Publishers Inc, NH USA.
2. Odum, E.P. 1983. Basic Ecology, Saunders, Philadelphia.
3. Smith, R.L. 1996. Ecology and Field Biology, Harper Collins, New York.
4. Dash M C (1993). *Fundamentals of Ecology*. Tata McGraw Hill.
5. Varma P S, Agarwal V K. *Principles of Ecology*. S Chand and Co.
6. Begon, M. Harper, J.L. and Townsend, C.R. 1996. Ecology,Blackwell Science, U.S.A.
7. N.S. Subrahmanyam and A.V. S.S. Sambamurty. 2000. Ecology. Narosa Publishing, Delhi

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester V	Course Code 17UBO530214					Title of the Paper ECOLOGY AND CLIMATE CHANGE							Hours 5	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	4	4	4	5	3	5	4	3	4	3	2	3	5	3.8
CO2	4	4	5	3	3	2	3	4	3	5	2	5	3	3.5
CO3	3	4	3	3	3	3	3	3	2	2	5	3	4	3.2
CO4	4	4	4	2	4	3	5	3	4	2	4	2	4	3.5
CO5	5	3	3	5	2	3	5	3	3	5	2	3	4	3.5
CO6	3	4	4	3	5	3	5	3	5	4	4	2	5	3.8
													Mean Overall Score	3.5

Result: The Score for this Course is 3.5 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester V **Hours/Week: 3**
17UBO530215 **Credits: 2**

LABORATORY COURSE-V

(Biophysics, Biostatistics, Ecology and Climate Change)

Course Outcome

1. To separate cell and tissue components by various techniques.
2. To analyze the physico-chemical characteristics of water and soil.
3. To study the vegetation by various methods.

Biophysics and Biostatistics

1. Separation of cell and tissue components by centrifugation
2. Separation of pigments by Paper chromatography
3. Absorption spectrum of macromolecules and pigments – UV, FTIR
4. Sampling by Random Number Table
5. Data Collection
6. Classification of Data: Discrete, continuous and cumulative.
7. Statistical diagrams: Histogram, Frequency curve, Bar chart and Ogive curve
8. Measures of Central Values: Mean, Median and Mode
9. Measures of Dispersion: Range, Mean Deviation and Standard Deviation.

Ecology and Climate Change

1. Chemical analysis of water and Soil –Total hardness, Carbonates and Bicarbonates and Dissolved oxygen.
2. Vegetation Analysis: Quadrat, Line transects, Species Density, abundance and richness. Basal area and relative dominance
3. Green auditing
4. Field trip

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Semester V **Hours/Week: 5**
17UBO530216 **Credits: 3**

MICROBIOLOGY AND IMMUNOLOGY

Course Outcome

1. To study micro organism and their activities
2. To exploit the potentiality of microbes in industry, agriculture and environmental issues
3. To learn culture techniques of microbes
4. To study various human diseases caused by microbes and their control
5. To understand various types of food spoilage and their methods of food preservation
6. To understand human immune system and learn the origin, structure and function of immunoglobulins.

Unit I

History and scope of microbiology, characterization and classification of microorganisms. Whittaker's five kingdom concept – Bergey's Manual of Systematic Bacteriology (outline only). Morphology, cell structure, cell wall chemistry, growth, nutrition and reproduction of bacteria. Viruses – structure, classification and reproduction - lytic and lysogenic cycle. A general account on Rickettsias, Chlamydias, Mycoplasmas, Viroids and Prions.

Unit II

Culture of microorganisms: Pure cultures, batch and continuous cultures. Preservation of microorganisms. Microorganisms and Human diseases: Food borne (botulism), water borne (typhoid), air borne (tuberculosis), vector borne (malaria) and contact diseases (AIDS), avian flu, swine flu and SARS. Control of microorganisms – physical, chemical and biological methods.

Unit III

Microbial ecology: Soil microbiology – role of microbes in biogeochemical cycles (carbon, nitrogen and sulphur). Aquatic microbiology – fresh water, marine and estuarine. Air microbiology. Food microbiology (types of food spoilage and methods of food preservation). Dairy microbiology – fermented dairy products. Industrial microbiology (fermentation and industrial production of alcohol and antibiotics).

Unit IV

Immune system - adaptive, innate, humoral and cellular immunity. Origin, structure and immunological role of primary lymphoid organs (bone marrow

and thymus) and Secondary lymphoid organs (Spleen, lymph nodes, Payer's patches, tonsils and appendix).

Unit V

Origin, structure and immunological role of immune cells (Leucocytes and lymphocytes). Lymph- composition and functions. Antibody types - study of IgG, its structure and immunological role.

Books

1. Pelczar J Chan ECS & Krieg R 1999. Microbiology, Tata McGraw Hill, New Delhi.
2. Sullia SB & Shantharam S 2005. General microbiology. Oxford & IBH
3. Chakravarty AK 2000. Immunology, Tata McGraw Hill Publication, New Delhi.

Reference

1. Casida LE 1989. Industrial microbiology, Wiley Eastern, New Delhi.
2. Dubey RC & Maheshwari DK. 2004. A text book of microbiology. S. Chand New Delhi.
3. Fraziel, NC.1974. Food Microbiology, II Edn., Tata McGraw Hill, New Delhi.
4. Martin Alexander. 1978. Introduction to Soil Microbiol, Wiley Eastern, New Delhi.
5. Janeway CA & Travers P. Immunobiology, Gerland Publishing Inc., New York.
6. Daniel P. Stites & Abba I. Jerr. 1998. Medical Immunology, 9th Ed., Prentice-Hall International Inc.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester V	Course Code 17UBO530216					Title of the Paper MICROBIOLOGY AND IMMUNOLOGY								Hours 5	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	5	3	4	4	3	3	4	2	5	2	3	4		3.5
CO2	5	2	3	3	3	2	4	2	3	4	2	4	4		3.2
CO3	4	5	3	5	3	4	3	4	3	5	4	2	5		3.8
CO4	5	3	5	3	4	5	3	5	4	4	3	2	4		3.8
CO5	3	3	2	3	2	3	3	3	2	2	3	2	2		3.5
CO6	3	4	3	5	2	5	3	4	2	5	3	4	2		3.5
													Mean Overall Score		3.5

Result: The Score for this Course is 3.5 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester V **Hours/Week: 3**
17UBO530217 **Credits: 2**

LABORATORY COURSE-VI
(MICROBIOLOGY & IMMUNOLOGY)

Course Outcome

1. To learn various techniques of isolation and enumeration of microorganisms from various sources.
2. To learn the various immunological tests.

Microbiology

1. Preparation of common media (Nutrient agar & Potato dextrose agar).
2. Staining of Bacteria (Simple & Grams staining).
3. Isolation and enumeration of microbes in soil and water (serial dilution).
4. Study of motility by Hanging Drop.
5. Pure cultures of bacteria – Streak plate, Pour plate and Spread plate.
6. Microbiology of milk (Phosphatase and MBRT)
7. Antibiosis - Kirby Baur method

Immunology

1. Blood grouping
2. WIDAL- test for typhoid
3. RPR- test for syphilis
4. RF- test for rheumatoid arthritis
5. Immunoelectrophoresis – Demo
6. ELISA – Demo

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Semester V **Hours/Week: -**
17UBO530218 **Credits: 2**

Self-Paced Learning:
ECONOMIC BOTANY
(Partially Online-Course)

Course Outcome

1. To understand the economically important crops
2. To study the morphology and uses of medicinal plants
3. To acquire the importance of medicinal plants for human welfare
4. To acquire scientific knowledge on preparation of valuable economic plant products
5. To produce beverages and narcotics from specific plants
6. To study plants used for the preparation of latex, dye, resin, gum and fibres.

Unit I

Study of binomial, family, morphology of useful parts and economic importance of the following: cereals: rice, wheat, maize, pearl millet and finger millet. pulses: red gram, black gram, bengal gram, rarden pea and cluster bean.

Unit II

Study of binomial, family, morphology of useful parts and economic importance of the following: fruits: apple, banana, mango, papaya grape and guava. Spices: nutmeg, cinnamon, fennel, fenugreek and pepper.

Unit III

Study of binomial, family, morphology of useful parts and economic importance of the following: fibres: cotton, jute, sissal hemp, coconut and flax. Essential oils: lemongrass oil, sandal wood oil, olive oil, jasmine oil and eucalyptus oil.

Unit IV

Study of binomial, family, morphology of useful parts and economic importance of the following: beverages & narcotics: coffee, tea, cocoa, tobacco and ganja. Tannins & resins: myrobalan, wattle bark, canada balsam, turpentine and gum arabic.

Unit V

Study of binomial, family, morphology of useful parts and economic importance of the following: latex & dyes: chicle, gutta percha, rubber, indigo

and haematoxylin. Drugs: digitalin, santonin, ephedrine, nux-vomica and serpentine.

Text Book

1. Pandey B.P.2005.Economic Botany.S.Chand &Company Pvt.Ltd., New Delhi.

References

1. Pandey B.P.2011.College Botany. Vol.III. S.Chand & Company Pvt. Ltd., New Delhi.
2. Verma V. 2009. Text book of Economic botany. Ane Books Pvt. Ltd., New Delhi.
3. Pandey BP. 2007. Botany for degree students, S.Chand &Company Pvt.. Ltd., New Delhi.

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Semester V **Hours/Week: 4**
17UBO530301A **Credits: 4**

Core Elective:
BIOPESTICIDES

Course Outcome

1. To understand the types and mode of action of biopesticides
2. To understand plants as source of natural pesticides
3. To learn moss production techniques of microbial biopesticides
4. To learn insects as biopesticides
5. To learn virus as biopesticide
6. To understand the various types of biopesticide formulations.

Unit I

Biological control of insect pests: scope and principles, factors affecting biological control. Biopesticides: introduction, importance and classification – living creatures to control pests – weeds for controlling pest.

Unit II

Botanical pesticides: present status and future prospects; opportunities for botanical pesticides in crop rotation; multiple cropping for controlling pests. Plants as a source of natural pesticides: neem, chrysanthemum, aristolochia, garlic, turmeric and citronella.

Unit III

Biocontrol agents: Isolation, identification, mode of action and mass production of *Pseudomonas fluorescens* (bacterial agent), *Trichoderma viride* (fungal agent).

Unit IV

Biological pesticides: isolation, identification. Bacterium as biopesticide (*Bacillus thuringiensis*). Fungus as biopesticide (Entomophagous - *Beauveria bassiana*). Insect as biopesticide (*Reduviid predators* - *Rhynocoris kumarii, R. fussipus R. marginatus*). Trichogramma. Virus as biopesticide (Baculovirus - NPV).

Unit V

Production methods of biopesticides: liquid culture fermentation and solid state fermentation – Types of biopesticide formulations: dry inoculum, granules, pellets, capsules, wettable powder and liquid formulations.

Books

1. Ghosh G K, 2000, Biopesticide and Integrated pest Management, A P H Publishing Corporation, New Delhi.
2. Subba Rao N S, 1982, Advances in Agricultural Microbiology, Oxford & IBH Publishing Company, Chennai.

References

1. Krishna Chandra, Greep and Srivathsa, 2005, Bio Control Agents & Biopesticides,
2. Ministry of Agriculture, New Delhi and Regional Centre of Organic Farming, Bangalore.
3. Franklin R. Hell and Julius J. Menn, 1999, Biopesticides – Use and delivery, Humene Press, New Jersey.
4. D. Dent, 2000, Insect Pest Management 2nd Ed, ABI Publishers, UK

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester V	Course Code 17UBO530301A					Title of the Paper BIOPESTICIDES							Hours 4	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	5	3	4	4	2	5	2	3	4	2	5	3	4	3.5
CO2	3	5	3	2	5	3	5	3	4	3	4	3	4	3.6
CO3	3	4	4	3	3	5	4	2	4	3	4	5	4	3.7
CO4	5	3	5	2	4	2	3	5	3	3	4	3	2	3.4
CO5	5	2	4	2	4	4	3	5	4	4	5	4	4	3.8
CO6	4	3	3	4	3	4	3	5	2	4	2	4	3	3.4
												Mean Overall Score		3.5

Result: The Score for this Course is 3.5 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester V **Hours/Week: 4**
17UBO530301B **Credits: 4**

Core Elective:

MEDICINAL BOTANY

Course Outcome

1. To understand the different Indian systems of medicine
2. To learn classifications of natural drugs
3. To study collection, cultivation and preparation of natural drugs
4. To understand drugs obtained from various parts of the plants
5. To study the process of drug adulteration
6. To learn various types of drug evaluation and quality control of drugs.

Unit I

History of medicinal plants. Traditional medicinal systems: ayurvedha, siddha, unani and naturopathy. Definition of drug classification of natural drugs - alphabetical, morphological, taxonomical, chemical and pharmacological.

Unit II

Ethnobotany – definition major tribes of South India and their ethno botanical and ethnobiological heritage. Ethnobotany and conservation of plants with special reference to India. Mythology and conservation of ecosystems (sacred groves).

Unit III

Cultivation, collection and preparation of natural drugs macroscopic (physical and organoleptic characters), therapeutic and pharmaceutical characterization of the following medicinal plants: *Adathoda vasica, Aloe vera, Centella asiatica, Piper nigrum, Allium sativum, Curcuma longa, Ocimum sanctum* and *Catharanthes roseus.*

Unit IV

Drugs from leaves (*Eucalyptus*), flower (*Eugenia*), fruits and seeds (*Coriander*), roots (*Withania*), underground stem (Ginger), bark (*Cinchona*) and wood (*Ephedra*). Cultivation and utilization of selected medicinal plants *Bacopa monnieri*, *Cassia senna*, *Gloriosa superba, Phyllanthus amarus* and *Rauvolfia serpentina.*

Unit V

Drug adulteration and types. Drug evaluation: physical, chemical and biological. Quality control of herbal drugs. Role of NMPB, AYUSH and CDRI.

Text Books

1. Gokhale, S.B., Kokate, C.K. and Purohit, A.P. (2003). Pharmacognosy. Nirali Prakashan, Pune.

References

1. Bhattacharjee, S.K. 2004. Hand Book of Medicinal plants. Pointer Publishers, Jaipur.
2. Harbourne, J. B. (1998). Phytochemical methods: A Guide to Modern Techniques of Plant Analysis (3rd edition). Chapman and Hill Co., New York.
3. Jain, (2001). Medicinal plants. National Book Trust, New Delhi.
4. John Jothi Prakash, E. (2003). Medicinal Botany and Pharmacognosy. JPR Publication, Vallioor, Tirunelveli.
5. Joshi, S.G. (2001). Medicinal plants. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
6. Prajapathi, Purohit, Sharma and Kumar. (2003). A Hand book of Medicinal plants. Agrobios Publications, Jodhpur.
7. Purohit and Vyas, (2004). Medicinal Plants Cultivation. Agrobios Publications, Jodhpur.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester V	Course Code 17UBO530301B					Title of the Paper MEDICINAL BOTANY								Hours 4	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	3	5	3	4	2	5	3	3	5	3	4	2	4		3.4
CO2	4	3	4	3	2	4	3	5	2	4	3	4	3		3.5
CO3	4	3	4	4	3	2	4	2	4	5	4	3	3		3.1
CO4	3	4	3	3	3	2	4	4	2	4	3	2	3		3.2
CO5	5	2	3	5	3	2	3	2	2	4	4	4	3		3.2
CO6	3	2	3	2	3	5	3	2	4	3	4	3	4		3.1
													Mean Overall Score		3.2

Result: The Score for this Course is 3.2 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester V **Hours/Week: 2**
17UBO540601 **Credits: 2**

Skill Based Elective:
MUSHROOM CULTURE

Course Outcome

1. To acquire knowledge on various types of mushrooms.
2. To understand cultivable species of mushrooms.
3. To learn the culture techniques of edible mushrooms.
4. To understand the various recipe prepared from mushrooms.
5. To learn the preservation and storage of mushrooms.
6. To study the economic importance of mushrooms.

Unit I

Introduction - Classification - Edible and Poisonous. Tests for identification - Nutritive value of mushrooms.

Unit II

Characteristics of common edible mushrooms Paddy straw, Oyster and milky mushrooms. Life cycle of a common mushroom (*Agaricus*).

Unit III

Culture Techniques – Preparation of spawn, preparation of compost – Spawn running – Harvesting and Marketing.

Unit IV

Preservation and storage of mushrooms – Diseases and pests of mushrooms.

Unit V

Delicious recipes of mushroom – Economic importance of mushrooms.

Book

1. Nita Bahl (1984). Handbook on Mushrooms, Oxford and IBH Publishing Company

Reference

1. Dubey, RC. (2001) A text book of Biotechnology, S.Chand & Co. Ltd.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester V	Course Code 17UBO540601					Title of the Paper MUSHROOM CULTURE								Hours 2	Credits 2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	5	3	5	3	3	4	3	4	3	3	5	3	4		3.3
CO2	4	5	4	3	3	3	3	3	3	3	3	3	3		3.1
CO3	3	4	3	3	3	3	3	3	3	3	3	3	3		3.2
CO4	3	2	3	3	3	3	3	5	3	3	4	3	3		3.2
CO5	3	3	3	4	3	4	3	3	3	3	3	3	3		3.1
CO6	3	3	3	3	3	3	3	3	3	3	3	3	4		3.5
													Mean Overall Score		3.2

Result: The Score for this Course is 3.2 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester V **L P C**
17USS540701A **2 - 2**

Inter Departmental Courses (IDC): SOFT SKILLS

Course Outcomes

1. To augment the level of confidence in articulation oif the students in their communication.
2. To ensure that the students learn to speak and interact with one another as social beings
3. To equip them and train to present the best of themselves as job seekers.
4. To equip with conversation techniques, presentation skills and grooming
5. To prepare them write their own resume and enhance their interview skills required by employers
6. To ensure that the students learn the parameters of group dynamics a key component of conversation

Module I

Basics of Communication: Definition of communication, Barriers of Communication, Grooming, Presentations & Practicum.

Module II

Resume Writing & Interview Skills: Resume Writing: What is resume? Types of Resume - Chronological, Functional and Mixed Resume**,** Steps in preparation of Resume. **Interview Skills:** Preparation

Module III

Group Discussion: Basics of Group Discussion, Parameters of GD, Essential Points for GD preparation, and GD Topics and Practicum.

Module IV

Personal Effectiveness: Self Discovery; and Goal Setting; Questioneers & Presentations for interview, Common interview questions, Attitude, Body Language, The mock interviews and Practicum

Module V

Numerical Ability: Calendar, Average, Percentage; Profit and Loss**,** Simple Interest, Compound Interest; Time and Work, Pipes and Cisterns; Time and Distance**,** Problems on Trains**,** Boats and Streams; Ratios and Proportions.

Module VI

Test of Reasoning - Verbal Reasoning: Series Completion, Analogy; Data Sufficiency, Assertion and Reasoning; and Logical Deduction. **Non-Verbal Reasoning:** Series; and Classification

Textbook

1. JASS, 2016. *Straight from the traits: Securing the soft skills*. St.Joseph's College, Trichy

References

1. Aggarwal, R.S. 2010. *A Modern Approach to Verbal and Non Verbal Reasoning*. S.Chand, New Delhi.
2. Aggarwal, R.S. 2001. Quantitative Aptitude. S.Chand. New Delhi
3. Covey, Stephen. 2004. *7 Habits of Highly effective people,* Free Press. Egan, Gerard. (1994). *The Skilled Helper* (5th Ed). Pacific Grove, Brooks/ Cole.
4. Khera ,Shiv 2003. *You Can Win.* Macmillan Books , Revised Edition.
5. Murphy, Raymond. 1998. *Essential English Grammar*. 2nd ed., Cambridge University Press. Sankaran, K., & Kumar, M. *Group Discussion and Public Speaking*. M.I. Pub, Agra, 5th ed., Adams, Media.
6. Trishna's 2006. *How to do well in GDs & Interviews*, Trishna Knowledge Systems.
7. Yate, Martin. 2005. H*iring the Best: A Manager's Guide to Effective Interviewing and Recruiting**

Evaluation Pattern

Modules	Topic	Examination Pattern	
		CIA	Online
I	Basics of Communication	15	5
II	Resume Writing & Interview Skills	15	5
III	Group Discussion	10	10
IV	Personal Effectiveness	10	10
V	Numerical Ability (Common Session)	-	10
VI	Test of Reasoning (Common Session)	-	10
	Total	**50**	**50**

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Semester V **Hours/Week: 2**
17USS540701B **Credits: 2**

Inter Departmental Courses (IDC):
NATIONAL CADET CORPS

Course Outcomes

1. NCC 'C' and 'B" certificates are very much useful and increase credit marks in UPSC and SSB examinations..
2. They learnt discipline punctual and leadership quality.
3. They got physical fitness for Army and Police selection.
4. They learnt general knowledge find political issue.
5. They got trained for social service and volunteers for disaster.
6. They will be the best citizens of India.

Unit-I: About NCC - Personality Developmet - Self Awareness (6 hours)

NCC Aims and objectives of NCC - Organization and training and NCC song Incentives for cadets in NCC - NCC ranks Religion, culture , traditions and customs of India.- National integration – importance and necessity - Freedom struggle and nationalist movement in India - Personality development - Introduction to personality development - Factors influencing / shaping personality – Physical , social, psychological and philosophical Self awareness – know yourself / insight . - Change your mindset.

Unit-II: Interpersonal Relationship and Communication - NDMA (6 hours)

Interpersonal relationship and communication - Communication skills Leadership traits - Types of leadership Attitude – assertiveness and negotiation - Time management - Effects of leadership with historical examples - Stress management skills - Interview skills - Conflict motives.- Importance of group – team work - Disaster Management - Civil defence organization and its duties – NDMA Types of emergencies / natural disasters- Assistance during natural / other calamities / floods / cyclone / earth quake / accident - Setting up of relief camp during disaster Management - Collection and distribution of aid material .

Unit-III: Social Awareness and Community Development - Hygiene and Sanitation (6 hours)

Social awareness and community development - Basics of social service-weaker sections of our society and their needs - Health and Hygiene Structure and functioning of the human body - Hygiene and sanitation- Physical and mental health - Infectious and contagious diseases and its prevention -

Basic of home nursing and first aid in common medical emergencies - Wounds and fractures - Introduction to yoga and exercises

Unit-IV: AIR-WING (6 hours)

Principles of flight – Elementary Mechanics – Atmosphere - Venturi effect and Bernauli's theorem - Glossary of terms; Aero engines – Aero-engine components; Aircraft components – Airframe structure; Metereology – Importance of Metereology in Aviation; Air Navigation – Why a pilot should study Navigation; Airmanship – Airmanship; Aeromodelling – History of Aeromodelling – Materials used in Aeromodelling – Types of Aeromodels.

Unit-V: NAVAL (6 hours)

Naval orientation - history of Indian Navy – Navy head quarters commands fleets- ships shore establishment war ships and their role - induction to Anti submarine warfare.- Types of war ships - types anchor parts of anchor - GPS RACON RADAR - types of firewater making in the ships- NBCD organization and structure - Damage flooding.

Text Book

1. Cadet's hand book published by the Directorate General, National Cadet Corps, Ministry of Defence, R. K. Puram, New Delhi 110022, 2008.

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Semester VI **Hours/Week: 5**
17UBO630220 **Credits: 3**

PLANT PHYSIOLOGY

Course Outcome

1. To learn the underlying principles of various physiological process of plants
2. To study mineral nutrition in plants
3. To understand the mechanism of photosynthesis
4. To understand the mechanism of respiration
5. To learn the various plant growth substances and their physiological effects
6. To study seed dormancy and photoperidiodism.

Unit I

Water, Mineral and Solute: Uptake and Transport. Molecular Structure and properties of water. Diffusion and osmosis – osmotic pressure, turgor pressure and significance of osmosis. Plasmolysis and its importance. Mechanism of absorption of water – passive and active absorption. Ascent of sap – theories on absorption. Absorption, mechanism and transport of mineral salts. Transpiration - types, mechanism, significance and factors affecting transpiration.

Unit II

Mineral nutrition: plant nutrients - essential and non-essential elements – micro and macro nutrients. Source, physiological role and deficiency symptoms of minerals. Hydroponics and aeroponics. Nitrogen metabolism: importance of nitrogen to plants. Sources of nitrogen – nitrogen cycle – nitrogen – ammonium assimilation and transamination.

Unit III

Photosynthesis**:** photosynthetic apparatus and pigment systems – Emerson enhancement effect and two pigment systems – photosynthetic electron transport system – Hill reaction – oxygen evolving complex. Mechanism of electron transport, cyclic, noncyclic and pseudocyclic phosphorylations. Synthesis of ATP by photophosphorylation. Mechanism of CO_2 fixation in C_3, C_4 and CAM plants.

Unit IV

Respiration**:** introduction**,** aerobic and anaerobic respiration - glycolysis – TCA cycle – mitochondrial electron transport system and its components – oxidative phosphorylation and ATP synthesis. Glyoxylate cycle – photorespiration – Pentose Phosphate Pathway. Respiratory Quotient.

Unit V

Plant growth substances: physiological effects of auxins, gibberellins, cytokinins, ethylene and absiscic acid. Dormancy: definition, causes of seed dormancy, breaking of seed dormancy, significance of seed dormancy. Physiology of seed germination. Photoperiodism, vernalization and flowering – Plant rhythm and Biological clock

Books

1. Verma V. 2007. Text book of Plant Physiology, Ane Books India, New Delhi
2. JainV.K. 2006. Fundamentals of Plant Physiology, 18th ed. Chand & Co.
3. Pandey, SN & Sinha, BK. 2006. Plant Physiology, 4th Ed. Vikas Publishing House Ltd.

References

1. Noggle and Fritz, 1976. Introductory Plant Physiology, Prentice Hall, New Delhi.
2. Baijal BD & Ravisharma, 1981. A Textbook of Plant Physiology, Shiva Lal Agarwal
3. Salisbury, F.B. & Ross, CN. 1995. Plant Physiology. CBS Publishers, New Delhi

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester VI	Course Code 17UBO630220					Title of the Paper PLANT PHYSIOLOGY								Hours 5	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	5	4	5	3	5	3	4	4	5	4	3	4	4	4.1	
CO2	5	5	3	5	4	4	3	5	3	5	3	4	4	4.1	
CO3	4	4	5	4	3	5	3	4	5	5	3	5	3	4.4	
CO4	5	5	4	5	5	4	5	4	5	3	5	4	3	4.3	
CO5	4	4	5	5	3	5	5	4	5	4	4	5	3	4.1	
CO6	5	3	4	4	5	4	3	3	5	3	5	4	5	4.0	
													Mean Overall Score		4.1

Result: The Score for this Course is 4.1 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\textbf{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \textbf{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester VI **Hours/Week: 3**
17UBO630221 **Credits: 2**

Lahoratory Course-VII: Plant Physiology

Course Outcome

1. To study the effect of environmental factors on various physiological process.
2. To measure the enzyme activities on specific substrates.

Detailed Study:

1. Effect of temperature on membrane permeability.
2. Osmosis – Thistle funnel, potato osmoscope.
3. Determination of water potential and solute potential.
4. Determination of root pressure and sap exudation.
5. Effect of environmental factors on the rate of transpiration.
6. Extraction and separation of leaf pigments.
7. Effect of light and CO_2 on photosynthesis.
8. Aerobic respiration –Ganong's respiroscope.
9. Ascent of sap – Balsam plant experiment.
10. Measurement of lipase activity.
11. Demonstration experiments:
    i. Phototropism,
    ii. Geotropism,
    iii. Arc Auxanometer,
    iv. Dialatometer
    v. Hydroponics

Semester VI **Hours/Week: 5**
17UBO630222 **Credits: 3**

GENETIC ENGINEERINGAND BIOTECHNOLOGY

Course Outcome

1. To understand the principles of genetic engineering
2. To study the mechanism of generating rDNA
3. To learn the types and application of cloning vectors
4. To study the different types of gene transfer methods
5. To acquire knowledge on the principles and applications of plant tissue culture
6. To learn the principles and application of Intellectual Property Rights.

Unit I

Crown gall disease and *Agrobacterium*. Steps in recombinant DNA Technology. Methods to generate desired foreign genes: isolation of prokaryotic gene by restriction enzymes and of eukaryotic gene by cDNA synthesis. Joining DNA molecules: ligases, linkers and homopolymers.

Unit II

Cloning vectors: natural vectors - *E. coli* plasmids; *in vitro* vectors – pBR; cosmids; single-stranded DNA vectors - M13; and shuttle vectors - *E. coli;* Yeast shuttle vector. Selectable markers. Gene cloning strategies: cDNA library and genomic library.

Unit III

Methods of gene transfer to bacteria, plants and animals: Ca-transfection, microinjection, electroporation, shotgun, lipofection, somatic cell nuclear transfer, and embryonic stem cells.

Unit IV

Protoplast fusion technology. Applications of plant tissue culture in agriculture and forestry. Transgenic plants against herbicide, insects, drought and salinity. Genetic Use Restriction Technology. Anti-sense RNA technology and the *Flavr Savr* tomato.

Unit V

Production technology of plantibodies and monoclonal antibodies by hybridoma technology. Gene therapy. Cloning animals (therapeutic and reproductive). Xenografting. Release of GMOs: Bt brinjal in India. Concerns of genetic engineering. IPRs – meaning, types (IP, Copy Rights & Patents). Arguments for & against patenting genes and life forms.

Books

1. Bernard R Glick & Jack J Pasternak. 2001. Molecular biotechnology-principles and applications of recombinant DNA, (2nd Edition), ASM Press, Washington, D.C.
2. Old, RW & Primrose, SB. 2001. Principles of Gene Manipulation-an introduction to genetic engineering, Black Well Science Ltd., New York.

References

1. Gamborg, OL & Phillips, GC. 1995. Plant cell, Tissue and Organ culture, Narosa publishing House, New Delhi.
2. George, EF & Sherrington, PD. 1984. Plant propagation by Tissue culture, Exegetics Limited, London.
3. Old, RW & Primrose, SB. 2001. Principles of Gene Manipulation - an introduction to Genetic engineering, Black Well Science Ltd., New York.
4. James D Watson *et al*., 1992. Recombinant DNA (2nd Edition), WH Freeman Co., New York.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester VI	Course Code 17UBO630222	Title of the Paper GENETIC ENGINEERING AND BIOTECHNOLOGY											Hours 5	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	3	3	3	3	2	3	3	2	2	5	4	3	4	3.2
CO2	3	3	3	4	5	3	2	3	2	4	2	3	4	2.9
CO3	3	3	4	3	3	3	2	3	3	3	2	2	4	3.1
CO4	3	4	3	3	2	2	2	4	3	4	4	3	3	3.2
CO5	4	2	4	2	3	2	5	2	5	2	4	2	5	3.4
CO6	3	5	3	5	2	4	4	3	2	4	2	4	3	3.4
													Mean Overall Score	3.2

Result: The Score for this Course is 3.2 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester VI **Hours/Week: 4**
17UBO630223 **Credits: 3**

BIOCHEMISTRY

Course Outcomes

1. To understand the structure and properties of biomolecules
2. To study the classification, properties and functions of carbohydrates
3. To study the classification, properties and functions of lipids
4. To study the classification, properties and functions of proteins
5. To learn the characteristics, classifications and mode of action of enzymes
6. To study the classification, properties and significance of secondary metabolites.

Unit I

Carbohydrates**:** classification. Stereochemistry of simple sugars, á & â glycosidic linkages; structure and properties of mono- and disaccharides and oligosaccharides. Polysaccharides: chemical structure and function of starch. Structure of plant cell wall and bacterial cell wall.

Unit II

Lipids: classification, saturated and unsaturated fatty acids. Properties and synthesis of lipids; derived lipids and their biological role. Function and structure of biological membranes - the Singer –Nicolson's "fluid-mosaic" model.

Unit III

Amino acids & proteins: basic structure & properties. Globular and fibrous proteins. The peptide bond, amino acid sequence and primary structure; backbone folding and secondary structure; tertiary structure of collagen and the forces of protein stabilization.

Unit IV

Enzymes**:** biocatalysts – definition and characteristics, IUB classification; principles of catalysis, activation energy, transition state, active site and Michaelis-Menten equation. Mode of action - Lock & Key and Induced Fit models. Factors affecting enzyme action – pH, temperature, [S] & [E]. Enzyme regulation by inhibition – competitive, non-competitive, uncompetitive & feedback.

Unit V

Secondary metabolites and their functions in plants. Terpenoids: N-containing metabolites. Phenolics: classification, properties, structure and significance. Pathways of shikimic acid and mevolonic acid. Synthesis of alkaloids from amino acids.

Book

1. Jain JL 2009 Fundamentals of Biochemistry S. Chand, New Delhi

Reference

1. Elliott WH & Elliott DC. 2005. Biochemistry and Molecular Biology, 3rd Ed. Oxford University, Oxford

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester VI	Course Code 17UBO630223					Title of the Paper BIOCHEMISTRY								Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	3	4	4	2	5	3	3	4	3	2	5	2	4		3.1
CO2	4	3	2	3	2	3	3	2	2	3	5	4	4		3.1
CO3	3	3	3	5	2	3	4	2	3	5	3	2	2		3.3
CO4	3	2	4	2	5	3	3	5	2	2	5	3	4		3.2
CO5	3	5	2	2	3	4	4	3	3	5	3	2	2		3.2
CO6	5	3	2	2	4	3	2	4	3	2	4	4	4		3.6
													Mean Overall Score		3.2

Result: The Score for this Course is 3.2 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\textbf{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \textbf{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester VI **Hours/Week: 3**
17UBO630224 **Credits: 2**

LABORATORY COURSE-VIII
(Genetic Engineering, Biotechnology and Biochemistry)

Course Outcome

1. To learn the preparation and sterilization of culture media.
2. To learn the procedure for tissue culture.
3. To estimate biomolecules using qualitative and quantitative methods.

Detailed Study:

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
7. Qualitative estimation of sugars.
8. Estimation of total lipids.
9. Estimation of total free amino acids.
10. Determination of strength of amino acids.
11. Quantitative estimation of total protein.
12. Separation of plant pigments by Column chromatography
13. Assay of alkaline phosphatase and amylase

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Semester VI **Hours/Week: -**

17UBO630225 **Credits: 2**

COMPREHENSIVE EXAMINATION

Course Outcomes:

1. Analyze the basic concepts of OOP and apply it in problem solving.
3. Apply the fundamental principles of digital electronics and memories to problems.
4. Relate Java and its advance concepts in application programs.
5. Review the basic concept of Computer System and Operating System Structure with simple examples.
6. Review concepts of PHP with MySQL in simple problems.

UNIT I

C Programming**,** Object Oriented Programming with C++

UNIT II

Relational Database Management System, Digital Computer Fundamentals

UNIT III

Java Programming HTML5 and CSS3

UNIT IV

VB.NET,ASP.NET

UNIT V

Operating Systems, PHP with MYSQL

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester VI	Course Code 17UBO630224					Title of the Paper COMPREHENSIVE EXAMINATION								Hours	Credits 2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	3	4	2	4	3	3	4	2	3	4	4	3	3		3.2
CO2	3	2	4	5	2	4	3	4	5	3	3	3	4		3.5
CO3	4	4	3	3	3	4	5	2	1	3	3	4	3		3.2
CO4	4	3	4	3	2	3	4	2	3	3	4	3	3		3.2
CO5	5	2	3	3	2	3	4	2	3	3	3	5	4		3.2
CO6	4	1	3	3	3	3	3	3	4	4	4	3	3		3.2
													Mean Overall Score		3.2

Result: The Score for this Course is 3.2 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester VI **Hours/Week: -**
17UBO630226 **Credits: 2**

GROUP PROJECT

Course Outcome

1. To acquire work skills in the field of biology.
2. To learn preliminary skills on research.

The chance to do research based project at the FINAL SEMESTER is offered to students as group work to be accomplished outside of the class hours.

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Semester VI **Hours/Week: 4**
17UBO630302A **Credits: 4**

Core Elective: BIO-INSTRUMENTATION

Course Outcomes:

1. To understand the principle, procedure and application of various microscopes
2. To study the principle, types and operation of centrifuges
3. To study the principle, types and operation of chromatography
4. To study the principle, types and operation of colorimeter
5. To learn tracer techniques and their application in biology
6. To initiate students in the field of instrumentation and research

UNIT I

Microscopy**:** simple, compound, phase contrast, fluorescence, electron (SEM and TEM) microscopy. Micrometry. Buffers: characteristics and preparation; pH meter – principle, measurement of pH and pKa. Electrometric determination - glass and reference electrodes.

UNIT II

Centrifugation**:** principles, types and operation**;** rotors, bench top, low speed, high speed. cooling and ultracentrifuge**.** Clark oxygen electrode - basic principles and function.

UNIT III

Chromatography **-** principles and applications of paper, TLC, HPLC, ion exchange, and affinity chromatography. Electrophoresis – principles, types and applications - gel electrophoresis (AGE, SDS-PAGE), isoelectric focusing.

UNIT IV

Colorimeter **-** principles and instrumentation. Spectrophotometry **-** principles, instrumentation and types UV/Vis - general principles and instrumentation. Atomic absorption spectrophotometer, NMR and ESR.

UNIT V

Tracer techniques: nature of radioactivity, patterns of decay, half life - detection of radiation and measurements – GM Counter, Scintillation counter, autoradiography, X-ray crystallography and applications of isotopes.

Books

1. Kothari, C.R. 2000. Research Methodology – Methods & Techniques. Wishwa Prakashan.

2. Misra, R.P, 2000 Research Methodology - a handbook, Concept Publising Company, New Delhi.

References

1. Hawkins, C and Sorgi, M. 2000 Research, Narosa Publishing House, New Delhi.
2. Willard, H.D., *et al.,* 1965, Instrumental Methods of Analysis, D Van Nostrand Co., New York.
3. Wilson, E. & Goulding, K.H. 2000 A Biologists' Guide to Principles and Techniques of Practical Biochemistry ELBS.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester VI	**Course Code 17UBO630302A**					**Title of the Paper BIOINSTRUMENTATION**								**Hours 4**	**Credits 4**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**								**Mean Score of COs**	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**		
CO1	4	4	4	5	3	4	3	3	5	3	5	2	2		3.5
CO2	4	3	5	4	5	3	3	3	4	2	3	2	4		3.1
CO3	3	3	3	2	4	3	4	3	5	2	4	2	2		3.4
CO4	3	2	4	2	5	4	3	5	4	2	3	3	4		3.5
CO5	5	3	3	3	4	2	3	5	3	4	5	3	3		3.4
CO6	4	4	4	3	5	2	4	2	4	2	4	2	4		3.4
													Mean Overall Score		**3.3**

Result: The Score for this Course is 3.3 (High Relationship)

Note:

Mapping	**1-20%**	**21-40%**	**41-60%**	**61-80%**	**81-100%**
Scale	**1**	**2**	**3**	**4**	**5**
Relation	**0.0-1.0**	**1.1-2.0**	**2.1-3.0**	**3.1-4.0**	**4.1-5.0**
Quality	**Very poor**	**Poor**	**Moderate**	**High**	**Very High**

***Values Scaling*:**

Mean Score of COs = $\frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}}$	**Mean Overall Score for COs** = $\frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$

Semester VI **Hours/Week: 4**

17UBO630302B **Credits: 4**

Core Elective:
BIONANOTECHNOLOGY

Course Outcomes:

1. To learn the basic knowledge of nanoscience
2. To learn the properties and dimensions of nanoparticles
3. To synthesis green nanoparticles
4. To understand the mechanism of action of nanoparticles
5. To characterize nanoparticles using various techniques
6. To study the interaction between nanoparticles and living organism.

Unit I

Nanotechnology - origin, scope and importance. Nanoparticles – definition. Principles: quantization effects - inverse relationship between size and *reactive* surface area. Properties: surface effects, the effects of size, shape, surface and bulk composition, and solubility and persistence.

Unit II

Essentials of nanostructure generation: top-down vs. bottom-up. Chemical and physical self assembly. Physical, chemical and biogenic synthesis of nanomaterials – biomimetics, green plants, and microorganisms. Role of biomolecules - reducing and/or capping agents: proteins, viruses and carbohydrates.

Unit III

Detection and measurement of nanoparticles – physical characterization by UV, FTIR, SEM, FESEM, DLS, X-ray diffraction and Zeta potential.

Unit IV

Targeted nanoparticles: active & passive targeting. Application: medicine, manufacturing & materials, delivery vehicles, cancer therapy, tissue engineering, fluorescent biological labels, biological assays, imaging agents, biosensors, manipulation of cells and biomolecules.

Unit V

Interactions between nanoparticles and living systems, interaction with cells, exposure of living systems to nanomaterials - toxicity effects. Mediators of the toxicity of particles. Factors influencing the interaction of nanomaterials over mammalian cells: uptake, transport and biodistribution of nanoparticles

in living system, toxicity on cellular processes. Overview of EU regulatory aspects.

Text Book

1. Sharon, M. & Sharon, M 2012. Bio-Nanotechnology- Concepts and Applications, CRC Press.
2. Jain, K. K. 2012. Handbook of Nanomedicine, Springer.

References

1. Barbara Panessa-Warren, 2006 Understanding cell nanoparticle interactions making nanoparticles more biocompatible. Brookhaven National Laboratory
2. Bhushan Bharat (Ed.) 2012. Encyclopedia of Nanotechnology, Springer. Chand A, Mirkin, Christof Niemeyer 2007. Nanobiotechnology II: more concept and applications 1st edition Wiley-VCH Publisher.
3. European Commission, SCENIHR, 2006. Modified opinion on the appropriateness of existing methodologies to assess the potential risks associated with engineered and adventitious products of nano-technologies, European Union
4. Gysell Mortimer, 2011. The interaction of synthetic nanoparticles with biological systems PhD Thesis, School of Biomedical Sciences, Univ. of Queensland.
5. Iseult Lynch, Anna Salvati & Kenneth A. Dawson, 2009 Protein-nanoparticle interactions: What does the cell see? *Nature Nano-technology* 4, 546 - 547 doi:10.1038/nnano.2009.248
6. Jain K.K. Nanobiotechnology molecular diagnostics: Current techniques and application (Horizon Bioscience) 2006 Taylor & Francis 1st edition.
7. Johan Ach, Ludwig Siep 2007. Nano–Bio–Ethics: Ethical dimension of nanobiotechnology by 1st edition lit ver leg publication.
8. Kelsall Robert W, Ian Hamley, Mark Geoghegan, 2004 Nanoscale Science and Technology, Wiley Eastern.
9. Mark Ratner and Daniel Ratner 2002. Nanotechnology: A gentle introduction to the next big idea. Pearson Education Publishers.
10. Michael Kohler, Wolfgang, Fritzsche, 2004 Nanotechnology: Introduction to Nanostructuring Techniques.
11. Volker Mailander and Katharina Landfester 2009 Interaction of nanoparticles with cells biomacromolecules, 10 (9): 2379 – 2400 DOI: 10.1021/bm900266r. Yao N and Zhong Ling Wang, 2005, Hand book of microscopy for nanotechnology kluwer academic publishers.

Online Resources

1) http://ieet.org/index.php/IEET/more/bionanotechnology20141007 Institute of Ethics & Emerging Technologies
2) https://phys.org/news/2014-10-endless-possibilities-bio-nano-technology.html
3) http://www.particle-works.com/applications/controlled-drug-release/ Applications
4) https://jnanobiotechnology.biomedcentral.com/articles/10.1186/1477-3155-2-3 DOI: 10.1186/1477-3155-2-3
5) https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3865110/
6) https://www.ncbi.nlm.nih.gov/pmc/articles/PMC419715/

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester VI	Course Code 17UBO630302B					Title of the Paper BIONANOTECHNOLOGY							Hours 4	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	4	4	3	5	3	3	4	3	5	4	4	3	5	3.2
CO2	5	3	4	2	2	4	2	4	3	2	4	3	4	3.2
CO3	4	3	3	3	2	2	3	2	3	5	3	4	4	3.5
CO4	4	4	3	4	3	2	5	2	4	4	3	3	5	3.2
CO5	5	3	3	3	3	3	3	2	3	2	3	4	4	3.2
CO6	5	4	3	5	3	2	3	3	3	5	2	2	2	3.2
													Mean Overall Score	3.2

Result: The Score for this Course is 3.2 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester VI **Hours/Week: 4**

17UBO630303A **Credits: 4**

Core Elective:
BIOLOGICAL TECHNIQUES

Course Outcomes:

1. To understand the various techniques in biology
2. To learn the principles and application of microscopy
3. To learn the technique of fixation, mounting and embedding of biological materials
4. To study the types of various staining
5. To prepare skeleton preparation, taxidermy and squash techniques
6. To learn vermiculture and animal rearing.

Unit I

Microtechniques - selection of material, fixation, fixation images- acid and basic. Preparation of permanent slide-Dehydration process, infiltration of wax, embedding, sectioning (microtome), mounting. Leaf clearing, smear and squash techniques.

Unit II

Stains: Classification- single, double, triple staining. Nuclear, cytoplasmic, cell wall stains and their rationale. Herbarium – collection, drying, pasting of plant specimen, protection of Herbarium- importance.

Unit III

Techniques of the preparation of vertebrate skeletons and transparency preparations (Alizarian red) cartilage staining, museum techniques: dry and wet preparation. Taxidermy Arthropod squash. Blood grouping ABO and Rh, blood smear preparation. Haemocytometer.

Unit IV

Earthworm and its types. Preparatory methods of vermiculture, culture techniques, Economic and ecological importance of vermicompost. Biofertilizers. Animal rearing : albino rats, rabbits and fruit fly.

Unit V

PCR - principles, technique and applications. Blotting techniques. DNA finger printing. SCP - Cultivation of *Spirulina* and *Scenedesmus*. Immunological test -WIDAL, RPR and RF.

Text Book

1. Ghatak KL. 2011. Techniques and methods in Biology, PHI Learning Private Limited.

References

1. Verma, P.S and Agarwal, Concept of Cell Biology, (New Delhi: S. Chand & Co., 1999)
2. Chamberlain, C.J., Methods in Plant Histology(Jaipur: Arihant Publishers, 1990)
3. Jayaraman , J., Techniques in biology, (Chennai: Higginbothoms Ltd., 1972)
4. Mahoney, R., Lab Techniques in Zoology,(UK: Butterworth, 1966)
5. Vasantaraj David, S. and Kumaraswamy. T., Elements of Economic Entomology, (Chennai: Popular Book Depo, 1998)

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester VI	Course Code 17UBO630303A					Title of the Paper BIOLOGICAL TECHNIQUES								Hours 4	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	3	4	3	4	3	4	3	2	5	2	2	4		3.2
CO2	4	3	5	2	2	3	2	2	5	2	4	3	4		3.3
CO3	3	2	3	5	3	5	2	4	3	3	4	2	4		3.1
CO4	3	3	3	2	2	5	3	2	2	3	3	4	5		3.3
CO5	3	5	3	4	2	3	3	3	5	2	2	5	3		3.0
CO6	3	2	3	2	4	3	4	2	2	5	2	2	5		3.3
													Mean Overall Score		3.2

Result: The Score for this Course is 3.2 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

***Values Scaling*:**

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester VI **Hours/Week: 4**

17UBO630303B **Credits: 4**

Core Elective:
WOOD TECHNOLOGY

Course Outcomes:

1. To acquire knowledge on developmental anatomy of woody plants
2. To impart knowledge on properties of wood
3. To understand the techniques of wood seasoning and wood preservation
4. To study the agents responsible for wood deterioration
5. To understand the principles underlying paper and pulp preparation
6. To study the natural defects of wood.

UNIT I

Types of wood - soft wood and hard wood, compression wood and tension wood. General and physical features of wood: sapwood and heartwood, growth rings, rays, porous and non-porous woods. Features visible on longitudinal surface of wood - color, luster, odor, taste, weight, grain, texture and figure.

UNIT II

Chemical constituents of wood: occurrence of cellulose, hemicellulose and lignin in different morphological regions of cell wall. Wood deterioration: agents responsible for wood deterioration - fungi, bacteria, insects, marine borers. Micro-structural changes in wood due to fungal attack- brown rot, white rot, dry rot and soft rot of timber - decay of standing trees and stored logs.

UNIT III

Natural defects of wood - knots, reaction wood, other defects due to stress, silica content. Seasoning and preservation of wood: General principles of wood seasoning. Wood seasoning procedures - air seasoning, kiln seasoning. Moisture content of timber for different uses in different localities.

UNIT IV

Natural durability of timber. Wood preservation: basic principles, preservative chemicals. Different wood preservation techniques. Paper and Pulp technology: pulping- mechanical and chemical methods. Pulp cleaning and bleaching. Stock preparation and sheet formation. Paper machine - principles of forming paper, steam drying and its effects. Coating and finishing.

UNIT V

Synthetic woods - composite wood, man-made wood, or manufactured board, plywood, fibre board, particle board, oriented strand board, laminated timber, laminated veneer, cross laminated, parallel strand, laminated strand, finger joint, beams, trusses. The common commercial timbers of India.

Book

1. Brown, H.P. 1985. Manual of Indian Wood Technology. Intl Books and Periodicals, New Delhi.

References

1. Christopher J. Bierman, 1993. Handbook of Pulping and Paper Making. Academic Press, 2nd E.
2. David N-S Hon and Nobuo Shiraishi. 2000. Wood and Cellulosic Chemistry 2nd ed.
3. Gary A. Smook. 2003. Handbook for Pulp & Paper Technologists (3rd Edition).
4. Panshim AJ Zeeauw CD 1980. Text Book Of Wood Technology, U S A, McGraw Hill
5. Wilson, K and White, D.J.B.1986. The Anatomy of Wood: Its Diversity and Variability. Stobart and son Ltd.
6. Zobel, B.J. and van Buijtenen, J.P. 1989. Wood Variation: Its Causes and Control. Springer-Verlag, New York.
7. Panshin, A. J. and de Zeeuw, C. 1980. Textbook of Wood Technology. McGraw-Hill Book Company, New York.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester VI	Course Code 17UBOG30303B					Title of the Paper WOOD TECHNOLOGY								Hours 4	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	5	3	4	4	2	5	3	4	2	2	5	2	4		3.0
CO2	2	5	2	3	3	2	2	3	3	2	5	2	5		3.1
CO3	3	2	3	4	3	4	3	4	2	3	4	2	3		3.0
CO4	3	2	3	2	3	3	3	5	2	2	5	2	4		3.7
CO5	3	5	4	2	5	3	4	4	5	2	4	3	4		3.1
CO6	4	2	5	2	3	2	3	5	3	2	3	3	3		3.2
													Mean Overall Score		3.2

Result: The Score for this Course is 3.2 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester VI **Hours/Week: 2**

17UBO640602 **Credits: 2**

Skill-Based Elective:
HERBAL TECHNOLOGY

Course Outcomes:

1. To understand the importance of medicinal plant wealth in India
2. To understand the role of medicinal plants in human health care
3. To understand the techniques of herbal decoction preparation
4. To understand the techniques of herbal powder preparation
5. To understand the techniques of herbal oil preparation
6. To understand the techniques of herbal tea, soup and natural cosmetics preparation.

Unit I

Herbal decoction preparation: *Andrographis paniculata*, *Tinospora cordifolia, Alpinia officinarum, Hygrophila auriculata* and *Adhathoda vasica.*

Unit II

Herbal powder preparation: *Withania somnifera, Cyanodon dactylon, Nymphaea nouchali, Vernonia anthelmintica.*

Unit III

Herbal massage oil preparation: Pinda thylam, Herbal bath conditioner preparation: Nalankumavu, Panchakarbam.

Unit IV

Herbal hair oil preparation: Neelibirikathi. Herbal cream preparation: Mathan thylam.

Herbal health drinks preparation: Mathulai manabaku (*Punica granatum*).

Unit V

Preparation of herbal tea, herbal soup, herbal sweet and herbal cosmetics.

Books

1. Materia Medica Siddha Volume I&II, Murukasha Muthaliar
2. Kokate, C.K., Purokit A.P and Gokahale, 2002. Pharmacognosy, Nirali Prakashan, Pune.

References

1. S. Somasundaram 1997. Maruthuva Thavaraiyal, Ilangovan Padhippagam, Palayamkottai.
2. Peeter B. Kaufmann et al., 1999. Natural Products from Plants, C.R.C. Press.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester VI	Course Code 17UBO640602					Title of the Paper HERBAL TECHNOLOGY								Hours 2	Credits 2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	5	3	4	4	4	3	5	3	4	2	4	4	5	3.4	
CO2	3	3	3	4	2	5	3	4	3	2	5	3	4	3.1	
CO3	4	3	3	5	3	2	2	2	2	3	3	5	3	3.2	
CO4	5	2	2	3	3	3	3	3	3	3	4	3	4	3.7	
CO5	4	2	5	3	4	2	4	5	3	5	5	2	4	3.3	
CO6	4	5	3	2	5	4	2	3	4	2	4	3	2	3.2	
													Mean Overall Score		3.3

Result: The Score for this Course is 3.3 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Notes