KG COLLEGE OF ARTS AND SCIENCE
Autonomous Institution | Affiliated to Bharathiar University
Accredited with A++ Grade by NAAC
ISO 9001:2015 Certified Institution
KGiSL Campus, Saravanampatti, Coimbatore – 641 035

Regulations 2025 -26 for Undergraduate Programme

Learning Outcomes Based Curriculum Framework- (LOCF)
model with Choice Based Credit System (CBCS)

Programme: B.Sc. Biotechnology (B.Sc. BT)

Programme Code: BBT

(Applicable for the Students admitted during the Academic Year 2025 - 26 onwards)

Eligibility

Candidates for admission to the first year of the Bachelor of Science (Biotechnology) Degree Programme should have passed Higher Secondary examination with Chemistry with Biology / Botany/ Zoology/ Microbiology / Biotechnology / Biochemistry / Nutrition & Dietetics / Nursing Vocational group – Agricultural / Food Science / Home Science.(As per the eligibility condition given by Bharathiar University Ref.BU/R/B3-B4/Eligibility condition/2025/7960 dated 08/05/2025).

Program Learning Outcomes (PLOs)

The successful completion of the B.Sc. Biotechnology programme shall enable the students to

PLO1	Inculcate deeper knowledge in theoretical and practical skills enabling them to work with disciplinary and interdisciplinary domains of Biotechnology.
PLO2	Enhance students learning abilities, technological solutions in digital domains of biotechnology for their applications in industry, research and entrepreneurship.
PLO3	Demonstrate their skills to apply approaches and methods in biotechnology for global environmental problems like climate change and waste management.
PLO4	Validate health safety and legal issues ethically with an understanding in the biotechnological principles behind, for society which could fetch career in food and agricultural industry.
PLO5	Understand and apply the Indian Knowledge System (IKS) in emerging Biotechnological industry.

B.Sc. Biotechnology
Distribution of Credits and Hours for all the Semesters

Part	Course Category	No. of Courses	Hours		Credits		Total Credits	Semester
I	Language-I	4	4 X 4	16	4 X 3	12	12	1 – 4
II	Language-II	4	4 X 4	16	4 X 3	12	12	1 – 4
III	Core Theory (6 hrs. / week)	4	4 X 6	24	4 X 4	16	100	3, 6
	Core Theory (5 hrs. / week)	8	8 X 5	40	8 X 4	32		1,2,4,5
	Core Theory (5 hrs. / week)	1	1 X 5	5	1 X 3	3		6
	Core Lab (4 hrs. / week)	1	1 X 4	4	1 X 2	2		1
	Core Lab (4 hrs. / week)	3	3 X 4	12	3 X 3	9		2,3,4
	Core Lab (5 hrs. / week)	2	2 X 5	10	2 X 3	6		5
	Allied (5 hrs. / week)	1	1 X 5	5	1 X 4	4		4
	Allied (4 hrs. / week)	1	1 X 4	4	1 X 2	2		3
	Allied (4 hrs. / week)	1	1 X 4	4	1 X 3	3		2
	Allied Lab (4 hrs. / week)	2	2 X 4	8	2 X 2	4		2, 3
	Electives	2	2 X 5	10	2 X 3	6		5 , 6
	Project	1	1 X 6	6	1 X 5	5		6
	Internship (IT)	1	-	-	1 X 2	2		5
	Skill Enhancement (SEC)	3	3 X 2	6	3 X 2	6		3, 4 , 6
IV	Foundation Course (FC)	2	2 X 2	4	2 X 2	4	14	1 – 2
	Foundation Course (FC)	1	-	-	1 X 2	2		3
	Ability Enhancement Compulsory Course(AECC)	3	3 X 2	6	3 X 2	6		1, 2 , 4
	Ability Enhancement Compulsory Course(AECC) – Online Course- MOOC	1	-	-	1 X 2	2		3
V	Liberal Arts – (Extra-Curricular & Co-curricular)	-	-	-	2	2	2	4
	Total	**46**		**180**		**140**	**140**	

Consolidated Semester wise and Component wise Hours and Credits Distribution

Semester	Part I		Part II		Part III		Part IV		Part V		Total	
	Hrs.	Credits	Hrs.	Credits	Hrs.	Credits	Hrs.	Credits	Hrs.	Credits	Hrs.	Credits
1	4	3	4	3	18	13	4	4	-	-	**30**	**23**
2	4	3	4	3	18	13	4	4	-	-	**30**	**23**
3	4	3	4	3	22	15	-	4	-	-	**30**	**25**
4	4	3	4	3	20	15	2	2		2	**30**	**25**
5	-	-	-	-	30	23	-	-	-		**30**	**23**
6	-	-	-	-	30	21	-	-	-	-	**30**	**21**
Total	**16**	**12**	**16**	**12**	**136**	**100**	**12**	**14**	**-**	**2**	**180**	**140**

Curriculum

B.Sc. Biotechnology

Semester – 1									
Course Code	**Part**	**Course Category**	**Course Name**	**Hours / Week**	**Examination**				**Credits**
					Duration in Hours	**Max Marks**			
						CIA	**ESE**	**Total**	
25TAM11L	I	Language – I	Tamil – I	4	3	25	75	100	3
25HIN11L	I		Hindi – I						
25MAL11L	I		Malayalam – I						
25FRE11L	I		French – I						
25ENG12L	II	Language – II	English – I	4	3	25	75	100	3
25BBT13C	III	Core – I	Cell Biology	5	3	25	75	100	4
25BBT14C	III	Core - II	Genetics	5	3	25	75	100	4
25BBT15P	III	Core Lab - I	Cell Biology & Genetics Lab	4	3	40	60	100	3
25BBT16A	III	Allied – I	Chemistry	4	3	25	75	100	2
25ENV1FC	IV	FC – I	Environmental Studies	2	2	50	-	50	2
25SOF1AE	IV	AECC – I	Soft Skills	2	2	-	50	50	2
			Total	**30**				**700**	**23**

Semester – 2									
Course Code	Part	Course Category	Course Name	Hours/ Week	Examination				Credits
					Duration in Hours	Max Marks			
						CIA	ESE	Total	
25TAM21L	I	Language – I	Tamil – II	4	3	25	75	100	3
25HIN21L	I		Hindi – II						
25MAL21L	I		Malayalam – II						
25FRE21L	I		French – II						
25ENG22L	II	Language – II	English – II	4	3	25	75	100	3
25BBT23C	III	Core - III	Microbiology	5	3	25	75	100	4
25BBT24C	III	Core - IV	Biochemistry	5	3	25	75	100	4
25BBT25P	III	Core Lab- II	Microbiology & Biochemistry Lab	4	3	40	60	100	3
25BBT26P	III	Allied Lab - I	Chemistry Lab	4	3	40	60	100	2
25HUM2FC/ 25DIM2FC	IV	FC - II	Human Rights/ Disaster Management	2	2	50	-	50	2
25IDT2AE/	IV	AECC – II	Innovation & Design Thinking/	2	2	-	50	50	2
25IPR2AE/			Intellectual Property Rights/						
25END2AE			Entrepreneurship Development						
Total				**30**				**700**	**23**

Semester – 3									
Course Code	**Part**	**Course Category**	**Course Name**	**Hours/ Week**	**Examination**				**Credits**
					Duration in Hours	**Max Marks**			
						CIA	**ESE**	**Total**	
25TAM31L	I	Language – I	Tamil – III	4	3	25	75	100	3
25HIN31L	I		Hindi – III						
25MAL31L	I		Malayalam – III						
25FRE31L	I		French – III						
25ENG32L	II	Language – II	English – III	4	3	25	75	100	3
25BBT33C	III	Core – V	Bioinstrumentation	6	3	25	75	100	4
25BBT34C	III	Core- VI	Molecular Genetics	6	3	25	75	100	4
25BBT35P	III	Core Lab-III	Bioinstrumentation and Molecular genetics Lab	4	3	40	60	100	2
25BBT36A	III	Allied -II	Basics of Biopython	4	3	25	75	100	3
25BBT37P	III	SEC Lab – I	Chemiformatics Lab	2	3	40	60	100	2
25BAT3FC/	IV	FC – II	Basic Tamil	-	2	50	-	50	2
25ADT3FC/			Advanced Tamil						
25IKS3FC			Indian Knowledge Systems (IKS)*						
25MOO3AE	IV	AECC – III	Online Course – MOOC	-	-	50	-	50	2
			Total	**30**				**800**	**25**

Semester – 4									
Course Code	**Part**	**Course Category**	**Course Name**	**Hours /Week**	**Examination**				**Credits**
					Duration in Hours	**Max Marks**			
						CIA	**ESE**	**Total**	
	I	Language – I	Tamil – IV	4	3	25	75	100	3
	I		Hindi – IV						
	I		Malayalam – IV						
	I		French – IV						
	II	Language – II	English – IV	4	3	25	75	100	3
	III	Core-VII	Recombinant DNA Technology	5	3	25	75	100	4
	III	Core Lab-IV	Recombinant DNA Technology	4	3	40	60	100	3
	III	Allied -III	Biostatistics	5	3	25	75	100	4
	III	Allied Lab-II	Lab: Computer for Biologist Using Python Lab	4	3	40	60	100	2
	III	SEC Lab – II	Medical Coding Lab	2	3	40	60	100	2
	IV	AECC – IV	Innovation/IPR/ Entrepreneurship	2	2	-	50	50	2
	V	Extension Activity	Liberal Arts	-	-	50	-	50	2
Total				**30**				**800**	**25**

Semester – 5									
Course Code	**Part**	**Course Category**	**Course Name**	**Hours / Week**	**Examination**				**Credits**
					Duration in Hours	**Max. Marks**			
						CIA	**ESE**	**Total**	
	III	Core- VIII	Plant Biotechnology	5	3	25	75	100	4
	III	Core -IX	Animal Biotechnology	5	3	25	75	100	4
	III	Core Lab-V	Plant & Animal Biotechnology Lab	5	3	40	60	100	3
	III	Core -X	Environmental & Industrial Biotechnology	5	3	25	75	100	4
	III	Core Lab -VI	Environmental & Industrial Biotechnology Lab	5	3	40	60	100	3
	III	Elective – II	Agricultural Biotechnology	5	3	25	75	100	3
			Nano biotechnology						
			Forensic Science						
	III	SEC-III	Internship	-	-	50	-	50	2
Total				**30**				**650**	**23**

Semester – 6									
Course Code	**Part**	**Course Category**	**Course Name**	**Hours/ Week**	**Examination**				**Credits**
					Duration in hours	**Max. Marks**			
						CIA	**ESE**	**Total**	
	III	Core -XI	Bioentrepreneurship	6	3	25	75	100	4
	III	Core - XII	Pharmaceutical Biotechnology	5	3	25	75	100	3
	III	Core -XIII	Immunology & Immunotechnology	6	3	25	75	100	4
	III	Elective - II	Food Technology	5	3	25	75	100	3
			Drug Designing						
			Bioethics and Biosafety						
	III	SEC - IV	AI in Life Science	2	3	25	75	100	2
	III	Core	Project	6	3	40	60	100	5
Total				**30**				**600**	**21**
Grand Total				**180**				**4250**	**140**

Semester 1

Semester – 1									
Course Code	**Part**	**Course Category**	**Course Name**	**Hours / Week**	**Examination**				**Credits**
					Duration in Hours	**Max Marks**			
						CIA	**ESE**	**Total**	
25TAM11L	I	Language – I	Tamil – I	4	3	25	75	100	3
25HIN11L	I		Hindi – I						
25MAL11L	I		Malayalam – I						
25FRE11L	I		French – I						
25ENG12L	II	English – I	English – I	4	3	25	75	100	3
25BBT13C	III	Core – I	Cell Biology	5	3	25	75	100	4
25BBT14C	III	Core - II	Genetics	5	3	25	75	100	4
25BBT15P	III	Core Lab - I	Cell Biology & Genetics Lab	4	3	40	60	100	3
25BBT16A	III	Allied – I	Chemistry	4	3	25	75	100	2
25ENV1FC	IV	FC – I	Environmental Studies	2	2	50	-	50	2
25SOF1AE	IV	AECC – I	Soft Skills	2	2	-	50	50	2
			Total	**30**				**700**	**23**

Course Code	Course Name	Category	Hours / Week	Credits
25TAM11L	Tamil – I	Language – I	4	3

Course Objectives

The course intends to

- இலக்கிய வளர்ச்சியை அறிந்து கொள்ளுதல்
- இலக்கியம் படைக்கும் திறன்
- இலக்கிய இலக்கண உரைசெய்தல்
- திறனாய்வு முறையினைக் கற்றுத்தேர்தல்

Course Learning Outcomes

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

CLO	CLO Statements	Knowledge Level
CLO1	புதுக்கவிதையின் மூலம் வாழ்வியல் விழுமியங்களை உணர்ந்து கொள்ளுதல்.	K1, K2
CLO2	சிறந்த மற்றும் வாழும் கவிஞர்களை அறிந்து கொள்ளுதல்.	K2, K3
CLO3	சிறந்த படைப்பாளர்களின் சிறுகதையில் வெளிப்படும் சமூகச் சிந்தனைகளை அறிந்து விழிப்புணர்வைப் பெறுதல்.	K3
CLO4	தற்கால இலக்கியங்களான புதுக்கவிதை, சிறுகதை தோன்றி வளர்ந்த பின்புலத்தை அறிதல்.	K1, K3
CLO5	மொழியைப் பிழையின்றி பேச எழுத கற்கத் தேவையான தமிழ் இலக்கணத்தின் இன்றியமையாமையை உணர்தல். நடைமுறை வாழ்வியலுக்குத் தேவைப்படும் ஆங்கிலக் கடிதத்தைத் தமிழாக்கம் செய்தலுக்கான பயிற்சி அடைதல்.	K2, K3
K1 - Remember**; K2 -** Understand**; K3 –** Apply.		

Part – I: Language-I-Tamil – I

Unit	Content	No. of Hours
I	**நாட்டுப்பற்று** 1. உலகத்தை நோக்கி வினவுதல் - பாரதியார் 2. பாரதிதாசன் கவிதைகள் - பாரதிதாசன் • தமிழ்ப்பேறு 3. ஒற்றுமையே உயிர்நிலை - நாமக்கல் கவிஞர் 4. தேவதேவன் கவிதைகள் - தேவதேவன் • சாலையும் மரங்களும் செருப்பும் • புதிய வீடு 5. ஆலாபனை - கவிக்கோ அப்துல் ரகுமான் • போட்டி • பாதை 6. புத்தகச் சந்தை - கவிஞர் வாலி	14
II	**சமூகம்** 1. எட்டாவது சீர்..... - ஈரோடு தமிழன்பன் 2. தொலைந்து போனேன் - கவிஞர் தாமரை 3. திருநங்கைகள் காகிதப் பூக்கள் - நா. காமராசன் 4. மரங்களைப் பாடுவேன் - வைரமுத்து 5. புள்ளிப் பூக்கள் (ஹைக்கூ) - அமுத பாரதி 6. நாட்டுப்புறப் பாடல்கள் (தாலாட்டுப் பாடல் , தெம்மாங்குப் பாடல் , உழவுத்தொழில்)	14
III	**சிறுகதை** 1. காஞ்சனை - புதுமைப்பித்தன் 2. சுமைதாங்கி - ஜெயகாந்தன் 3. சோற்றுக் கணக்கு - ஜெயமோகன் **4.** ஆறு யானைகள் - எஸ்.ராமகிருஷ்ணன் **5.** மரத்தைக் கர்ப்பம் சுமந்தவள் - ஆண்டாள் பிரியதர்சினி	12

Unit	Content	No. of Hours
IV	**இலக்கிய வரலாறு** 1. மரபுக்கவிதையின் தோற்றமும் வளர்ச்சியும் 2. புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும் **3.** ஹைக்கூ கவிதையின் தோற்றமும் வளர்ச்சியும் **4.** சிறுகதையின் தோற்றமும் வளர்ச்சியும்	10
V	**இலக்கணம்** 1. எழுத்துகள் (முதல் எழுத்துகள், சார்பெழுத்துகள்) 2. எழுத்துக்களின் பிறப்பு 3. மாத்திரைகள் 4. பயிற்சிக்குரியன - மொழிபெயர்ப்பு (ஆங்கிலத்திலிருந்து தமிழுக்கு மொழிபெயர்த்தல்)	10
	Total Hours	**60**

Reference Books

1	பேரா. குருசாமி, ம.ரா.போ. (2014), பாரதி பாடல்கள், ஆய்வுப் பாதிப்பு, தமிழ்ப் பல்கலைக் கழகம், தஞ்சாவூர்.
2	அப்துல் ரகுமான்,(2000), ஆலாபனை, கவிக்கோ பதிப்பகம்
3	தாமரை கவிதைகள், (2012), நியூ செஞ்சுரி புக் ஹவுஸ்
4	வரதராசனார் மு, (2021), தமிழ் இலக்கிய வரலாறு, சாகித்ய அகாடமி பதிப்பு.
5	முனைவர் பஞ்சாங்கம் கா, (2017), தமிழ் இலக்கிய வரலாறு, காவ்யா பதிப்பகம்.
6	முனைவர் வேங்கடராமன் கா. கோ (2008), தமிழ் இலக்கிய வரலாறு, கலையக வெளியீடு.
7	பரந்தாமனார் அ.கி. (2002), நல்ல தமிழ் எழுத வேண்டுமா?, அல்லி நிலையம்.
8	ராமகிருஷ்ணன் எஸ் (2006), 100 சிறந்த சிறுகதைகள் (தொகுதி 1 & 2) பதிப்பகம்: தேசாந்திரி பதிப்பகம்
9	குமரன் கோ (2010), தமிழ் இலக்கணம் எளிய அறிமுகம் , சந்தியா பதிப்பகம்
10	சக்திவேல் சு,(2012), நாட்டுப்புறவியல், மணிவாசகர் பதிப்பகம்

Question Pattern

காலம் : 3 மணி நேரம் மொத்த மதிப்பெண்கள் : 75

பிரிவு – அ **10x1=10**

- சரியான விடையைத் தேர்ந்தெடுத்து எழுதுக.

பிரிவு – ஆ **5x5=25**

- செய்யுள் - 1 வினா
- செய்யுள் - 1 வினா
- சிறுகதை - 1 வினா
- இலக்கிய வரலாறு - 1 வினா
- இலக்கணம் - 1 வினா

பிரிவு – இ **5x8=40**

- செய்யுள் - 1 வினா
- செய்யுள் - 1 வினா
- சிறுகதை - 1 வினா
- இலக்கிய வரலாறு - 1 வினா
- மொழிபெயர்ப்பு - 1 வினா

குறிப்பு: ஆ, இ பிரிவுகளில் வினாக்கள் "இது" அல்லது "அது" என்ற வகையில் அந்தந்த அலகுகளிலிருந்து அமைத்தல் வேண்டும்.

Course Code	Course Name	Category	Hours / Week	Credits
25HIN11L	Hindi - I	Language – I	4	3

Course Objectives

The course intends to

- Improves grammatical knowledge.
- Read and learn about articles and think about them.
- Read and understand short stories and the thoughts and life of the people of this state.
- Provide translation knowledge and the ability to read and analyze a message

Course Learning Outcomes

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

CLO	CLO Statements	Knowledge Level
CLO1	Understand the text styles and grammatical elements	K1, K2
CLO2	Discuss the content of a reading passage	K2, K3
CLO3	Develop an interest in the appreciation of short stories	K3
CLO4	Comprehend the grammatical structures and sentence making	K1, K3
CLO5	Understand the language and developing English to Hindi translation skill	K2, K3
K1 - Remember; **K2** - Understand; **K3** - Apply		

Part – I: Hindi – I

Unit	Content	No. of Hours
I	**Prose : Nuthan Gadya Sangrah** Lesson 1 – Bharathiya Sanskurthi - Dr.Rajendra Prasad Lesson 3 – Razia - Ramaviksha Benipuri Lesson 4 – Makreal - Yespal Lesson 5 – Bahtha Pani Nirmala -'Ageya' Lesson 6 – Rashtrapitha Mahathma Gandhi - Mukthibodh Lesson 9 – Ninda Ras - Harishankar Parsayi.	14
II	**Non Detailed Text Short Stories: Kahani Kunj** Pareksha - Premchand Mamtha - Jayashankar Prasad Apna paraya - Jaynendrakumar Admi ka bachcha - Yespal Bolaram ka jeev - Harishankar Parsayi Vapasi - Mannu Bhandari	14
III	**Grammar: Shabdha Vichar Only** (Noun, Pronoun, Adjective, Verb, Tense, Case, Endings) Theoretical & Applied.	12
IV	**Translation: English – Hindi Only.** Anuvadh Abhyas – III (1-15 Lessons Only)	10
V	**Comprehension**: 1 Passage From Anuvadh Abhyas–III (16-30)	10
Total Hours		**60**

Text Books	
1	Jayaprakash, (2009), Nuthan Gadya Sangrah, Publisher : Sumitra Prakashan Sumitravas, 16/4, Hastings Road, Allahabad – 211001.
2	Amithab. V.P. (2011), Kahani Kunj, Publisher : Govind Prakashan Sadhar Bagaar, Mathura, Uttar Pradesh,–281 001

Course Code	Course Name	Category	Hours / Week	Credits
25MAL11L	Malayalam - I	Language – I	4	3

Course Objectives

The course intends to

- Improves grammatical knowledge
- Will continue to read and learn about articles and think about them
- Read and understand short stories and the thoughts and life of the people of this state
- Translation knowledge and the ability to read and analyze a message

Course Learning Outcomes

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

CLO	CLO Statements	Knowledge Level
CLO1	Understand the text styles and grammatical elements	K1
CLO2	Discuss the content of a reading passage	K1
CLO3	Develop an interest in the appreciation of short stories	K2
CLO4	Comprehend the grammatical structures and sentence making	K3
CLO5	Understand the language and developing English to Malayalam translation skill	K4
K1 - Remember; **K2** - Understand**; K3** – Apply**; K4**-Analyse.		

Part – I: Malayalam – I

Unit	Content	No. of Hours
I	Novel – Pathummayude Aadu - Vaikam Muhammed Basheer	14
II	Novel- - Pathummayude Aadu - Vaikam Muhammed Basheer	14
III	Short Story - Ente Priyappeta Kadhakal – (Akbar Kakkattil)	12
IV	Short Story - Ente Priyappeta Kadhakal – (Akbar Kakkattil)	10
V	Composition &Translation(English to Malayalam)	10
	Total Hours	**60**

Text Books	
1	Vaikam Muhammed Basheer, (2012), Novel- PathummayudeAadu, D.C.Books, Kottayam, Kerala
2	Akbar Kakkattil, (2009), Short Story - Ente Priyappeta Kadhakal
Reference Books	
1	Tharakan K.M , (2016), Malayala Novel SahithyaCharitram, N.B.S.Kottayam.
2	Achuyuthan M, (2014), Cherukatha Innale Innu-M.Achuyuthan D.C Books, Kottayam.
3	Dr George K.M,(2011) Sahithya CharitramPrasthanangalilude, D.C.Books Kottayam.
4	Sukumar Azheekode, (2015), Malayala Sahithyavimarsam, D.C.Books

Course Code	Course Name	Category	Hours / Week	Credits
25FRE11L	French - I	Language – I	4	3

Course Objective

The course intends

To understand, speak, read and write simple, standard speech which is very slow and is carefully articulated and can recognize familiar words and very basic phrases concerning themselves, their family and immediate concrete surroundings when people speak slowly and clearly.

Course Learning Outcomes

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

CLO	Course Outcome	Knowledge Level
CLO1	Comprehend basic vocabulary	K1
CLO2	Understand basic syntax and grammar patterns	K2
CLO3	Converse slowly in known situations	K2
CLO4	Translate small basic sentences	K3
K1 - Remember; **K2** - Understand; **K3** - Apply		

Part – I: French – I

Unit	Content	Hours
I	Etape 0	14
	Etape1- (Lecons 1 - 3)	
II	Etape2- (Lecons 1 - 3)	14
III	Etape 3 – (Leçons 1 – 2)	12
IV	Etape 3 – (Leçon 3)	10
	Etape 4 – (Leçon 1)	
V	Etape 4 – (Leçons 2 – 3)	10
	Total Hours	**60**
Text Book		
1	Céline Himber, Corina Brillant, Sophie Erlich, (2008), Adomania 1 – Methode de francais, Publisher - Hachette Fle.	
Reference Book		
1	Yves Loiseau, Régine, (2014), Latitudes 1, Merieux Publisher: French and European Publications Inc.	

Course Code	Course Name	Category	Hours / Week	Credits
25ENG12L	English - I	Language II	4	3

Course Objectives

The course intends to cover

- Various genres of literature.
- Active and passive vocabulary.
- Usage of Grammar and Communication.

Course Learning Outcomes

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

CLO	CLO Statements	Knowledge Level
CLO1	Identify aesthetic sense and appreciate poetry, enhancing creativity and understanding relevant to professional environments.	K1
CLO2	Understand diverse styles of prose, facilitating versatility in writing and inculcating interpersonal skills.	K2
CLO3	Apply the characters and the narrative techniques in creative writing and content creation ethically.	K3
CLO4	Employ vocabulary and grammatical proficiency in communication to enhance clarity in workplace interactions.	K3
CLO5	Enhance overall communication competence. Practicing these skills in combination reinforces learning and provides students with opportunities to use the language in authentic contexts.	K3
K1 - Remember; **K2** - Understand; **K3** - Apply		

Part - II: English – I

Unit	Content	No. of Hours
I	**Poetry** : Nature I Wandered Lonely as a Cloud - William Wordsworth The Sparrow - Paul Laurence Dunbar Stopping by woods on a snowy Evening – Robert Frost	12
II	**Prose** : Friendship The Man in Black - Oliver Goldsmith Of Friendship - Francis Bacon The Blessing of Friends - Sir John Lubbock	12
III	**Short Stories:** Morality The Necklace – Guy de Maupassant The Lottery - Shirley Jackson The Monkey's Paw - W. W. Jacobs	12
IV	**Language Competency** Vocabulary : Synonyms, Antonyms, Word Formation Parts of Speech Error correction	12
V	**English for Communication** Listening for General and Specific Information. Self - Introduction, Introducing others, Greetings. Reading a prose passage, Reading a poem and Reading a short story Descriptive writing – Writing a short descriptive essay of two to three paragraphs.	12
	Total Hours	**60**

Text Books

1.	Zama, M. (2004). Poetry Down the Ages. Orient Blackswan.
2.	Goldsmith, O. (1869). The Works of Oliver Goldsmith. J. Dicks
3.	Bacon, F., & Montagu, B. (1857). The Works of Francis Bacon (Vol. 1). Parry & McMillan.

Reference Books

1.	Kumar,V. T. Bhavani, Durga.K. Srinivas.YL. (2018). English in use - A textbook for College Students. (English, Paperback).
2.	Swan, M. (2005). Practical english usage (Vol. 7). Oxford: Oxford university press.

Web Resources (Swayam / NPTEL)

1.	https://nptel.ac.in/courses/109105205

Course Code	Course Name	Category	Hours /Week	Credits
25BBT13C	Cell Biology	Core – I	5	4

Course Objectives

The course intends to cover

- The structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes, and organelles.
- The cellular components are used to generate and utilize energy in cells.

Course Learning Outcomes

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

CLO	CLO Statements	Knowledge Level
CLO1	Know the cell discovery and cell organization.	K1
CLO2	Know the mechanisms of cell transport phenomenon.	K1
CLO3	Understand the cell cytoplasmic compartments.	K2
CLO4	Understand the cell division.	K2
CLO5	Understand the communications of cells with other cells and to the environment.	K2
K1 - Remember; **K2** – Understand		

CLO – PLO Mapping

CLOs/PLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	2	3	2	2	2
CLO2	3	2	2	3	2
CLO3	-	-	3	3	-
CLO4	2	2	2	-	3
CLO5	1	1	2	1	1
3 - Substantial (high)		**2** - Moderate (medium)		**1** - Slight (low)	

Core - I: Cell Biology

Unit	Content	No. of Hours
I	**Basics of Cells**: Cell as a basic unit: Discovery of the cells, classification of cell types, development of cell theory, early chemical investigation in cell biology. Prokaryotic and Eukaryotic cell organization.	15
II	**Mechanisms of Cell Transport**: Cell transport phenomenon: Membrane architecture. Active, Passive, diffusion and osmosis. Chemistry of carbohydrates, lipids, proteins and nucleic acids.	15
III	**Cytoplasmic Compartments of The Cell**: Structure and function of cytoplasmic Compartments of the cell: ribosome and protein synthesis, energy flow through mitochondrion, chloroplast and photosynthesis, Golgi apparatus, lysozymes and micro bodies, endoplasmic reticulum, vacuoles, peroxysomes, lysozomes and Nuclear compartment. Heterochromatin and euchromatin, polytene chromosomes.	15
IV	**Cell Division**: Cell division in prokaryotes and eukaryotes: Cell cycle, Mitosis, Meiosis, Crossing over and Characteristics of cancer. Apoptosis, Stem cell, Prions.	15
V	**Specialized Cells and Interaction**: Integrative and specialized cellular events: Cell-cell signaling, specialized cells nerve cells, sperm cells, microfilaments, microtubules, muscle cells. Cells of vision, Nucleocytoplasmic interaction, cell cloning.	15
	Total Hours	**75**

Text Books

1.	Alberts. B., (2014), Molecular Biology of the cell, W. W. Norton & Company, 6th Edition.
2.	Devasena.T., (2012), Cell Biology, Oxford University Press, New Delhi, 1st Edition
3.	Granger.S., (2018), Text Book of Cell Biology, Callisto Publishers, USA
4.	Kukerti. S, Joshi.D, Sharma.C.S., (2022), Text of Study of Cell Biology, Lambert Publishers,Uttarakhand.
5.	James. D, Watson., (2001), The Double Helix: A personal account of the Discovery of the Structure of DNA, Touchstone Publishers

Reference Books

1.	Cooper.G.M., (2015), The Cell: A Molecular Approach, Sinauer Associates, Qxford University Press, 7th Edition
2.	James. D, Watson.,(2014), Molecular Biology of the Gene, Pearson Publications, 7th Edition.
3.	Karp's.,(2015), Cell and Molecular Biology: Concepts and Experiments. Wiley Publications, 8th Edition.
4.	Lodish.H., (2016), Molecular Cell Biology, W. H. Freeman Publications, 6th Edition.
5.	Plopper.G, Ivankovic.D.B., (2020), Principles of Cell Biology, Jones & Bartlett, USA,3rd Edition.

Web Resources (Swayam / NPTEL)

1.	https://nptel.ac.in/courses/102108086
2.	https://nptel.ac.in/courses/102103012

Course Code	Course Name	Category	Hours /Week	Credits
25BBT14C	Genetics	Core – II	5	4

Course Objectives

The course intends to cover

- The concepts of heredity, genes, Mendelian genetics, Blood group inheritance, Genetic map preparation, Human and Population genetics and Recombination.
- Inherited diseases and related traits.

Course Learning Outcomes

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

CLO	CLO Statements	Knowledge Level
CLO1	Understand historical overview of genetic materials for a better appreciation of genetic evolution	K2
CLO2	Gain knowledge on chromosomes, linkage & crossing over to imply on genetic disorders.	K1
CLO3	Understand structure of gene and the genetic material hypothesis	K2
CLO4	Gain knowledge on Mutation.	K2
CLO5	Apply and Analyze the concepts of genetics in genetic counseling.	K3, K4
K1 - Remember; **K2** - Understand; **K3** – Apply; **K4** - Analyze		

CLO – PLO Mapping

CLOs/PLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	2	2	2	2	2
CLO2	2	-	2	2	2
CLO3	1	3	1	1	1
CLO4	-	1	3	3	3
CLO5	2	2	-	3	3
3 - Substantial (high)		**2** - Moderate (medium)		**1** - Slight (low)	

Core – II: Genetics

Unit	Content	No of Hours
I	**History of Genetics:** Mendel's experiments, Monohybrid cross, Dihybrid cross, Backcross or Testcross, Mendel's laws. Incomplete dominance. Interaction of Genes. Epistasis – Lethal genes. Multiple alleles – In drosophila. Rabbit, and Blood group inheritance in man.	15
II	**Linkage and Crossing over:** Linkage - linkage in Drosophila- Morgan's experiments, factors affecting linkage. Crossing over- types, mechanism, significance of crossing over. Mapping of Chromosomes, interference and coincidence. Cytoplasmic inheritance. Sex Linked Inheritance and Sex Determination in Man.	15
III	**Fine Structure of Gene:** Fine structure of the gene and gene concept, Operon Concept. Identification of the DNA as the genetic material- Griffith experiments, Avery, McLeod, McCarty and Hershey Chase experiment. Microbial Genetics- bacterial recombination, Conjugation, Transformation, Transduction and sexduction.	15
IV	**Mutation:** Types of mutation, mutagens, DNA damage and Repair Mechanism. Chromosomal aberrations- Numerical and Structural, Pedigree Analysis-Mendelian inheritance in human. (Cystic Fibrosis, Muscular Dystrophy).	15
V	**Population Genetics:** Population Genetics– Hardy Weinberg principle, gene frequency, genotype frequency and factors affecting gene frequency**.** Eugenics, Euphenics and Euthenics. Genetic counselling.	15
	Total Hours	**75**

Text Books

1.	Dr. Veer Bala Rastogi., (2000). Elements of Genetics
2.	Verma, P.S. and Agarwal, V.K., (2022). Genetics, S. Chand & Co.

Reference Books

1.	Gardener E.J. Simmons M.J. Slustad D. P., (2006). Principles of Genetics.
2.	Griffiths, Miller, J.H., (2003). An Introduction to Genetic Analysis W.H. Freeman. New York.
3.	Good Enough U., (1985). Genetics. Hold Saunders international.
4.	Lewis, R., (2001). Human Genetics- Concepts and application. 4th edition. McGraw Hill.
5.	Winter, P.C., Hickey, G.J. and Fletcher., (2010), Instant notes in Genetics. Viva books, Ltd.

Web Resources (Swayam / NPTEL)

1.	https://nptel.ac.in/courses/102104052
2.	https://nptel.ac.in/courses/102/103/102103013/

Course Code	Course Name	Category	Hours/Week	Credit
25BBT15P	Cell Biology & Genetics Lab	Core Lab – I	4	3

S. No.	List of Practicals	
1	Laboratory Rules & Regulations. a) Basic reagents preparation & Basic lab instrumentation.	
2	Components of a Compound / Light Microscope.	
3	Blood smear preparation and Identification of Blood cells. Simple staining techniques	
4	Buccal smear preparation and Identification of squamous epithelial cells.	
5	Isolation and Identification of plant cells.	
6	Mitotic stages of onion (Allium cepa) root tip.	
7	Meiotic stages of cockroach testes/ Flower bud.	
8	Giant chromosomes from Chironomus larvae/ Drosophila salivary glands.	
9	Identification of Barr bodies from Buccal smear.	
10	Blood typing in humans for multiple alleles and Rh factor.	
11	Monohybrid cross and Dihybrid cross analysis	
12	Problem solving in Sex Linked Inheritance	
13	Problem solving in Pedigree analysis.	
	Total Hours	**60**

Course Code	Course Name	Category	Hours/ Week	Credits
25BBT16A	Chemistry	Allied – I	4	2

Course Objectives

The course intends to cover

- The fundamentals of chemical structure, pH and bonding of water molecules.
- Role of chemistry in day today life.

Course Learning Outcomes

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

CLO	CLO Statements	Knowledge Level
CLO1	Understand the importance of bonding and order.	K2
CLO2	Understand the importance of carbohydrates.	K2
CLO3	Apply and Analyze the adulteration in food meticulously	K3, K4
CLO4	Analyse the role as agricultural and textile chemist	K4
CLO5	Analyze the empirical role as a pharmaceutical chemist	K4
K2 – Understand; **K3-** Apply; **K4** - Analyze		

CLO – PLO Mapping

CLOs/PLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	2	2	-	2	3
CLO2	3	3	1	-	-
CLO3	-	1	3	1	3
CLO4	2	2	2	2	2
CLO5	3	3	3	3	3
3 - Substantial (high)		**2** - Moderate (medium)			**1** - Slight (low)

Allied – I: Chemistry

Unit	Content	No. of Hours
I	**Atomic theory and Water molecules:** Atomic theory, formation of molecules, electronic configuration of atoms- s & p shapes of atomic orbitals. Types of chemical bonds. Types of reactions - addition, substitution, elimination, Condensation and polymerization. Chemical foundation of life. Water: its unique properties, ionization of water, buffering action in biological system, Properties, and characteristics of water.	12
II	**Environmental Chemistry**: Concept and scope of environmental Chemistry-Nomenclature: Pollutant, contaminant, receptor, sink, pathways of a pollutant. Water – Sources of water, qualities of potable water, soft and hard water, methods of removal of hardness- water pollution- dissolved oxygen, chemical oxygen demand (COD), biochemical oxygen demand (BOD)-Environmental segments. Atmosphere: Composition and structure of atmosphere, particles, ions and radicals in the atmosphere, Air Pollution: Air Pollutants, e.g. carbon monoxide, nitrogen oxides, hydrocarbons, oxides of sulfur, photochemical smog, acid rain and particulates.	12
III	**Food chemistry:** Food and Nutrition – Carbohydrates, Proteins, Fats, Vitamins and Minerals – Definition, Classification and their importance as food constituents Balanced diet- Calorie. Food Adulteration- Types and detection methods.	12
IV	**Pharmaceutical Chemistry:** Medicinally important Inorganic compounds: Compounds of Aluminium, Phosphorous, Arsenic, Iron and Mercury. Sulphonamide: mechanism and action of sulpha drugs- preparation and uses of sulphanilamide sulphadiazine & sulphapyridine. Analgesics-definition and actions-narcotic and non narcotic-morphine, Heroin. Heroin. Antipyretic analgesics-preparation and uses - methyl salicylate, aspirin & paracetamol	12
V	**Agricultural and Textile Chemistry:** Fertilizers: Effect of Nitrogen, potassium and phosphorous on plant growth – commercial method of preparation of urea, triple superphosphate. Complex fertilizers and mixed fertilizers – their manufacture and composition. Secondary nutrients – micronutrients – their function in plants. Dyes: azo and triphenylmethane dyes- Preparation one example-Methyl Orange, Malachite green.	12
	Total Hours	**60**

Text Books	
1.	Soni P.L., (2005), A Text book of Organic Chemistry, S. Chand & Sons publications, 11th Edition.
2.	Krishnamurthy. N, Jayasubramanian.K and Vallinayagam., (1990), Applied Chemistry, Prentice Hall of India, New Delhi.
3.	Chang.R and Over by.J., (2017), Chemistry, McGraw-Hill, 14th Edition.
Reference Books	
1.	Jeyashre Ghosh., (2005), A Text book of Pharmaceutical Chemistry, S.Chand & Company, New Delhi.
2.	Meyer L. H., (2006).Text book of Food Chemistry - CBS Publishers, New Delhi.
Web Resources (Swayam / NPTEL)	
1.	https://nptel.ac.in/courses/104105130
2.	https://nptel.ac.in/courses/104105076

Part – IV: Foundation Courses

(All the Undergraduate Programmes)

Course Code	Course Name	Category	Hours / Week	Credits
25ENV1FC	Environmental Studies	FC- I	2	2

Unit	Content
I	The Multidisciplinary nature of environmental studies Definition; Scope and importance, Need for public awareness.
II	**Natural Resources:** Renewable and non-renewable resources: Natural resources and associated problems. • Forest resources: Use and Over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people. • Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems. • Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. • Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. • Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Case studies. • Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.
III	**Ecosystems** • Concept of an ecosystem. • Structure and function of an ecosystem. • Producers, consumers and decomposers. • Energy flow in the ecosystem. • Ecological succession. • Food chains, food webs and ecological pyramids. • Introduction, types, characteristic features, structure and function of the following ecosystem: - a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

Unit	Content
IV	**Biodiversity and its Conservation** • Introduction-Definition: genetic, species and ecosystem diversity. • Bio geographical classification of India. • Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. • Biodiversity at global, National and local levels. • India as a mega-diversity nation. • Hot-spots of biodiversity. • Threats to biodiversity: habital loss, poaching of wildlife, man-wildlife conflicts. • Endangered and endemic species of India. • Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.
V	**Environmental Pollution Definition** • Causes, effects and control measures of: - a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. Nuclear hazards • Solid waste Management: Causes, effects and control measures of urban and industrial wastes. • Role of an individual in prevention of pollution. • Pollution case studies. • Disaster management: floods, earthquake, cyclone and landslides.
VI	**Social Issues and the Environment** • From Unsustainable to Sustainable development. • Urban problems related to energy. • Water conservation, rain water harvesting, watershed management. • Resettlement and rehabilitation of people; its problems and concerns. Case studies. • Environmental ethics: Issues and possible solutions. • Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies. • Wasteland reclamation. • Consumerism and waste products. • Environment Protection Act. • Air (Prevention and Control of Pollution) Act. • Water (Prevention and Control of Pollution) Act. • Wildlife Protection Act. - Forest Conservation Act. • Issues involved in enforcement of environmental legislation. • Public awareness.

Unit	Content
VII	**Human Population and the Environment** • Population growth, variation among nations. • Population explosion-Family welfare Programme. • Environment and human health. • Human Rights. • Value Education. • HIV/AIDS. • Women and Child Welfare. • Role of information Technology in Environment and human health. • Case Studies. **Biosafety and Biosecurity** The basic principles of biosafety. - Biological hazards and assess risk in laboratory settings. - Biosafety protocols to minimize risks associated with biological agents. - Role of biosafety in the protection of public health, environment, and nationalsecurity. The theoretical knowledge as well as practical applications to prepare learners for real-world biosafety challenges. 1. Introduction to Biosafety • Definition and importance of biosafety. • Historical perspective on biosafety incidents. • Biosafety vs. biosecurity: Key differences. 2. Biological Hazards and Risk Assessment • Classification of biological agents (e.g., bacteria, viruses, fungi, parasites). • Risk assessment methodology: Identifying hazards, evaluating risks, and control measures. 3. Biological Waste Management • Types of biological waste: Solid, liquid, sharps, etc. • Waste disposal techniques: Autoclaving, incineration, chemical disinfection. • Environmental impact and regulations surrounding waste management. 4. Standard Operating Procedures (SOPs) and Safety Practices • Developing and implementing SOPs for laboratory safety. • Practices for handling, storing, and disposing of biological materials.
VIII	**Field Work (Practical).** • Visit to a local area to document environmental assets-river/forest/grassland/ hill/mountain. • Visit to a local polluted site-Urban/Rural/Industrial/Agricultural. • Study of common plants, insects, birds. • Study of simple ecosystems-pond, river, hill slopes, etc.
	Total Hours **30**

Reference Resources

1.	https://www.ugc.gov.in/oldpdf/modelcurriculum/env.pdf
2.	Biosafety in Microbiological and Biomedical Laboratories (CDC, NIH). (BMBL) 6th Edition
3.	Sateesh, M. K. (2010). Bioethics and Biosafety. New Delhi: I. K. International Pvt Ltd.
4.	Additional Readings:Relevant journal articles, government publications, and guidelines (e.g., WHO, CDC, European Union, etc.). https://www.iberdrola.com/innovation/what-is-biosafety

Course Code	Course Name	Category	Hours / Week	Credits
25SOF1AE	Soft Skills	AECC - I	2	2

Course Objectives

The course intends to cover

- The essential soft skills that is crucial for success in today's dynamic and interconnected workplace.

Course Learning Outcomes

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

CLO	CLO Statements	Knowledge Level
CLO1	Understand the comprehensive skills to participate actively in conversation, writing short texts with expression	K1, K2, K3
CLO2	Infer the cohesive devices to describe and discuss any objects, pictures using compound, complex sentence forms.	K2, K3
CLO3	Comprehend the logic in the given situation to organize the ideas to write formal and informal letters.	K2, K3
CLO4	Understand the given material to organize it in a logical sequence to present a paragraph with main and supporting ideas with concluding sentences.	K3
CLO5	Present valuable ideas in conversation to emulate the main ideas and key points in short essays.	K3
K1 - Remember; **K2** - Understand; **K3** - Apply;		

Ability Enhancement Compulsory Course - I: Soft Skills

Module	Unit	Details	No. of Hours
Presentation Skills			
I	1	**Getting to Know You:** Grammar: Introduction to Tenses, Everyday English, Role-Play. Reading Activity: Different ways of communication. Activities: Fill in the blanks (Listening), Self Introduction (Speaking).	6
	2	**My Day:** Grammar: Present simple positive & negative/Adverbs of Frequency, Vocabulary & Speaking about Daily Activities. Listening: Observe and Answer/Telling the time. Activities: Reading & Writing: Describe where you live.	
	3	**Your World:** Grammar: Possessive determiners. Listening: Positive & negative contractions. Reading & Writing: Personal profile. Activities: Talk about countries, nationalities (Vocabulary & Speaking).	
	4	**The World of Work:** Grammar: Yes/No & Who Questions. Vocabulary & Speaking: Jobs. Listening: Recognize the schwa sound. Activities: Opening and closing an email (Reading & Writing).	
	5	**Places and Things:** Grammar: There is / there are, articles. Vocabulary & Speaking: Talk about rooms & furniture. Listening: Directions. Reading & Writing: Imperatives.	
	6	**24 Hours:** Grammar: Likes & Dislikes. Vocabulary & Speaking: Speak about hobbies and interests. Reading: Match the photos with descriptions. Writing: Write complete sentence using prompt. Activities: Observe & answer (Listening).	
		Practice: Listening & Speaking Presentations - Talking about how you learn – Understanding key information in a presentation –Writing sentences about you.	
Confidence			
II	1	**Clothes and Shopping:** Grammar: Modal verbs/Adverbs of Frequency/Adjectives and Adverbs. Vocabulary & Speaking: Shopping. Reading & Writing: Product Review. Activities: Observe & answer (Listening).	6
	2	**Travel & Transport:** Grammar: Past simple questions. Vocabulary & Speaking: Talk about holidays. Listening: At the train station. Activities: Email - A perfect holiday (Reading & Writing).	
	3	**Health & Fitness:** Grammar: Past simple irregular verbs; Listening: Listen & Answer; Reading & Writing: Time sequencers; Activities: Talk about a healthy lifestyle (Vocabulary & Speaking)	
	4	**Music:** Grammar: Present perfect simple; Vocabulary & Speaking: Survey about music; Listening: Listen two people talk about music; Activities: Use adjectives and create sentences (Reading)	
	5	**Let's go shopping:** Vocabulary & Speaking: Town Survey; Listening: Listen and answer; Reading & Writing: Read and match; Activities: Countable & Uncountable **(**Grammar)	
		Practice: Writing a personal statement.	

Creativity			
III	1	**Cooking & Eating:** Grammar: Some & Any, Quantifiers. Vocabulary & Speaking about Food & Drink. Activities Kitchen conversation (Listening). Reading an article & answering.	6
	2	**Survival:** Grammar: Comparison of adjectives. Activities Describing people (Speaking and Vocabulary). Listening to an audio & Answering. Reading & Writing: Read and Answer.	
	3	**Working Together:** Grammar: Verb + Noun phrases. Activities Technology (Vocabulary & Speaking). Listening: Listen & Answer. Reading & Writing: Notice.	
	4	**Music:** Grammar: Present perfect simple. Activities Survey about music (Vocabulary & Speaking). Listen to two people talking about music (Listening). Reading: Use adjectives and create sentences.	
	5	**Culture and Arts:** Grammar: Present perfect. Vocabulary & Speaking activity: Speak on the phone. Activities: Listen and answer. Reading & Writing activity: Review.	
		Practice: Writing comparison sentences & paragraphs.	
Problem-Solving			
IV	1	**Do's and Don'ts:** Grammar, Modal Verbs. Activities Roleplay (Speaking). Holidays in January (Listening). Reading an article & answering.	6
	2	**Body:** Grammar: First conditional. Vocabulary & Speaking about Personality & Appearance. Activities Conversations about personality (Listening), Reading & Writing: Read and Answer about your skills.	
	3	**Speed:** Grammar: Present simple passive. Vocabulary & Speaking about relationships. Listening: Listen & Answer. Reading and Error spotting.	
	4	**Work:** Grammar: Adverbs of manner. Vocabulary & Speaking about work advice. Listening: Observe & Answer; Reading: Read & check your ideas.	
		Practice: Writing argumentative and descriptive essays.	
Critical Thinking			
V	1	**Influence:** Grammar: would / past habits. Listening: Sentence Correction. Activities Your inspiration (Speaking). Picture description (Reading).Rewrite the sentences (Writing).	6
	2	**Money:** Grammar: Second conditional. Activities: Radio programme (Listening). Talk about games (Speaking). Reading & Writing: Fill in the blanks.	
	3	**Things that changed the world:** Grammar: articles. Activities: Talk about chewing gum (Speaking & Listening). Reading & Writing: Read and write a book review.	
		Practice: Writing Emails, reports and proposals.	
		Total Hours	**30**

Components for Internal Assessment and Distribution of Marks for CIA and ESE (Theory)

Max Marks	Marks for		Components for CIA						
100	CIA	ESE	CIA		Model		Attendance	Active Engagement	Total
	25	75	Actual	Weightage	Actual	Weightage	5	5	25
			50	**5**	75	**10**			

Question Paper Pattern

Component	Duration in Hours	Section A			Section B			Section C			Total
		Type of Question	No. of Questions	Marks	Type of Question	No. of Questions	Marks	Type of Question	No. of Questions	Marks	
CIA	2	MCQ	8	8x1=8	Either or	3	3x6=18	Either or	3	3x8=24	50
Model Exam / **ESE**	3	MCQ	10	10x1=10	Either or	5	5x5=25	Either or	5	5x8=40	75

Components for Internal Assessment and Distribution of Marks for CIA (Lab)

Max Marks	Marks for		Components for CIA						
	CIA	ESE	Test		Model		Experiments / Programs	Observation	Total
100	40	60	Actual	Weightage	Actual	Weightage	Marks	5	40
			50	**10**	60	**15**	**10**		

Examination Pattern

Component	Duration in Hours	Marks			Total Marks
		Practical Exam	Record	Weightage	
Test	2	50	-	**10**	50
Model	3	60	-	**15**	60
Experiments	-	-	-	**10**	10
Observation	-	-	-	**05**	05
Total Marks - CIA				**40**	**40**
ESE	3	50	10	-	**60**

Components for Internal Assessment and Distribution of Marks for CIA (Foundation Course -Theory)

Max Marks	Marks for		Components for CIA				
50	CIA	ESE	CIA		Model		Total
	50	-	Actual	Weightage	Actual	Weightage	
			50	**25**	50	**25**	**50**

Question Paper Pattern

Duration in Hours	Mode of Exam	Type of Questions	No. of Questions	Marks
2	Offline	Open Choice	5 (Out of 8)	5 x 10=50

Components for and Distribution of Marks for ESE (Theory) Ability Enhancement Compulsory Courses (AECC) & Question Paper Pattern

Duration in Hours	Mode of Exam	Type of Questions	No. of Questions	Marks
2	Online	MCQ	50	50x1=50

Semester 2

Semester – 2									
Course Code	**Part**	**Course Category**	**Course Name**	**Hours/ Week**	**Examination**				**Credits**
					Duration in Hours	**Max Marks**			
						CIA	**ESE**	**Total**	
25TAM21L	I	Language – I	Tamil – II	4	3	25	75	100	3
25HIN21L	I		Hindi – II						
25MAL21L	I		Malayalam – II						
25FRE21L	I		French – II						
25ENG22L	II	Language – II	English – II	4	3	25	75	100	3
25BBT23C	III	Core - III	Microbiology	5	3	25	75	100	4
25BBT24C	III	Core - IV	Biochemistry	5	3	25	75	100	4
25BBT25P	III	Core Lab- II	Microbiology & Biochemistry Lab	4	3	40	60	100	3
25BBT26P	III	Allied Lab - I	Chemistry Lab	4	3	40	60	100	2
25HUM2FC/ 25DIM2FC	IV	FC - II	Human Rights/ Disaster Management	2	2	50	-	50	2
25IDT2AE/	IV	AECC – II	Innovation & Design Thinking/	2	2	-	50	50	2
25IPR2AE/			Intellectual Property Rights/						
25END2AE			Entrepreneurship Development						
Total				**30**				**700**	**23**

Course Code	Course Name	Category	Hours / Week	Credits
25TAM21L	Tamil – II	Language - I	4	3

Course Objectives

The Course intends to cover

- தமிழ் இலக்கியம் கற்பதன் மூலம் நாகரிகம் மற்றும் பண்பாட்டைப் புரிந்துகொள்ளுதல்.
- தனிப்பட்ட வளர்ச்சி, படைப்பாற்றல் திறனை வளர்த்தல்.
- வாழ்வியல் அறங்களைக் கற்றல் மற்றும் வாழ்வைச் செழுமையாக்க உதவும் நன்னெறிகளை அறிதல்.

Course Learning Outcomes

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

CLO	CLO Statements	Knowledge Level
CLO1	அற இலக்கியங்கள் வழி வாழ்வியல் ஒழுக்கங்களைப் பின்பற்றுதல்	K1 - K3
CLO2	பக்தி இலக்கியங்கள் வழி பக்தி நெறிகளை உணர்தல்.	K1 - K3
CLO3	உரைநடை இலக்கிய படைப்பாளர்களின் சிந்தனைகளைக் கற்று பின்பற்றுதல்	K1 - K3
CLO4	தமிழ் இலக்கிய வரலாற்றில் அற இலக்கியம் மற்றும் உரைநடையின் தாக்கம் குறித்து அறிதல்	K1- K3
CLO5	இலக்கணங்களைக் கற்று பிழையின்றி எழுதுதல்.	K1 - K3
K1 - Remember; **K2** - Understand; **K3** – Apply		

Unit	Content	No. of Hours
I	**(அறம்)** 1. திருக்குறள்(மூன்று அதிகாரங்கள்) • புகழ் • வினை செயல்வகை • நெஞ்சொடு கிளத்தல் 2. திரிகடுகம்(10, 16, 19, 26, 42 பாடல்கள் மட்டும்) 3. பழமொழி நானூறு(2,7,21,54,69,119,130,184,267,375 பாடல்கள் மட்டும்)	14
II	**(பக்தி)** 1. தாயுமானவர் பாடல்கள்(பராபரக் கண்ணி முதல் 10 பாடல்கள்) 2. உமர்கயாம் பாடல்கள் (தனிப்பாடல்கள்) - கவிமணி தேசிகவிநாயகம் பிள்ளை 3. வள்ளலார் பாடல்கள்(திருவருட்பா – வள்ளலார் விண்ணப்பம்) 4. இயேசுகாவியம் - மலைப்பொழிவு - கண்ணதாசன் 5. சித்தர் பாடல் - சிவவாக்கியார் பாடல்	14
III	**(கலை மற்றும் பண்பாடு)** 1. அறம் எனப்படுவது - அமுதன் 2. ஏட்டில் எழுதா இலக்கியம் - ஔவை துரைச்சாமி 3. கீழடி - தொல்லியல் துறை, வெளியீடு 4. மனம் எனும் சொர்க்கவாசல்- டாக்டர் எம்.எஸ்.உதயமூர்த்தி 5. ஆளுமைத் திறன் - அறிவுக்கதிர். அரசுப்பணி சிறப்பிதழ்	12
IV	**(இலக்கிய வரலாறு)** 1. பதினெண் கீழ்க்கணக்கு நூல்கள் 2. உரைநடையின் தோற்றமும் வளர்ச்சியும்	10

Unit	Content	No. of Hours
V	**(இலக்கணம்)** 1. சொல்லின் வகைகள் 2. வேற்றுமைத் தொகைகள் 3. பகுபத உறுப்புகள்	10
	Total Hours	**60**

Reference Books	
1	கவிஞர் கண்ணதாசன், (2006, 6-ஆம் பதிப்பு), இயேசு காவியம், கலைக்காவிரி பதிப்பகம்.
2	நடராசன் தி.சு. (2013, 16-ஆம் பதிப்பு), உரைகளும் உரையாசிரியர்களும், நியூ செஞ்சுரி புக் ஹவுஸ்.
3	முனைவர் சேதுராமன் சி.(2010, முதல் பதிப்பு), அபிராமி அந்தாதி, நியூ செஞ்சுரி புக் ஹவுஸ்.
4	முனைவர் பஞ்சாங்கம் கா. (2017, 4-ஆம் பதிப்பு), தமிழ் இலக்கிய வரலாறு, காவியா பதிப்பகம்.
5	வரதராசன் மு. (2021, 34-வது பதிப்பு), தமிழ் இலக்கிய வரலாறு, சாகித்திய அகாதமி பதிப்பு.
6	செல்வநாயகம் வி.(2003, முதல் பதிப்பு), தமிழ் உரைநடை வரலாறு, அடையாளம் பதிப்பகம்.
7	பேரா. முனைவர் பாக்கியமேரி, (2022, 6-ம் பதிப்பு), வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு, நியூசெஞ்சுரி புக் ஹவுஸ்(பி). லிட்.
8	டாக்டர் உதயமூர்த்தி எம். எஸ்.(2016, முதல் பதிப்பு), எண்ணங்கள், வெளியீடு கங்கை புத்தக நிலையம்.
9	புலவர்.பொன்மணிமாறன், (2011, முதல் பதிப்பு) அடோன் தமிழ் இலக்கணத் தொகுப்பு, அருண் பப்ளிஷிங்.
10	குமரன் கோ (2010, முதல் பதிப்பு), தமிழ் இலக்கணம் எளிய அறிமுகம் , சந்தியா பதிப்பகம்.

Course Code	Course Name	Category	Hours / Week	Credits
25HIN21L	Hindi - II	Language - I	4	3

Course Objectives

The Course intends to cover :

- A basic understanding of contemporary poetry can be gained and the nature of modern poetry can be realized.
- Realizing the nature of drama and its nature and improving the knowledge of reading and understanding the nature of contemporary plays.
- Understands the benefits of correspondence and can enhance the correspondence you need.
- Translation is especially useful for translating from Hindi to English.

Course Learning Outcomes

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

CLO	CLO Statements	Knowledge Level
CLO1	Get a basic understanding of renewal poetry and the essence of the poem	K1
CLO2	It is possible to understand the genre of Drama	K2
CLO3	Translating skill improved specially from English to Hindi	K2, K3
CLO4	Knowledge is gained by using phrases and idioms	K3
CLO5	Learners can express opinion in small sentences	K4
K1 - Remember; **K2** - Understand; **K3** – Apply; **K4** - Analyse		

Unit	Content	No. of Hours
I	**Modern Poetry :** Panchvati By Mythli Sharan Gupt	14
II	**One Act Play:** Ekaniki Piyush 1. Owrangjeb ki aakirirath– Ramkumar varma 2. Ek din - Lakshminarayan Misra 3. Vapasi - Vishnuprabhakar 4. Badsurath rajkumari – Krishnachandra 5. Aakket – Harijeeth	14
III	**Letter Writing :** (Leave Letter, Job Application, Ordering Books, Letter to Publisher, Personal Letter)	12
IV	**Conversation:**(Doctor & Patient, Teacher & Student, Storekeeper & Buyer, Two Friends, Booking Clerk & Passenger at Railway Station, Auto rickshaw driver and Passenger)Ref : Bolchal Ki Hindi Aur Sanchar by Dr. Madhu Dhavan Vani Prakashan, New Delhi.	10
V	**Translation:** Hindi-English only Lessons – 1-15 only Anuvadh Abyas -III	10
	Total Hours	**60**

Text Book

1.	Luca Giachino, Carla Baracco, Romain Chrétien(DELF), (2022), Nouvelle Génération A1, Didier FLE

Reference Books

1.	Kavya Parasar, Dr.Bolanath,(2018) Jawahar Pusthakalay, Sadar Bazaar,Mathura-U.P.281001.
2.	Sone ki Varsha (2020) Dakshin Bharat Hindi Prachar Sabha, Chennai – 600 017

Course Code	Course Name	Category	Hours / Week	Credits
25FRE21L	French - II	Language - I	4	3

Course Objectives

The course intends to

- Understand and use familiar everyday expressions and basic phrases aimed at the satisfaction of concrete needs.
- Recognize key aspects of Francophone cultures such as greetings, etiquette, daily life, and basic geography of French-speaking countries.
- Write short, simple texts such as postcards, emails, or short descriptions about themselves and their immediate environment.
- Construct simple sentences using correct word order and basic vocabulary.Develop sensitivity to cross-cultural differences in communication and social practices.
- Read and understand short, simple texts such as personal messages, advertisements, menus, and schedules.

Course Learning Outcomes

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

CLO	CLO Statements	Knowledge Level
CLO1	Improve all the four French language skills (speaking, listening, reading, and writing) (Effective communicators)	K1
CLO2	Comprehend French and other Francophone nations' cultures and civilizations.	K2
CLO3	Comprehend the fundamentals of language structure, vocabulary, grammar, and phonetics (language skill).	K3
CLO4	The French DELF-A1 Certification is appreciated.	K3
CLO5	Developing Communication Skills	K4
K1 - Remember; **K2** - Understand; **K3** – Apply; **K4**-Analyse		

Unit	Content	No. of Hours
I	Portraits(pg 50-60) Grammaire: pg(140-144)	14
II	Communication(pg 61-65) Grammaire: pg(145-146)	14
III	Temps Libre(pg 66-68) Grammaire: pg(147)	12
IV	Mots Et Expressions((pg 69-76) Grammaire: pg(148-151)	10
V	Communication(pg 77-81) Grammaire: pg(152-155)	10
	Total Hours	**60**

Text Book

1. Luca Giachino, Carla Baracco, Romain Chrétien(DELF), (2022), Nouvelle Génération A1, Didier FLE.

Reference Book

1. Nathalie Hirschsprung, Tony Tricot, (2017) Cosmopolite, Hachette.

Course Code	Course Name	Category	Hours /Week	Credits
25ENG22L	English-II	Language - II	4	3

Course Objectives

The course intends to cover

- The literary elements in poetry.
- The critical contemplation and writing in styles of prose texts.
- The modernist techniques and ethics in the narratives of short stories.
- The interpersonal skills essential in the work environment.

Course Learning Outcomes

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

CLO	CLO Statements	Knowledge Level
CLO1	Identify the common techniques underlying free verse and traditional forms of poetry for crafting poems.	K1
CLO2	Understand humour in prose texts psychologically to master the oratory skills.	K2
CLO3	Employ empathy and morale in diplomatic Day-to-day circumstances.	K3
CLO4	Strengthen the writing skills for documentation.	K3
CLO5	Demonstrate flexibility and mobility in the sequel LSRW Skills.	K3
K1 - Remember; **K2** - Understand; **K3** - Apply		

Unit	Content	No. of Hours
I	**Poetry**: Motherhood 1. My Grand Mother's House – Kamala Das 2. Of mother, among others things – A.K Ramanujam 3. Night of the Scorpion – Nissim Ezekiel	12
II	**Prose**: Humour 1. With The Photographer – Stephen Leacock 2. Travel by Train – J.B.Priestley 3. On Forgetting – Robert Lynd	12
III	**Short Stories:** Integrity 1. The taxi driver – K.S. Duggal 2. A Retrieved Reformation- O Henry 3. Kabuliwala - Rabindranath Tagore	12
IV	**Language Competency : Vocabulary** 1. Homonyms, Homophones, Homographs Portmanteau words 2. Verbs and Tenses, Subject Verb Agreement 3. Error Correction Vocabulary : Synonyms, Antonyms, Word Formation	12
V	**English for Communication** 1.Listening with courtesy and adding ideas and giving opinions during the meeting and making concluding remarks 2. Participating in a meeting: face to face and online 3. Reading news and weather reports 4. Preparing first drafts of short assignments .	12
	Total Hours	**60**

Text Books

1.	Ezekiel Nissim, 1989 .Collected Poems 1952-1988. Oxford University Press.
2.	Hewings, M. (2000). Advanced English Grammar. Cambridge. University Press.

Reference Books

1.	Bakshi, S.P. & Sharma, R. (2019). Descriptive English. Arihant Publications (India) Ltd.
2.	Cameron S & Dempsey L. (2019). The Reading Book: A Complete Guide to Teaching Reading. S & L. Publishing.
3.	Sherman B. (2014) Skimming and Scanning Techniques. Liberty University Press.

Web Resources (Swayam / NPTEL)

1.	https://nptel.ac.in/courses/109103020

Course Code	Course Name	Category	Hours /Week	Credits
25BBT23C	Microbiology	Core – III	5	4

Course Objectives

The course intends to cover

- The basics of microbiology - types of microbes, classification and characterization, various applied aspects of microbes in biotechnology.
- The pathological aspects by identifying the diseases.

Course Learning Outcomes

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

CLO	CLO Statements	Knowledge Level
CLO1	Know history & classifications of microbes.	K1
CLO2	Understand and differentiate the different types of microbes.	K2
CLO3	Apply the knowledge on culturing techniques.	K3
CLO4	Analyze the Microbial pathology and apply the knowledge in control measures.	K3
CLO5	Apply the knowledge on the economic importance of microbes in Food and Agro industry	K3, K4
K1 - Remember; **K2** - Understand; **K3** – Apply; **K4** – Analyze		

CLO – PLO Mapping

CLOs/PLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	1	1	1	1	1
CLO2	2	2	2	-	3
CLO3	2	3	-	3	3
CLO4	2	-	3	2	-
CLO5	3	3	1	3	3
3 - Substantial (high)		**2** - Moderate (medium)		**1** - Slight (low)	

Core - III: Microbiology

Unit	Content	No. of Hours
I	**Microbes and their Classifications:** History of Microbiology, Classification of bacteria, fungi, virus, protozoa and algae – classical and molecular approaches. Scope of microbiology – Role of microbes in industries	15
II	**Media and Culture Methods:** Structure of bacteria - Bacterial growth and measurement of growth, Media – types and preparation- plating methods - staining methods (Gram's, capsule, spore, LCB mount)- methods of preservation and storage of microbes. Culture of fungi, virus and algae.	15
III	**Methods of Sterilization:** Sterilization methods - physical and chemical methods- Mode of action – Antibiotic in clinical use - Resistance to antimicrobial agents - MRSA, ESBL, Retro & non retro virus, systemic-griseofulvin, topical-candidiasis- ketoconazole.	15
IV	**Microbial Disease:** Microbial Disease- host -pathogen interaction, clinical features, lab diagnosis and treatment of Airborne disease (Pneumonia, Chicken pox), food borne disease (Typhoid, Aspergillosis), Water borne disease (Cholera, Amoebiasis), Sexually transmitted disease (AIDS, Trichomoniasis), Vector borne disease (Dengue, Malaria). Parasite- Trypanosomiasis. Sars Covi 2.	15
V	**Applications of Microbes:** Bioinsecticides-Bacillus thuringiensis, Baculoviruses - Biofertilizers - Azospirillum and blue green algae - single cell protein – prebiotics and probiotics - Dairy products (Cheese and Yoghurt).	15
	Total Hours	**75**

Text Books

1.	Ananthanarayanan, Panicker, Kapil., (1987), Textbook book of Microbiology, Orient Black Swan.
2.	Dubey R.C. and Maheswari, S., (2003). A Textbook of Microbiology, S. Chand & Co., New Delhi.
3.	Pelczar.M. J, Chan E.C.S. and Noel. R.K., (2007). Microbiology, McGraw –Hill, New York, 7th Edition.
4.	Prescott, Harley, Klein., (2016), Microbiology, McGraw – Hill, 10th Edition.

Reference Books	
1.	Boyd. R.F., (1998), General Microbiology, Times Mirror, Mosby College Publishing, St Louis, 2nd Edition.
2.	Bamford.G., (2012), Medical Microbiology and Infection at a Glance, Wiley-Blackwell,4th edition.
3.	Madigan, Bender, Buckley, Stahl., (2019), Brock Biology of Microorganisms, Pearson Publishers, USA,14th edition.
4.	Salle.A.J., (1992), Fundamental Principles of Bacteriology, McGraw Hill Inc. New York
Web Resources (Swayam / NPTEL)	
1.	https://nptel.ac.in/courses/102105087
2.	https://onlinecourses.nptel.ac.in/n oc21_ce07

Course Code	Course Name	Category	Hours /Week	Credits
25BBT24C	Biochemistry	Core – IV	5	4

Course Objectives

The course intends to cover

- Structure, classification and functions of biomolecules.
- Metabolism of biomolecules.

Course Learning Outcomes

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

CLO	CLO Statements	Knowledge Level
CLO1	Know the concepts of acids and bases.	K1
CLO2	Understand the importance of carbohydrates.	K2
CLO3	Understand the notion of proteins, lipids.	K2
CLO4	Understand the basics of structure and functions of bio-molecules.	K2
CLO5	Understand how energy is generated and utilized biochemically.	K2
K1-Remember; **K2** – Understand.		

CLO – PLO Mapping

CLOs/PLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	2	2	-	2	3
CLO2	3	3	1	-	-
CLO3	-	1	3	1	3
CLO4	2	2	2	2	2
CLO5	3	3	3	3	3
3 - Substantial (high)		**2** - Moderate (medium)		**1** - Slight (low)	

Core - IV: Biochemistry

Unit	Content	No. of Hours
I	**Acids & Bases-Properties and differences:** Concepts of acids and bases- Arrhenius, Lowry-Bronsted and Lewis. Concentration of solutions- Ways of expressing concentrations: Percent by weight, Normality, Molarity, Molality, Mole fraction. pH of solution- pH scale, measurement of pH. Buffer solutions-properties of buffers,Henderson-Hasselbalch equation, mechanism of buffer action of acidic buffer and basic buffer.	15
II	**Classification & Metabolism of Carbohydrates:** Importance of Biochemistry. Structure, Classification, Properties, and Metabolism of Carbohydrates. Glycogenesis, Glycogenolysis, Cori's cycle, Glycolysis, TCA cycle, bioenergetics of carbohydrate metabolism.	15
III	**Structure and Classification of Proteins:** Classification and structure of amino acids. Structural conformation of proteins. Classification of proteins. Properties and biological importance of amino acids and proteins.	15
IV	**Metabolism of Lipids & Nucleic acids:** Metabolism of Fatty acids, triglycerides, phospholipids. Classification and Metabolism of nucleic acids, salvage pathway. Degradation of amino acids and urea cycle.	15
V	**Enzymes, Vitamins and Hormone:** Enzymes – Nomenclature, Mode of action and types. Role of Vitamins and Hormones in metabolism. ATP production. Oxidative phosphorylation, Electron transport chain.	15
	Total Hours	**75**

Text Books

1. Shourie.A, Shilpa.S, Chapadgoankar and Anamika Singh., (2021), Textbook of Biochemistry,Wiley–India Publishers.
2. Deb.A.C., (2016), Fundamentals of Biochemistry, New central book agencies, Kolkata, 7th edition.
3. Jain. J.L., (2016), Fundamentals of Biochemistry, S. Chand publication, Noida,7th edition.
4. Satyanarayana.U., (2016), Biochemistry, MJ publishers, 3rd edition.
5. Soni.P.L., (2005), A Text-book of Organic Chemistry, S. Chand & Sons publications, India,11th Edition.

Reference Books

1. Arun.B, Bahl.B.S., (2016), A Textbook of Organic Chemistry, S. Chand & Sons publications, Noida, 22nd Edition.
2. Geoffrey L. Zubay, William W. Parson, Dennis E. Vance., (1995), Principles of Biochemistry, W.C. Brown Publishers.
3. Lehninger., (2013), Principles of Biochemistrty WH Freeman and Company ,NY, 4th edition.
4. Stryer.L., (2007), Biochemistry , W H Freemann and company, San Francisco, 5th Edition.
5. Murray et al., (2003), Harper's Biochemistry, Appleton and Lange Publishers, Florida USA, 26th edition.

Web Resources (Swayam / NPTEL)

1. https://nptel.ac.in/courses/104105130

Course Code	Course Name	Category	Hours /Week	Credits
25BBT25P	Microbiology & Biochemistry Lab	Core Lab - II	4	2

S. No.	List of Practicals	
1.	Sterilization techniques, Preparation of Media and Maintenance of culture.	
2.	Inoculation techniques- Pour plate, Spread plate and Streak plate.	
3.	Isolation of bacteria from various sources and dilution techniques.	
4.	Staining techniques: Gram's, Capsule (Negative), Spores.	
5.	Preparation of temporary mounts- Lactophenol cotton blue staining.	
6.	Motility tests: Hanging drop technique.	
7.	Biochemical characterization - Catalase, Oxidase, IMVIC test and TSI.	
8.	Antibiotic sensitivity test.	
9.	Estimation of Ascorbic acid	
10.	Estimation of sugars- Glucose & Fructose.	
11.	Estimation of Cholesterol- Zak's method.	
12.	Estimation of total free amino acids.	
13.	Estimation of Proteins – Bradford's method.	
	Total Hours	**60**
Text Books		
1.	Benson H.J., (1998). Microbiological applications: A laboratory manual in general microbiology, WCB/McGraw-Hill Publishers, USA.	
2.	Cappuccino., (2005), Microbiology: A Laboratory Manual, Pearson Education, UK.	

Course Code	Course Name	Category	Hours /Week	Credits
25BBT26P	Chemistry Lab	Allied Lab - I	4	2

S. No.	List of Practicals	
I	**Systematic analysis of Organic compounds**	
1.	Functional group tests (Carboxylic acid (Benzoic acid, phthalic acid), Phenol, Urea, Benzaldehyde, Aniline (Aniline not to be given for exam).	
2.	Detection of elements (N, Halogens).	
3.	Distinguish between aliphatic and aromatic compounds.	
4.	Distinguish between Saturated and unsaturated compounds.	
II	**Qualitative Analysis**	
1.	Qualitative analysis of carbohydrates - Glucose, Fructose, Lactose, Maltose, Sucrose and Starch	
2.	Qualitative analysis of amino acids - Tyrosine, Tryptophan, Arginine, Proline and Cysteine.	
III	**Volumetric Analysis**:	
1.	Estimation of Glycine- Formal Titration.	
2.	Determination of Ascorbic acid – DCPIP method.	
3.	Estimation of Ferrous sulphate using standard Mohr's salt.	
	Total Hours	**60**
Text Books		
1.	Venkateswran.V, Veerasmy.R, and Kulandavelu A. R., (1997), Basic principles of Practical Chemistry, Sultan Chand and Sons Publishers.	
2.	Joy P.P, Surya.S and Awathy., (2015), Laboratory Manual of Biochemistry, Web: www.kau.edu/prsvkm, http://prsvkm.tripod.com.	

Course Code	Course Name	Category	Hours / Week	Credits
25HUM2FC	Human Rights	Foundation Course	2	2

Unit	Content
I	**Concept of Human Values, Value Education Towards Personal Development** Aim of education and value education; Evolution of value oriented education; Concept of Human values; types of values; Components of value education. **Personal Development :** Self analysis and introspection; sensitization towards gender equality, physically challenged, intellectually challenged. Respect to - age, experience, maturity, family members, neighbours, co-workers. Character Formation Towards Positive Personality: Truthfulness, Constructivity, Sacrifice, Sincerity, Self Control, Altruism, Tolerance, Scientific Vision.
II	**Value Education Towards National and Global Development** **National and International Values:** Constitutional or national values - Democracy, socialism, secularism, equality, justice, liberty, freedom and fraternity. Social Values - Pity and probity, self-control, universal brotherhood. Professional Values - Knowledge thirst, sincerity in profession, regularity, punctuality and faith. Religious Values - Tolerance, wisdom, character. Aesthetic values - Love and appreciation of literature and fine arts and respect for the same. National Integration and international understanding.
III	**UNIT – III: Impact of Global Development on Ethics and Values** Conflict of cross-cultural influences, mass media, cross-border education, materialistic values, professional challenges and compromise. Modern Challenges of Adolescent Emotions and behavior; Sex and spirituality: Comparison and competition; positive and negative thoughts.Adolescent Emotions, arrogance, anger, sexual instability, selfishness, defiance.
IV	**UNIT - IV: Therapeutic Measures** Control of the mind through a. Simplified physical exercise b. Meditation – Objectives, types, effect on body, mind and soul c. Yoga – Objectives, Types, Asanas d. Activities: (i) Moralisation of Desires (ii) Neutralisation of Anger (iii)Eradication of Worries (iv)Benefits of Blessings

Unit	Content	
V	**UNIT - V: Human Rights** 1. Concept of Human Rights – Indian and International Perspectives a. Evolution of Human Rights b. Definitions under Indian and International documents 2. Broad classification of Human Rights and Relevant Constitutional Provisions. a. Right to Life, Liberty and Dignity b. Right to Equality c. Right against Exploitation d. Cultural and Educational Rights e. Economic Rights f. Political Rights g. Social Rights 3. Human Rights of Women and Children a. Social Practice and Constitutional Safeguards (i) Female Feticide and Infanticide (ii) Physical assault and harassment (iii) Domestic violence (iv) Conditions of Working Women 4. Institutions for Implementation a. Human Rights Commission b. Judiciary 5. Violations and Redressal a. Violation by State b. Violation by Individuals c. Nuclear Weapons and terrorism d. Safeguards.	
	Total Hours	**30**

Course Code	Course Name	Category	Hours/Week	Credits
25DIM2FC	Disaster Management	FC-II	2	2

Unit	Content
I	**Unit I: Introduction to Disasters** 1.1. Definition of Concepts 1.2. Difference between hazards and vulnerability 1.3. Types of Disasters 1.4. Natural Disasters 1.5. Human - Made Disasters
II	**Unit II: Disasters Management** 2.1. Disaster Management 2.2. Disaster Management Cycle 2.3. Key Phases of Disaster Management 2.4. Disaster and Development 2.5. Disaster Impacts on Differential Groups
III	**Unit III: Vulnerability Assessment and Reduction** 3.1. Vulnerability 3.2. Vulnerability Assessment 3.3. Early Warning System 3.4. Factors Contributing to Vulnerability 3.5. Vulnerability Reduction 3.6. Impact of Development Projects such as Dams, Embankments, Changes in Land-use etc. 3.7. Climate Change Adaptation
IV	**Unit IV: Disaster Risk Reduction** 4.1. Disaster Risk Reduction (DRR), 4.2. Knowledge Management in Disaster Risk Reduction 4.3. The Knowledge Management Cycle 4.4. Role of Information and Knowledge in Disaster Risk Reduction 4.5. Indigenous Knowledge and Disaster Risk Reduction 4.6. Indigenous Knowledge and Early Warning Indicators 4.7. Indigenous Knowledge and Coping Strategies 4.8. Sendai Framework for Disaster Risk Reduction 4.9. Intergovermental Panel on Climate Change (IPCC) 4.10. IPCC Scenario in the Context of India
V	**Unit V: Institutional Framework for Disaster Management** 5.1. National Policy on Disaster Management 2009 5.2. The National Disaster Management Authority (NDMA) 5.3. State Disaster Management Authority (SDMA) 5.4. District Disaster Management Authorities (DDMAs) 5.5. Community-Based Disaster Management (CBDM) 5.6. NGOs and Disaster Management 5.7. Other Related Policies, Plans, Programmes and Legislation
	Total Hours **30**

References	
1.	Agrawal A. (1995), Dismantling the divide between Indigenous Knowledge and Scientific Knowledge. Development Change 26: 413 – 439.
2.	Mrinalini Pandey (2014), Text Book of Disaster Management, Wiley India Pvt Ltd.
3.	Pradeep K Goyal,Anil K Gupta, Disaster Management, All India Council for Technical Education Nelson Mandela Marg, Vasant Kunj, New Delhi, 110070
4.	Sharma S.C (2020), Disaster Management (1st ed.), Khanna Book Publishing Co. (P) Ltd, New Delhi.
5.	Srivastava A.K (2021), Text Book of Disaster Management, Scientific Publishers, Jodhpur.
6.	Subramanian, (2018), Disaster Management, Vikas Publishing House, Noida.
7.	Tushar Bhattacharya (2015), Text Book of Disaster Science and Management, McGraw Hill Education.
8.	United Nation (2015), Sendai Framework for Disaster Risk Reduction. 2015 – 2030. Geneva: UNISDR
9.	www.EasyEngineering.net

Course Code	Course Name	Category	Hours / Week	Credits
25IDT2AE	Innovation & Design Thinking	AECC - II	2	2

Course Objectives

The Course intends to cover

- The principles and practices of innovation and design thinking.
- Creative problem-solving skills, and impactful solutions across diverse contexts.
- The user-centered research techniques, and practical tools to generate, prototype.

Course Learning Outcomes

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

CLO	CLO Statements	Knowledge Level
CLO1	Understand the design thinking methodology for solving real-world problems.	K2
CLO2	Generate, prototype, and test innovative ideas.	K3
CLO3	Frame human-centered solutions and present them effectively.	K3
CLO4	Enhance their confidence in collaborative approaches to problem solving.	K3
CLO5	Integrate innovation strategies into business, social, and creative contexts to drive sustainable impact.	K4
K2 - Understand; **K3** – Apply ; **K4** - Evaluate		

Ability Enhancement Compulsory Courses (AECC) - II: Innovation & Design Thinking

Unit	Content	No. of Hours
I	**Principles of Design Thinking:** Usability, Human-centeredness, Empathy, Iteration. **Types of Innovation:** Product, Process, Business Model, Social Innovation.	6
II	**Empathy & Defining The Problem:** Understanding users - observation - ethnographic research - interviews - Empathy maps and personas - Identifying user pain points - Problem framing vs. problem solving.	6
III	**Ideation & Creativity Tools:** Divergent vs. Convergent Thinking - Brainstorming and mind mapping techniques – SCAMPER. Idea selection and prioritization frameworks.	6
IV	**Prototyping & Experimentation:** Low-fidelity vs. High-fidelity prototyping - Storyboarding, sketching, mock-ups, and role-playing - Rapid prototyping with simple materials.	6
V	**Testing & Feedback:** Testing prototypes with users - Iteration and learning from feedback. **Innovation Strategy & Implementation :** Scaling ideas into innovations - Measuring innovation impact - Barriers - Design Thinking for social change and sustainability.	6
	Total Hours	**30**

Text Books	
1	Kelley, T., & Kelley, D. (2013). Creative confidence: Unleashing the Creative Potential within us all. Crown Business.
2	Dan Saffer, Designing for Interaction, New Riders Publications, 2010.
Reference Books	
1	Plattner, H., Meinel, C., & Leifer, L. (Eds.). (2018). Design Thinking Research: Making Distinctions: Collaboration versus Cooperation. Springer.
2	Liedtka, J., & Ogilvie, T. (2011). Designing for Growth: A Design Thinking Tool kit for Managers. Columbia University Press.
3	Martin, R. (2009). The Design of Business: Why Design Thinking is the Next Competitive Advantage. Harvard Business Press.
Web Resources (Swayam / NPTEL)	
1	https://onlinecourses.nptel.ac.in/noc22_mg32/preview
2	https://onlinecourses.swayam2.ac.in/imb23_mg65/preview
3	https://onlinecourses.nptel.ac.in/noc20_hs08/preview

Course Code	Course Name	Category	Hours/Week	Credits
25IPR2AE	Intellectual Property Rights	AECC - II	2	2

Course Objectives

This course intends to cover

- Identify the objectives, forms, duration, and scope of protection for different types of intellectual property.
- Understand the global IP framework and India's compliance challenges.
- Recognize the role of IP as a policy tool for national, economic, social, and cultural growth.
- Gain knowledge of substantive laws and procedural mechanisms of IP in India.
- Analyze recent national and global trends in intellectual property rights.

Course Learning Outcomes

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

CLO	CLO Statements	Knowledge Level
CLO1	Understand the core principles of intellectual property protection.	K1, K2
CLO2	Identify the key concepts and principles of trademarks.	K2
CLO3	Comprehend the legal implications and rights under copyright law.	K3
CLO4	Understand the legal consequences of patents and trade secrets.	K2
CLO5	Comprehend IP rights for plant varieties and farmers, along with their legal and social aspects.	K4
K1 - Remember; **K2** - Understand; **K3** – Apply; **K4** – Analyze		

Ability Enhancement Compulsory Courses (AECC)-II:
Intellectual Property Rights

Unit	Content	No. of Hours
I	**Introduction to Intellectual Property:** Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.	6
II	**Trade Marks:** Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting, and evaluating trade mark, trade mark registration processes.	6
III	**Law of Copy Rights:** Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law**.**	6
IV	**Law of Patents, Trade Secrets:** Foundation of patent law, patent searching process, ownership rights and transfer. Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.	6
V	**Protection of Plant Varieties and Farmers' Rights:** Introduction -Meaning and Definition - Registrable Varieties of Plants - Procedure for Registration - Plant Varieties Protection.	6
	Total Hours	**30**

Text Books	
1	V K Ahuja - Law Relating To Intellectual Property Rights - Lexis Nexis; Third edition , 2017.
2	Elizabeth Verkey - Intellectual Property Law and Practice – Eastern Book Company – 2018.
3	S R Myneni - Law of Intellectual Property - Asia Law House – 2021.
Reference Books	
1	B.L. Wadehra - Law Relating To Intellectual Property – Universal Law Publishing House, New Delhi , 2011.
2	Avtar Singh - Intellectual Property Law - Eastern Book Company – 2015.
Web Resources (Swayam/NPTEL)	
1	https://onlinecourses.nptel.ac.in/noc22_hs59/preview

Course Code	Course Name	Category	Hours / Week	Credits
25END2AE	Entrepreneurship Development	AECC – II	2	2

Course Objectives

This course intends to cover

- Basics of starting and managing entrepreneurial ventures.
- Tools for planning, funding, and entrepreneurial growth.

Course Learning Outcomes

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

CLO	CLO Statements	Knowledge Level
CLO1	Understand the concept of entrepreneurship.	K2
CLO2	Gain knowledge on entrepreneurial motivation	K2
CLO3	Apply business idea evaluation	K3
CLO4	Create systematic Business plan	K3
CLO5	Analyse business finance and support	K4
K1 - Remember; **K2 -** Understand; **K3 -** Apply; **K4 -** Analyse		

Ability Enhancement Compulsory Course – II: Entrepreneurship Development

Unit	Content	No. of Hours
I	**Entrepreneurship:** Meaning of Entrepreneurship - Characteristics, Functions and Types of entrepreneurs - Intrapreneur vs. Entrepreneur - Need for Entrepreneurship in economic development - Contribution to GDP, Employment, Innovation.	5
II	**Entrepreneurial Motivation:** Meaning - Need for Achievement Theory - Risk-taking Behaviour - Innovation and Entrepreneur – Economic & non-economic factors affecting entrepreneurial growth.	5
III	**Business Ideas:** Sources of Business Ideas & Opportunity Identification – Idea generation techniques (Brainstorming, Design Thinking). Business incubation - Technical Assistance for small business – Preparation of Feasibility Reports, Legal Formalities and Documentation	7
IV	**Business Plan:** Meaning and importance of Business Plan – Structure and components – Market Study.	7
V	**Entrepreneurial finance:** Sources of finance (Bank, Angel investors, Venture Capital, Crowdfunding, Mudra Loans) - Institutional support to entrepreneurs (DIC, KVIC, EDII and MSME).	6
	Total Hours	**30**
Text Books		
1	C.B. Gupta and N.P. Srinivasan (2020), Entrepreneurship Development, Sultan Chand and Sons.	
2	Dr. Vasant Desai and Dr. Kulveer Kaur (2021), Entrepreneurship Development and Management, Himalaya Publications.	
Reference Books		
1	Dr. Jayashree Suresh (2021), Entrepreneurial Publications, Margham Publications	
2	S S Khanka (2020), Entrepreneurial Development, Sultan Chand and Sons, New Delhi.	
Web Resources (Swayam/NPTEL)		
1	https://onlinecourses.nptel.ac.in/noc25_mg95/preview	

Components for Internal Assessment and Distribution of Marks for CIA and ESE (Theory)

Max Marks	Marks for		Components for CIA						
100	CIA	ESE	CIA		Model		Attendance	Active Engagement	Total
	25	75	Actual	Weightage	Actual	Weightage	5	5	25
			50	**5**	75	**10**			

Question Paper Pattern

Component	Duration in Hours	Section A			Section B			Section C			Total
		Type of Question	No. of Questions	Marks	Type of Question	No. of Questions	Marks	Type of Question	No. of Questions	Marks	
CIA	2	MCQ	8	8x1=8	Either or	3	3x6=18	Either or	3	3x8=24	50
Model Exam / **ESE**	3	MCQ	10	10x1=10	Either or	5	5x5=25	Either or	5	5x8=40	75

Components for Internal Assessment and Distribution of Marks for CIA (Lab)

Max Marks	Marks for		Components for CIA						
	CIA	ESE	Test		Model		Experiments / Programs	Observation	Total
100	40	60	Actual	Weightage	Actual	Weightage	Marks	5	40
			50	**10**	60	**15**	**10**		

Examination Pattern

Component	Duration in Hours	Marks			Total Marks
		Practical Exam	Record	Weightage	
Test	2	50	-	**10**	50
Model	3	60	-	**15**	60
Experiments	-	-	-	**10**	10
Observation	-	-	-	**05**	05
Total Marks - CIA				**40**	**40**
ESE	3	50	10	-	**60**

Components for Internal Assessment and Distribution of Marks for CIA (Foundation Course -Theory)

Max Marks	Marks for		Components for CIA				
50	CIA	ESE	CIA		Model		Total
	50	-	Actual	Weightage	Actual	Weightage	
			50	**25**	50	**25**	**50**

Question Paper Pattern

Duration in Hours	Mode of Exam	Type of Questions	No. of Questions	Marks
2	Offline	Open Choice	5 (Out of 8)	5 x 10=50

Components for and Distribution of Marks for ESE (Theory) Ability Enhancement Compulsory Courses (AECC) & Question Paper Pattern

Duration in Hours	Mode of Exam	Type of Questions	No. of Questions	Marks
2	Online	MCQ	50	50x1=50

Semester 3

Semester – 3									
Course Code	**Part**	**Course Category**	**Course Name**	**Hours/ Week**	**Examination**				**Credits**
					Duration in Hours	**Max Marks**			
						CIA	**ESE**	**Total**	
25TAM31L	I	Language – I	Tamil – III	4	3	25	75	100	3
25HIN31L	I		Hindi – III						
25MAL31L	I		Malayalam – III						
25FRE31L	I		French – III						
25ENG32L	II	Language – II	English – III	4	3	25	75	100	3
25BBT33C	III	Core – V	Bioinstrumentation	6	3	25	75	100	4
25BBT34C	III	Core - VI	Molecular Genetics	6	3	25	75	100	4
25BBT35P	III	Core Lab-III	Bioinstrumentation and Molecular genetics Lab	4	3	40	60	100	2
25BBT36A	III	Allied-II	Basics of Biopython	4	3	25	75	100	3
25BBT37P	III	SEC Lab – I	Chemiformatics Lab	2	3	40	60	100	2
25BAT3FC/	IV	FC – II	Basic Tamil/	-	2	50	-	50	2
25ADT3FC/			Advanced Tamil/						
25IKS3FC			Indian Knowledge Systems (IKS)*						
25MOO3AE	IV	AECC – III	Online Course – MOOC	-	-	50	-	50	2
Total				**30**				**800**	**25**

Part –I: Language – I - Tamil – III

Course Code	Course Name	Category	Hours / Week	Credits
25TAM31L	Tamil - III	Language - I	4	3

Course Objectives

The Course intends to cover

- தமிழரின் பிற துறை சார்ந்த சிந்தனைகளைக் கற்பித்தல்
- இன்றைய அறிவியல் வளர்ச்சி மற்றும் கணினியின் பயன்பாட்டுத் தேவையை உணர்த்துதல்
- இயற்கை பாதுகாப்பு குறித்த விழிப்புணர்வை வளர்த்தல்

Course Learning Outcomes

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

CLO	CLO Statements	Knowledge Level
CLO1	வணிகத் தமிழ் - கணினித் தமிழின் நுட்பங்கள் மற்றும் பயன்பாடுகளை அறிந்து பின்பற்றுவர்	K1, K2
CLO2	ஊடகம் மற்றும் உளவியல் தன்மை குறித்த சிந்தனைகளை வளர்த்துக் கொள்வர்	K2
CLO3	சுற்றுலா - சுற்றுச்சூழலியல் தேவை மற்றும் மீட்டுருவாக்கம் குறித்து உணர்த்து செயல்படுதல்	K3
CLO4	மேலாண்மை பற்றி அறிதல் மற்றும் சுயக்கற்றல் திறனை வளர்த்துக் கொள்ளுதல்	K1, K3
CLO5	பன்முக ஆளுமைகள் குறித்து அறிந்து தனித்திறன்களை உருவாக்கிக் கொள்வர்.	K2, K3
K1 - Remember; **K2** - Understand; **K3** - Apply		

Language – I: Tamil – III

பயன்பாட்டுத் தமிழ்

Unit	Content	No. of Hours
I	**வணிகம் மற்றும் கணினித் தமிழ்** தமிழரின் வணிகம் - வணிகக் கடிதங்கள் – உலகமயமாக்கல் - செயற்கை நுண்ணறிவு கற்றல் - இணைய நூலகம் - இணையத் தமிழ் பயன்பாடு	12
II	**ஊடகம் மற்றும் உளவியல் தமிழ்** ஊடகத்தின் இன்றியமையாமை - நிகழ்வுகளைச் செய்திகளாக வடிவமைத்தல் - ஊடகத் துறையில் மொழியின் பங்கு - உளவியல் வரையறை - உளவியல் பிரிவுகள் - வகுப்பறை உளவியல் (ஆசிரியர், மாணவர்)	12
III	**சுற்றுச்சூழலியல் மற்றும் சுற்றுலாவியல்** தமிழரின் சூழலியல் அறிவு - சுற்றுச்சூழல் மாசுபாடு - சுற்றுச்சூழல் பாதுகாப்பு - சுற்றுலா வகைகள் - உலகப் புகழ்பெற்ற சுற்றுலாத் தலங்கள் - சுற்றுலா வளர்ச்சி மற்றும் பயன்கள்	12
IV	**மேலாண்மைத் தமிழ் மற்றும் மொழிப்பயிற்சி** மேலாண்மையும் அணுகுமுறைகளும் - மேலாண்மை செயல்பாடுகள் மற்றும் வகைகள் - வகுப்பறை மேலாண்மை – நேர்காணல் - நூல் திறனாய்வு மற்றும் மதிப்பீடு - படிவங்கள் பூர்த்தி செய்தல் மற்றும் விண்ணப்பங்கள்	12
V	**பன்முக ஆளுமைகள்** ஜி.டி.நாயுடு(அறிவியல்) – பத்மஸ்ரீ டாக்டர் பக்தவத்சலம்(மருத்துவம்) - நா மகாலிங்கம்(தொழில்) - மயில்சாமி அண்ணாதுரை(விஞ்ஞானம்) - என் ஜி ராமசாமி(சமூகம்) - நம்மாழ்வார்(விவசாயம்)	12
	Total Hours	**60**

Reference Books	
1	சுந்தரம்.இல, (2022) கணினித் தமிழ், விகடன் பிரசுரம்
2	மணியரசன்.துரை, (2019), இணையமும் இனியத் தமிழும், இசை பதிப்பகம்
3	பொன்னவைக்கோ.மு, (2015) இணையத் தமிழ் வரலாறு, பாரதிதாசன் பல்கலைக் கழகம்.
4	தங்கமணி இரா.ம, (2018) சுற்றுலாவியல், கொங்கு பதிப்பகம்
5	இலக்கியா க.வி, நந்தினி சா.சு,(2022), விடியல் பதிப்பகம்
6	சின்னத்தம்பி முருகேசன்.பொன்(2016) சுற்றுச் சூழலியல்(உலகம் தழுவிய வரலாறு), எதிர் வெளியீடு
7	இறையன்பு.வெ (2018) இலக்கியத்தில் மேலாண்மை, நியூ செஞ்சுரி புக் ஹவுஸ்
8	ஸ்ரீனிவாசன்.வி, (2009), திருக்குறளில் மேலாண்மை, விகடன் பிரசுரம்
9	பட்டனத்தி மைந்தன், (2018), ஜி.டி நாயுடு, ராமையா பதிப்பகம்
10	டாக்டர் பக்தவத்சலம்.ஜி (2009) இதயம் ஒரு கோவில், விஜயா பதிப்பகம்

Part – I: Language – I- Hindi – III

Course Code	Course Name	Category	Hours / Week	Credits
25HIN31L	**Hindi - III**	**Language - I**	**4**	**3**

Course Objectives

The Course intends to

- Have knowledge of the contents of primitive poetry.
- Learn about contemporary poetry and its techniques.
- Interest in reading poetry and the ability to express social thoughts
- Understand the basics of Hindi literature properly.
- Provide knowledge of the elements of poetry and subtle translation will improve.

Course Learning Outcomes

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

CLO	CLO Statements	Knowledge Level
CLO1	Get a basic knowledge of the history of Hindi literature.	K1
CLO2	Enhances the art and taste of Hindi literary works	K2
CLO3	Literary genres can be learned	K3
CLO4	Create an interest to read and enjoy Hindi poetry	K4
CLO5	Get the basic Knowledge of poetry techniques like Anlankar.	K4
K1 - Remember; **K2** - Understand; **K3** – Apply;**K4** - Analyze		

Part – I: Language – I - Hindi – III

Unit	Content	No. of Hours
I	Poetry:Kavya Tharang – by Dr. Niranjan Pracheen Kavitha 1. Mahatma kabeer – sakhi & padh (2) 2. Goswamy tulsidas – pad(4) 3. Mahatma soordas- pad(3) 4. Kavivar rahim – dohe(6)	12
II	Modern Poetry : Kavya Tharang- by Dr. Niranjan 1. Nirjar – Mythili sharan gupth 2. Parichay – Ramdhari singh Dinkar 3. Prethibimb – Sumithra nandan Panth 4. Kavi kaha ththa – Sooryakanth Tripati Nirala 5. Kah de mam Kya ab dekoon – Mahadevi varma 6. Kanu ke prathi – Darmveer Bharathi 7. Loha ka swad – Dhumil 8. Bhanth Kidikkiyon ki Takrahat – Gorakh pande	12
III	History of Hindi Literature :(Tippaniyan) 1. Bhakthi kal ka samanya parichaya (Kabeer, Jaysi, Soor, Thulsi, Meera, Raskhan, Rahim)	12
IV	Ras Chad & Alankar: 1. Srungar & veer Ras 2. Anupras & Upama 3. Dhoha & Rola	12
V	Translation : English-Hindi only 1. Anuvadh Abhyas – III (16-30 Lessons Only)	12
	Total Hours	**60**

Text Books	
1.	Kavya Tharang – by Dr. NIRANJAN, Jawahar Pusthakalay, Sadar Bazaar,Mathura U.P.281001.
2.	Anuvadh abyas-III,Dakshin Bharath Hindi Prachar Sabha Chennai – 17.
Reference Books	
1.	Hindi sahithya ka saral ithihaas,by Rajnath sharma, vinod pustak mandir, agra-282
2.	Kavya Pradeep Rambadri Shukla, Hindi Bhavan, 36, Tagore Town, Allahabad – 211 002.

Part – I: Language – I- Malayalam – III

Course Code	Course Name	Category	Hours / Week	Credits
25MAL31L	Malayalam - III	Language - I	4	3

Course Objectives

The Course intends to cover

- May have knowledge of the contents of primitive poetry.
- Learn about contemporary poetry and its techniques.
- Interest in reading poetry and the ability to express social thoughts will improve.
- This will help you to understand the basics of Malayalam Poetry and to understand Malayalam literature properly.
- It will provide knowledge of the elements of poetry.

Course Learning Outcomes

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

CLO	CLO Statements	Knowledge Level
CLO1	Get a basic knowledge of the history of Malayalam literature.	K1
CLO2	Enhances the art and taste of Malayalam literary works	K1
CLO3	Literary genres can be learned	K2
CLO4	Create more to read and enjoy Malayalam poetry	K3
CLO5	Get the basic Knowledge of poetry techniques	K4
K1 - Remember; **K2** - Understand; **K3** – Apply; **K4** - Analyze		

Part – I: Language – I

Malayalam – III

Unit	Content	No. of Hours
I	Poetry – Sishyanum makanum - Vallaththol Narayana Menon	12
II	Poetry – Sishyanum makanum - Vallaththol Narayana Menon	12
III	Poetry - Rafeeque Ahammed (Selected poetries – Thoramazha,Madhuranarangakal,Athrayum,Umma,Pakaram)	12
IV	Poetry-RafeequeAhammed(Selectedpoetries-Ammathottil,Vidhyalayam,	12
V	Thottakutty,Sivakami,Ithanu prarthana)	12
	Total Hours	**60**

Text Books	
1.	Sishyanum makanum - Vallaththol Narayana Menon,Poorna Publishers.
2.	Rafeeque Ahammed – Selected poetries ,Mathrubhumi Books, Kozhikkode
3.	Aayisha – Vayalar Ramavarma - Kerala Book Store Publishers.
Reference Books	
1.	Kavitha SahithyaCharitram-Dr.M.Leelavathi (Kerala SahithyaAcademy,Trichur)
2.	Kavitha Dwani-Dr.M.Leelavathi (D.C.Books, Kottayam)
3.	Aadhunika Sahithyacharithram Prasthanangalilude-Dr.K.M.George (D.C.Books, Kottayam)
4.	Padya SahithyaCharithram – T.M.Chummar (Kerala SahithyaAcademy,Trichur)

Part – I: Language – I- French – III

Course Code	Course Name	Category	Hours / Week	Credits
25FRE31L	French - III	Language - I	4	3

Course Objectives

The Course intends to

- Understand and use familiar everyday expressions and basic phrases aimed at the satisfaction of concrete needs.
- Recognize key aspects of Francophone cultures such as greetings, etiquette, daily life, and basic geography of French-speaking countries.
- Write short, simple texts such as postcards, emails, or short descriptions about themselves and their immediate environment.
- Construct simple sentences using correct word order and basic vocabulary.
- Develop sensitivity to cross-cultural differences in communication and social practices.
- Read and understand short, simple texts such as personal messages, advertisements, menus, and schedules.

Course Learning Outcomes

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

CLO	CLO Statements	Knowledge Level
CLO1	Improve all the four French language skills (speaking, listening, reading, and writing) (Effective communicators)	K1
CLO2	Comprehend French and other Francophone nations' cultures and civilizations.	K2
CLO3	Comprehend the fundamentals of language structure, vocabulary, grammar, and phonetics (language skill).	K3
CLO4	The French DELF-A1 Certification is appreciated.	K4
K1 - Remember; **K2** - Understand; **K3** – Apply;**K4**- Analyse		

Part – I: Language – I

French – III

Unit	Content	No. of Hours
I	Vendre Et Acheter pg (82-92) Grammaire: pg(156-160)	12
II	Communication(pg 93-97) Grammaire: pg(161-162)	12
III	Tout Le Monde s'amuse(pg 98-100) Grammaire: pg(163)	12
IV	Mots Et Expressions(pg 101-107) Grammaire: pg(164-167)	12
V	Communication(pg 108-120) Grammaire: pg(168-171)	12
Semester III Portions from Textbook « Nouvelle Génération A1» : UNITÉ 5, UNITÉ 6(Pg 82-120) Cahier d'exercices (Pg156-171)		
	Total Hours	**60**

Text Book	
1.	Luca Giachino,Carla Baracco, Romain Chrétien(DELF), 2022, Nouvelle Génération A1, Didier FLE
Reference Book	
1.	Nathalie Hirschsprung, Tony Tricot, 2017, Cosmopolite, Hachette

Language-II: Part – II: English –III
(All the Undergraduate Programmes)

Course Code	Course Name	Category	Hours / Week	Credits
25ENG32L	English III	Language II	4	3

Course Objectives
The course intends to cover

- The values of patriotism, empowerment and social responsibility through Biographies and Speeches.
- The use of grammar for communication.
- The essential interpersonal skills for effective group interaction.
- The analytical reading and ethical digital writing skills.

Course Learning Outcomes
On the successful completion of the course, students will be able to

CLO	CLO Statements	Knowledge Level
CLO1	Identify key themes in biographies and speeches, and understand the basic structure of the content.	K1
CLO2	Understand the ideas and rhetorical strategies in texts and relate them to social awareness.	K2
CLO3	Apply grammar rules to form clear and accurate sentences in speech and writing.	K3
CLO4	Demonstrate effective listening and speaking skills by participating confidently in group discussions with appropriate body language and voice modulations.	K3
CLO5	Develop reading and writing skills to communicate effectively across different digital platforms with digital integrity.	K3
K1 Remember; **K2** Understand; **K3** Apply		

Language II: Part II - English III

Unit	Content	No. of Hours
I	**Biographies : Patriotism** 1. Nehru – AF Toynbee 2. Martin Luther King – R N Roy 3. C.V. Raman – H. Kusumakar	12
II	**Renowned Speeches : Empowerment** 1. UN Youth Assembly Speech - Malala Yousafzai 2. Give Us a Role Model - A.P.J. Kalam 3. Inaugural Address Nelson Mandela	12
III	**Grammar** 1. Sentence Structure 2. Types of Sentences (Declarative, Interrogative, Imperative, Exclamatory), Transformation of Sentences 3. Active Voice and Passive Voice 4. Direct and Indirect Speech	12
IV	**Listening and Speaking Skills:** 1. **Group Discussion**: Structure of Group Discussion , Types of Group Discussion, Phrases for participating in a Group Discussion ,Do's and Don'ts in a Group Discussion. 2. **Group Dynamics (Nonverbal and Behavioural Aspects)**: Body Language, Personal Appearance, Posture, Gestures, Facial Expression, Eye Contact, Space Distancing 3. **Paralinguistic Cues:** Tone, Pitch, Volume, Speed (rate of speech), Pauses, Stress and Intonation.	12
V	**Reading and Writing Skills : Digital Communication** 1. **Reading and Understanding Digital Texts**: Skills for Analysing Digital Texts (connotative and denotative skills). 2. **Introduction to Digital Writing**: Types of Digital Writing, Website content, Blog Writing, Social Media Writing, SEO Writing, Review and Opinion Writing 3. Editing Digital Content, Digital Integrity and Ethics in Writing.	12
	Total Hours	**60**

Reference Books

1.	Rengasamy, P. Ed.(2012). Paths of Glory An Anthology of Biographies. Macmillan Publishers India Ltd.
2.	Yousafzai, M. (2013, July 12). Speech at the United Nations Youth Assembly. United Nations. https://www.un.org/en/events/malalayousafzaispeech
3.	A.P.J. Abdul Kalam.(2012). Ignited Minds - Unleashing the Power within India. Penguin Books.
4.	Mandela, N. (1994). Inaugural Address. In Long Walk to Freedom. Little, Brown and Company.

Reference Books	
5.	Raymond Murphy. (2016). English Grammar in Use : A Self-study Reference and Practice Book for Intermediate Learners of English. Cambridge University Press.
6.	Kumar, S., & Lata, P. (2018). Communication Skills: A Workbook. Oxford University Press India.
7.	Mitra, B. K. (2012). Personality Development and Soft Skills (3rd ed.). Oxford University Press India.
8.	Butterfield, J. (2023). Written Communication: Soft Skills for a Digital Workplace (3rd ed.). Cengage India.
Web Resources (Swayam / NPTEL)	
1.	https://onlinecourses.swayam2.ac.in/e-learning/preview/cec26_hs08
2.	https://onlinecourses.nptel.ac.in/noc26_hs111/preview

Course Code	Course Name	Category	Hours/ Week	Credits
25BBT33C	Bioinstrumentation	Core – V	6	4

Course Objectives

The course intends to cover

- To understand the analytical techniques in the field of Biotechnology
- To understand the basic principles of Bio analytical instruments.

Course Learning Outcomes

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

CLO	CLO Statements	Knowledge Level
CLO1	Know the basics of instrumentation by analysis	K1
CLO2	Know the structure of atoms and molecules by using the principles of spectroscopy	K1
CLO3	Understand the Separating and Purifying the components	K2
CLO4	Categorize the working principle and applications of fluorescence and radiation based techniques	K2
CLO5	Understand the need and applications of imaging techniques	K2 , K3
K1 - Remember; **K2** – Understand; **K3**-Apply		

CLO – PLO Mapping

CLOs/PLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	3	3	2	2	3
CLO2	2	2	1	2	3
CLO3	3	2	2	3	3
CLO4	2	2	3	3	2
CLO5	1	1	2	2	2
3 - Substantial (high)		**2** - Moderate (medium)		**1** - Slight (low)	

Core – V: Bioinstrumentation

Unit	Content	No. of Hours
I	**Basics Instruments:** pH meter, Buffer of biological importance, Centrifuge- Preparative, Analytical and Ultra. Types of microscopes- light, dark, phase contrast, fluorescent and electron microscope- (Transmission and Scanning electron).	18
II	**Spectroscopic Techniques:** Spectra – Absorption and Emission Spectra – Beer Lambert's law – Colorimeter, UV-Visible Spectrophotometer. Mass spectroscopy - Atomic absorption spectrometer (AAS) - Nuclear magnetic resonance spectrometer (NMR).	18
III	**Chromatographic and Electrophoresis Techniques:** Chromatographic Techniques: Paper, Thin Layer, Column, HPLC and GC. Electrophoresis Techniques: Starch Gel, AGE, PAGE.	18
IV	**Fluorescence and Radiation Based Techniques:** Spectrofluorimeter, Flame photometer, Scintillation counter, Geiger Muller counter, Autoradiography.	18
V	**Imaging Techniques:** Principle, Instrumentation and application of ECG, EEG, EMG, MRI, CT and PET scan radioisotopes.	18
	Total Hours	**90**
Text Books		
1.	Introductory Practical Biochemistry (2014), S. K. Sawhney and Randhir Singh. Narosa Publishing House	
2.	Principles of Applied Biomedical Instrumentation (2024), Gedder A and L. E. Balsar,John Wiley and Sons.	
Reference Books		
1.	Modern Experimental Biochemistry 2nd Edition (1993), Boyer, Rodney F.Benjamin and Cummins.	
2.	Biophysical Chemistry, Fourth Edition, (2020), Avinash Upadhyay, Himalaya publishing 'House.	
Web Resources (Swayam / NPTEL)		
1.	https://onlinecourses.nptel.ac.in/noc25_ph02/preview	

Course Code	Course Name	Category	Hours/Week	Credits
25BBT34C	Molecular Genetics	Core -VI	6	4

Course Objectives

The course intends to

- Focus on fundamental molecular genetics concepts.
- Understand the structure and processes involved in DNA and its conversion into proteins.

Course Learning Outcomes

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

CLO	CLO statements	Knowledge Level
CLO1	Remember the concept of DNA and know the overview and scope of molecular genetics.	K1
CLO2	Understand the expression of the gene.	K1
CLO3	Understand the mechanism of translation.	K2
CLO4	Understand the mechanism of DNA damage and repair	K2
CLO5	Understand the mechanisms of recombination and mapping.	K2
K1 - Remember; **K2** – Understand.		

CLO – PLO Mapping

CLOs/PLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	3	2	-	3	1
CLO2	3	2	-	2	2
CLO3	3	-	1	2	-
CLO4	3	3	-	3	1
CLO5	3	3	-	3	1
3 - Substantial (high)		**2** - Moderate (medium)		**1** - Slight (low)	

Core – VI: Molecular Genetics

Unit	Content	No. of Hours
I	**Introduction to Molecular Genetics:** Principles and applications of molecular genetics. Molecules of life. Structure, types and functions of DNA and RNA. DNA replication mechanisms steps and enzymes involved in replication.	18
II	**Gene Expression:** Transcription in Prokaryotes & Eukaryotes. Post transcriptional modification. Inhibitors of transcription. Regulation in Prokaryotes. Elucidation of genetic code.	18
III	**Translation:** Introduction to genetic code, Wobble hypothesis and its importance. Mechanism of translation in Prokaryotes & Eukaryotes. Inhibitors of protein synthesis. Post translational modifications and its importance.	18
IV	**DNA Damage and Repair:** DNA mutations and their mechanisms- Molecular basis of mutation. Spontaneous and induced mutations. Mutagens- Physical and chemical agents, Screening of chemicals for mutagenicity- Ames test. Types of repair mechanisms.	18
V	**Genetic Recombination:** Recombination- Homologous and non- homologous recombination, transposition, site specific recombination. Genetic exchange and their mapping.	18
	Total Hours	**90**
Text Books		
1.	Dubey, R.C. (2014). A Textbook of Biotechnology. S Chand and Company, Ram Nagar, New Delhi 110 055 (India)	
2.	Satyanarayana, U and Chakrapani,U. (2020). Biotechnology. Books and Allied (P) Ltd	
Reference Books		
1.	David Freifelder. (2006). Molecular Biology. 15th edition. Narosa Publishing house, NewDelhi	
2.	Lodish, H, Berk, A, Kaiser, C.A., Krieger, M., Bretscher, A., Ploegh, H., Amon, A. and Martin K. (2016). Molecular Cell Biology, 8th Edition, Freeman and Company, New York.	
Web Resource (Swayam/NPTEL)		
1.	https://onlinecourses.nptel.ac.in/noc25_bt35/	

Course Code	Course Name	Category	Hours/ Week	Credits
25BBT35P	Bioinstrumentation and Molecular Genetics Lab	Core Lab – III	4	2

S. No.	List of Practicals	
1.	Preparation of Buffer- Phosphate.	
2.	Preparation of Buffer Acetate.	
3.	Preparation of Buffer Tris.	
4.	Determination of OD using pH.	
5.	Determination of OD using Colorimeter.	
6.	Determination of OD using Spectrophotometer.	
7.	Paper Chromatography.	
8.	Thin Layer Chromatography.	
9.	Agarose Gel Electrophoresis.	
10.	Isolation of genomic DNA from Plant Tissue.	
11.	Isolation of genomic DNA from Animal Tissue.	
12.	Isolation of genomic DNA from Bacteria.	
13.	Quantification of Genomic DNA by Diphenylamine Reaction	
14.	Determination of absorption spectra of DNA using UV-Visible Spectrophotometer	
15.	Separation of DNA by Agarose Gel Electrophoresis.	
	Total Hours	**60**

Course Code	Course Name	Category	Hours/Week	Credits
25BBT36A	Basics of Biopython	Allied-II	4	3

Course Objectives

The course intends to

- Develop the skills necessary for industry-oriented applications.
- Develop the basic skills required to retrieve, process, and visualize biological data from sequence and structure databases.

Course Learning Outcomes

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

CLO	CLO Statements	Knowledge Level
CLO1	Basic architecture of digital computers and write simple Python programs using variables, data types, operators, and expressions.	K1
CLO2	Develop Python using conditional statements, loops, and user-defined functions for solving computational problems.	K1, K2
CLO3	Manipulate and analyze sequence data using Python string operations and list processing techniques.	K3
CLO4	Use tuples and dictionaries in Python to store, retrieve, and manage structured biological data efficiently.	K3
CLO5	Use Biopython tools to retrieve, process, and visualize biological data from sequence and structure databases.	K3
K1 - Remember; **K2** – Understand; **K3 –** Apply.		

CLO – PLO Mapping

CLOs/PLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	2	2	1	2	2
CLO2	2	-	1	1	3
CLO3	1	-	-	-	3
CLO4	3	2	3	2	2
CLO5	2	2	1	2	3
3 - Substantial (high)		**2** - Moderate (medium)		**1** - Slight (low)	

Allied – II: Basics of Biopython

Unit	Content	No. of Hours
I	**Introduction to digital Computer :** Von Neumann concept- storage- Programming Languages – Translators- problem solving Strategies: Problem Analysis – Algorithms – Flow Charts – Introduction to Python: Introduction – Python overview- Comments-Python identifiers – Reserved Keywords – Variables – Standard data types – Operators- Statements and Expressions – String Operations- Boolean Expressions.	12
II	**Control Statements:** Iteration- The for loop – While statement – if elif else statement – Input from keyboard functions: Introduction- Built- in functions – Composition of functions – Type conversion – Data and time- dir () function – help () function – User defined functions – Parameters & arguments – Function calls – The return statement – Python recursive function – writing python scripts.	12
III	**Strings:** Compound data type – len function – String slice – String traversal – Escape characters – String formatting operator – String formatting functions. Lists – Values and accessing elements – Travering a list – Deleting elements from list- Built – in list operators – Built – in list methods.	12
IV	**Tuples:** Creating tuples – Accessing values in tuples – Tuple assignment – Tuples as return values- Basic tuples operations – Built in tuple functions- Dictionaries: Creating a dictionary – Accessing values in a dictionary – Updating dictionary – Deleting elements from dictionary – operations in dictionary – Built – in – dictionary methods.	12
V	**Introduction to Biopython:** Biopython Installation- Components: Alphabet- Seq-MutableSeq- SeqRecord -Align- AlighIO- ClustalW – SeqIO – AlignIO - BLAST- Biological Related Data-Entrez- PDB-PROSITE -SeqUtils- Sequencing. Visualisation: Visualizing DNA/protein sequences, alignments, or phylogenetic trees using matplotlib, seaborn etc.	12
	Total Hours	**60**

Text Books	
1.	E. Balagurusamy, (2016), Introduction to computing and Problem-Solving Using Python, McGraw Hill publication, New Delhi.
2.	Sebastian Bassi, 2(2017), Python for Bioinformatics, CRC Press.
Reference Books	
1.	Srinivasa K.G., Siddesh G.M.,Hanumantha Raju R., (2018). “Internet of Things” Cengage earning India pvt. Ltd
2.	R.K. Taxali, PC Software for Windows Made Simple,Tata McGrawHill Publishing Company.
Web Resources (Swayam / NPTEL)	
1.	https://onlinecourses.nptel.ac.in/noc25_bt21/
2.	https://onlinecourses.nptel.ac.in/noc24_bt63/announcements?force=true

Course Code	Course Name	Category	Hours / Week	Credits
25BBT37P	Cheminformatics Lab	SEC Lab -I	2	2

S. No.	List of Practical	
1.	Basics of Bioinformatics and its relation with molecular biology.	
2.	Introduction to Databases.	
3.	Examples of related tools (FASTA, BLAST)	
4.	Databases (GEO, BRENDA KEGG).	
5.	Databases (GENBANK, Pubmed, PDB)	
6.	Databases (UniProt), Gene structure Prediction.	
7.	Nucleic acid databases (NCBI, DDBJ, and EMBL), Primer tool.	
8.	Multiple sequence alignment and Patchdock.	
9.	Softwares used in molecular docking.	
10.	BIOLOGICS - drug discovery.	
11.	Preclinical Pharmacology & Taxology.	
12.	Cheminformatics tools for drug discovery.	
13.	Structural and Functional Genomics. Comparative Genomics.	
14.	Chemical databases: CSD, ACD, WDI, ChemBank, hazardous chemical database, PUBCHEM.	
15.	Drug likeness screening, Concept of pharmacophore mapping and pharmacophore based Screening.	
	Total Hours	**30**

Part – IV – Foundation Course

(All the Undergraduate Programmes)

Course Code	Course Name	Course Category	Hours/Week	Credits
25IKS3FC	Indian Knowledge Systems (IKS)	FC-III	-	2

Unit	Content
1	**Indian Knowledge Systems (IKS) Basic Concepts** - Introduction - Journey of Indian Culture and Civilization - Hindu Philosophical System - Contribution of Indian Knowledge System in Science and Arts - Indian Knowledge System and Way of Life - The Implicit Concepts in Indian Knowledge System - Social Viewpoint in Indian Knowledge system - Idea of Vasudhaiva Kutumbakam.
2	**Indian Culture, Art & Architecture** - Introduction - Concept of Culture - Culture and Heritage - General Characteristics of Culture - Indian Culture - Indian Culture during the Modern and Contemporary Period -The Factors of Unity in Diversity - Aspects of Indian culture - Indian Architecture - Architecture of Tamil Nadu.
3	**Vedic Mathematics** - Introduction - History of Vedic Mathematics - Addition - Subtraction - Base Method - Sub Base Method - Multiplication by numbers consisting of all 9s - Division - Special Methods of Division - Straight Division.
4	**Science and Technology in Indian Knowledge System** - Introduction - The Indian S & T Heritage - Metals and Metalworking Technology - Lost wax casting of Idols and Artefacts - Literary sources for Science and Technology - Technology in Ancient India - Significant Science and Technology Discovery in Ancient India - Council of Scientific and Industrial Research - Animal Science in Ancient India - Biodiversity and folk traditions.
5	**History of Trade and Commerce in Ancient India** - Introduction - Indigenous Banking System - Rise of Intermediaries - Transport - Major Trade Centres - Major Exports and Imports - Position of Indian Subcontinent in World Economy.
6	**Indigenous Agriculture in IKS** - Introduction - History of Indian Agriculture - Indigenous Knowledge - Organic Farming and Natural Fertilization - Mixed Cropping and Crop Rotation - Ecological and Socioeconomic Impacts of Indigenous Farming - Challenges and Future Directions.
7	**Traditional Water Management Systems of India** - Introduction - Traditional Water Management Systems - Northern Region - North Western Region - North Eastern Region - Central Indian Region - Southern Indian Region.

Unit	Content
8	**Traditional Foods and Festival of India** - History - Introduction - Foods Consumed in Different Regions of India - Eating Styles of India - Traditional Equipment's used for Cooking - Changes in Consumption of Traditional Foods - Traditional Foods/Modern Functions - The Future of Traditional Foods - Traditional Festivals of India.
9	**Sports in India-From Ancient Period to Modern Period** - Introduction - Indus Valley Civilization - Early Hindu Period/ Epic Period - Traditional Indoor and Outdoor Games - British Period - Post Independence - Modern Period.
10	**Nobel Laureates of Indian Origin & Inspiring Scientists of India and their Contributions** - History of the Nobel Prize - Nobel Prize Insignia - Indian Nobel Prize winners and their Biography - Inspiring Scientists and their Contributions.
Reference Resources	
1.	https://www.education.gov.in/shikshakparv/docs/background_note_Stimulating_Indian_Knowledge_Systems_Arts_Culture.pdf
2.	Singh, R. K., King, C. A., & Barrett, D. A. (2010). Traditional ecological knowledge and agricultural sustainability in India. Indian Journal of Traditional Knowledge, 9(2), 231- 243

Components for Internal Assessment and Distribution of Marks for CIA and ESE (Theory)

Max Marks	Marks for		Components for CIA						
100	CIA	ESE	CIA		Model		Attendance	Active Engagement	Total
	25	75	Actual	Weightage	Actual	Weightage	5	5	25
			50	**5**	75	**10**			

Question Paper Pattern

Component	Duration in Hours	Section A			Section B			Section C			Total
		Type of Question	No. of Questions	Marks	Type of Question	No. of Questions	Marks	Type of Question	No. of Questions	Marks	
CIA	2	MCQ	8	8x1=8	Either or	3	3x6=18	Either or	3	3x8=24	50
Model Exam / **ESE**	3	MCQ	10	10x1=10	Either or	5	5x5=25	Either or	5	5x8=40	75

Components for Internal Assessment and Distribution of Marks for CIA (Lab)

Max Marks	Marks for		Components for CIA						
	CIA	ESE	Test		Model		Experiments / Programs	Observation	Total
100	40	60	Actual	Weightage	Actual	Weightage	Marks	5	40
			50	**10**	60	**15**	**10**		

Examination Pattern

Component	Duration in Hours	Marks			Weightage
		Practical Exam	Record	Total Marks	
Test	2	50	-	**50**	10
Model	3	60	-	**60**	15
Experiments Completed	-	-	-	**10**	10
Observation Note	-	-	-	**05**	05
				Total Marks - CIA	**40**
ESE	3	50	10	-	**60**

Components for Internal Assessment and Distribution of Marks for CIA (Foundation Course -Theory)*

Max Marks	Marks for		Components for CIA				
50	CIA	ESE	CIA		Model		Total
			Actual	Weightage	Actual	Weightage	
	50	-	50	25	50	25	50

*FC-III: Indian Knowledge Systems (IKS) – A self-study course with open book assessment.

Question Paper Pattern

Duration in Hours	Mode of Exam	Type of Questions	No. of Questions	Marks
2	Offline	Open Choice	5 (Out of 8)	5 x 10=50

Components for and Distribution of Marks for ESE (Theory) Ability Enhancement Compulsory Courses (AECC) & Question Paper Pattern

Duration in Hours	Mode of Exam	Type of Questions	No. of Questions	Marks
2	Online	MCQ	50	50x1=50

Components of Internship (Internal Assessment Only)

Components	Marks
Submission of Internship Report	20
Performance in viva-voce	30
Total Marks	**50**

***Certification of Completion is Mandatory for the award of Internal Marks and to avail the credits**