SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE
(An Autonomous Institution)
(Approved by AICTE, New Delhi & Affiliated to Pondicherry University)
(Accredited by NBA-AICTE, New Delhi, ISO 9001:2000 Certified Institution &
Accredited by NAAC with "A" Grade)
Madagadipet, Puducherry - 605 107

SCHOOL OF ARTS AND SCIENCE

BACHELOR OF SCIENCE

IN

BIOTECHNOLOGY

ACADEMIC REGULATIONS

2020(R-2020)

CURRICULUM AND SYLLABI

COLLEGE VISION AND MISSION

Vision

To be globally recognized for excellence in quality education, innovation and research for the transformation of lives to serve the society.

Mission

M1: Quality Education:

To provide comprehensive academic system that amalgamates the cutting-edge technologies with best practices.

M2: **Research and Innovation:**

To foster value-based research and innovation in collaboration with industries and institutions globally for creating intellectuals with new avenues.

M3: Employability and Entrepreneurship:

To inculcate the employability and entrepreneurial skills through value and skill-based training.

M4: Ethical Values:

To instill deep sense of human values by blending societal righteousness with academic professionalism for the growth of society.

DEPARTMENT OF BIOSCIENCE

BIOTECHNOLOGY - VISION AND MISSION

Vision

- To give Knowledge of both fundamental and applied aspects of Biotechnology
- To develop hardcore specialization in various diversified areas of biotechnology and its application to Medicine, Agriculture, Environment, Neutraceuticals and functional food etc.
- To encourage students to follow emerging scientific interests and talents.
- To provide students with transferable skills and critical thinking and analytical methods, laboratory techniques, team work and scientific communication, information technology and bioinformatics.
- To provide students with high quality research experience

Mission

M1: Quality Education:

- Updating the course curriculum to cater the needs of Academia and Industry
- To impart quality education for life-long professional growth and opportunity in a wide range of Careers.

M2: **Research and Innovation:**

- To create awareness towards socio-ethical implications of potentials of Biotechnology
- Emphasis on recent trends in Biotechnology through organization of conferences, symposia, workshops.

M3: Employability and Entrepreneurship:

- To inculcate the employability and entrepreneurial skills through value and skill based training.
- To foster value based research and innovation in collaboration with industries and institutions globally for creating intellectuals with new avenues.

STRUCTURE FOR UNDERGRADUATE PROGRAMME

S. No	Course Category	Break down of Credits
1	Language Modern Indian Language (MIL)	6
2	English (ENG)	6
3	Discipline Specific Core Courses(DSC)	74
4	Discipline Specific Elective Courses (DSE)	12
5	Inter-Disciplinary Courses(IDC)	24
6	Skill Enhancement Courses(SEC)	12
7	Employability Enhancement Courses(EEC*)	-
8	Ability Enhancement Compulsory Courses(AECC)	4
9	Open Elective(OE)	4
10	Extension Activity(EA)	1
	Total	**143**

SCHEME OF CREDIT DISTRIBUTION –SUMMARY

S. No	Course Category	Credits per Semester						Total Credits
		I	II	III	IV	V	VI	
1	Language Modern Indian Language (MIL)	3	3	-	-	-	-	6
2	English (ENG)	3	3	-	-	-	-	6
3	Discipline Specific Core Courses(DSC)	10	10	10	10	16	18	74
4	Discipline Specific Elective Courses (DSE)	-	-	3	3	3	3	12
5	Inter-Disciplinary Courses(IDC)	6	6	6	6	-	-	24
6	Skill Enhancement Courses(SEC)	2	2	2	2	2	2	12
7	Employability Enhancement Courses(EEC*)	-	-	-	-	-	-	-
8	Ability Enhancement Compulsory Courses(AECC)	2	2	-	-	-	-	4
9	Open Elective(OE)	-	-	2	2	-	-	4
10	Extension Activity(EA)	-	1	-	-	-	-	1
	Total	26	27	23	23	21	23	**143**

**** EEC will not be included for the computation of "Total of Credits " as well as "CGPA"***

SEMESTER–I										
S.No	Course Code	Course Title	Category	Periods L	T	P	Credits	Max.Marks CAM	ESM	Total
Theory										
1	A20TAT101 A20FRT101	Tamil-I/French-I	MIL	3	0	0	3	25	75	100
2	A20GET101	General English -I	ENG	3	0	0	3	25	75	100
3	A20BTT101	Cell biology	DSC	4	0	0	4	25	75	100
4	A20BTT102	Biochemistry - I - Biomolecules	DSC	4	0	0	4	25	75	100
5	A20BTD101	Chemistry – I	IDC	3	1	0	4	25	75	100
Ability Enhancement Compulsory Course										
6	A20AET101	Environmental Studies	AECC	2	0	0	2	100	0	100
Practical										
7	A20BTL103	Cell biology and Biomolecules Practical	DSC	0	0	4	2	50	50	100
8	A20BTD102	Chemistry – I Practical	IDC	0	0	4	2	50	50	100
Skill Enhancement Course										
9	A20BTS101	Communication Skills Lab	SEC	0	0	4	2	100	0	100
Employment Enhancement Course										
10	A20BTC101	Certification course -I	EEC	2	0	2	0	100	0	100
							26	**525**	**475**	**1000**

SEMESTER– II										
S. No.	Course Code	Course Title	Category	Periods L	T	P	Credits	Max.Marks CAM	ESM	Total
Theory										
1	A20TAT202 A20FRT202	Tamil-II/French-II	MIL	3	0	0	3	25	75	100
2	A20GET202	General English-II	ENG	3	0	0	3	25	75	100
3	A20BTT204	Fundamentals of Microbiology	DSC	4	0	0	4	25	75	100
4	A20BTT205	Biochemistry-II-Intermediary Metabolism	DSC	4	0	0	4	25	75	100
5	A20BTD203	Chemistry –II	IDC	3	1	0	4	25	75	100
Ability Enhancement Compulsory Course										
6	A20AET202	Public Administration	AECC	2	0	0	2	100	0	100
Practical										
7	A20BTL206	Fundamentals of Microbiology and Intermediary Metabolism Practical	DSC	0	0	4	2	50	50	100
8	A20BTD204	Chemistry-II Practical	IDC	0	0	4	2	50	50	100
Skill Enhancement Course										
9	A20BTS202	Medical Laboratory Technology	SEC	0	0	4	2	100	0	100
Extension Activities										
10	A20EAL201	National Service Scheme	EA	0	0	2	1	100	0	100
Employment Enhancement Course										
11	A20BTC202	Certification course- II	EEC	2	0	2	0	100	0	100
							27	**625**	**475**	**1100**

SEMESTER – III										
S. No	Course Code	Course Title	category	Periods			Credits	Max.Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20BTT307	Molecular Biology	DSC	4	0	0	4	25	75	100
2	A20BTT308	Analytical Techniques in Biotechnology	DSC	4	0	0	4	25	75	100
3	A20BTD305	Biostatistics	IDC	3	1	0	4	25	75	100
4	A20BTE3XX	DSE-I	DSE	3	0	0	3	25	75	100
5	A20XXO3XX	Open Elective–I	OE	2	0	0	2	25	75	100
Practical										
6	A20BTL309	Molecular Biology and Analytical Techniques in Biotechnology Practical	DSC	0	0	4	2	50	50	100
7	A20BTD306	Biostatistics Practical	IDC	0	0	4	2	50	50	100
Skill Enhancement Course										
8	A20BTS303	Soft Skills	SEC	0	0	4	2	100	0	100
Employment Enhancement Course										
9	A20BTC303	Certification course- III	EEC	2	0	2	0	100	0	100
							23	**425**	**475**	**900**

SEMESTER– IV										
S. No	Course Code	Course Title	Category	Periods			Credits	Max.Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20BTT410	Genetic Engineering	DSC	4	0	0	4	25	75	100
2	A20BTT411	Immunology	DSC	4	0	0	4	25	75	100
3	A20BTD407	Biophysics	IDC	3	1	0	4	25	75	100
4	A20BTE4XX	DSE-II	DSE	3	0	0	3	25	75	100
5	A20XXO4XX	Open Elective– II	OE	2	0	0	2	25	75	100
Practical										
6	A20BTL412	Genetic Engineering and Immunology Practical	DSC	0	0	4	2	50	50	100
7	A20BTD408	Biophysics Practical	IDC	0	0	4	2	50	50	100
Skill Enhancement Course										
8	A20BTS404	Research and Development	SEC	0	0	4	2	100	0	100
Employment Enhancement Course										
9	A20BTC404	Certification course- IV	EEC	2	0	2	0	100	0	100
							23	**425**	**475**	**900**

SEMESTER–V										
S. No	Course Code	Course Title	Category	Periods			Credits	Max.Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20BTT513	Animal Biotechnology	DSC	3	1	0	4	25	75	100
2	A20BTT514	Bioinformatics	DSC	3	1	0	4	25	75	100
3	A20BTT515	Medical Biotechnology	DSC	3	1	0	4	25	75	100
4	A20BTE5XX	DSE-III	DSE	3	0	0	3	25	75	100
Practical										
5	A20BTL516	Animal Biotechnology and Bioinformatics Practical	DSC	0	0	4	2	50	50	100
6	A20BTL517	Medical Biotechnology and DSE- III Practical	DSC	0	0	4	2	50	50	100
Skill Enhancement Course										
7	A20BTS505	In-Plant training/Internship	SEC	0	0	4	2	100	0	100
Employment Enhancement Course										
8	A20BTC505	Certification course- V	EEC	2	0	2	0	100	0	100
							21	**400**	**400**	**800**

SEMESTER–VI										
S. No	Course Code	Course Title	Category	Periods			Credits	Max.Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20BTT618	Plant Biotechnology	DSC	3	1	0	4	25	75	100
2	A20BTT619	Microbial Biotechnology	DSC	3	1	0	4	25	75	100
3	A20BTT620	Biosafety, Bio-ethics and IPRs	DSC	3	1	0	4	25	75	100
4	A20BTT621	Research methodology	DSC	3	1	0	4	25	75	100
5	A20BTE6XX	DSE- IV	DSE	3	0	0	3	25	75	100
Practical										
5	A20BTL622	Plant Biotechnology and Microbial Biotechnology practical	DSC	0	0	4	2	50	50	100
Skill Enhancement Course										
6	A20BTS606	Bio entrepreneurship	SEC	4	0	0	2	100	0	100
Employment Enhancement Course										
7	A20BTC606	Certification course-VI	EEC	2	0	2	0	100	0	100
							23	**375**	**425**	**800**

Discipline Specific Electives are to be selected from the list given in Annexure I

****Open electives are to be selected from the list given in Annexure II***

Annexure- I

DISCIPLINE SPECIFIC ELECTIVE COURSES

DISCIPLINESPECIFICELECTIVES										
S. No.	Course Code	Course Title	Category	Periods			Credits	Max.Marks		
				L	T	P		CAM	ESM	Total
Discipline Specific Electives (DSE - I) - offered in Third Semester										
1	A20BTE301	Genetics	DSE	3	0	0	3	25	75	100
2	A20BTE302	General Biology	DSE	3	0	0	3	25	75	100
3	A20BTE303	Parasitology and Entomology	DSE	3	0	0	3	25	75	100
Discipline Specific Electives (DSE - II) - offered in Fourth Semester										
1	A20BTE404	Developmental Biology	DSE	3	0	0	3	25	75	100
2	A20BTE405	Genomics and Proteomics	DSE	3	0	0	3	25	75	100
3	A20BTE406	Molecular Diagnosis	DSE	3	0	0	3	25	75	100
Discipline Specific Electives (DSE - III) - offered in Fifth Semester										
1	A20BTE507	r-DNA Technology	DSE	3	0	0	3	25	75	100
2	A20BTE508	Environmental Biotechnology	DSE	3	0	0	3	25	75	100
3	A20BTE509	Bioprocess Technology	DSE	3	0	0	3	25	75	100
Discipline Specific Electives (DSE - IV) - offered in Sixth Semester										
1	A20BTE610	Enzyme Technology	DSE	3	0	0	3	25	75	100
2	A20BTE611	Marine Biotechnology	DSE	3	0	0	3	25	75	100
3	A20BTE612	Pharmaceutical Biotechnology	DSE	3	0	0	3	25	75	100

Annexure –II
OPEN ELECTIVE COURSES

Open Elective – I (Offered in Semester III)				
Sl. No	**Course Code**	**Course Title**	**Offering Department**	**Permitted Departments**
1	**A20BTO301**	Boon and Bane of Microbes	Bioscience	Chemistry, Food Science, Physics
2	**A20BTO302**	Microbial Technology for Entrepreneurship	Bioscience	Chemistry, Food Science, Physics
3	**A20BTO303**	Origin of Life	Bioscience	Chemistry, Food Science, Physics
4	**A20CHO304**	Food Analysis (Practical)	Chemistry	Bioscience, Computational Studies, Food Science, Mathematics, Physics
5	**A20CHO305**	Molecules of Life (Practical)	Chemistry	Bioscience, Computational Studies, Food Science, Mathematics, Physics
6	**A20CHO306**	Water Analysis (Practical)	Chemistry	Bioscience, Computational Studies, Food Science, Mathematics, Physics
7	**A20CMO307**	Fundamentals of Accounting and Finance	Commerce and Management	Bioscience, Chemistry, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
8	**A20CMO308**	Fundamentals of Management	Commerce and Management	Bioscience, Chemistry, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
9	**A20CMO309**	Fundamentals of Marketing	Commerce and Management	Bioscience, Chemistry, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
10	**A20CPO310**	Data Structures	Computational Studies	Mathematics
11	**A20CPO311**	Programming in C	Computational Studies	Commerce and Management, Mathematics, Media Studies
12	**A20CPO312**	Programming in Python	Computational Studies	Commerce and Management, Mathematics, Media Studies
13	**A20ENO313**	Conversational Skills	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics
14	**A20ENO314**	Fine-tune your English	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics
15	**A20ENO315**	Interpersonal Skills	English	Chemistry, Commerce and Management, Computational Studies, Media Studies,

				Mathematics, Physics
16	**A20MAO316**	Mathematical Modelling	Mathematics	Chemistry, Commerce and Management, Computational Studies, Physics, Biotechnology, Nutrition and Dietetics
17	**A20MAO317**	Quantitative Aptitude - I	Mathematics	Chemistry, Commerce and Management, Computational Studies, Physics, Biotechnology, Nutrition and Dietetics
18	**A20MAO318**	Statistical Methods	Mathematics	Chemistry, Commerce and Management, Computational Studies, Physics, Biotechnology, Nutrition and Dietetics
19	**A20VCO319**	Event Management	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
20	**A20VCO320**	Graphic Design	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
21	**A20VCO321**	Role of social media	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
22	**A20NDO322**	Basic Food Groups	Food Science	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Media Studies, Physics, Tamil
23	**A20NDO323**	Life Style Management	Food Science	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Media Studies, Physics, Tamil
24	**A20NDO324**	Nutritive Value of Foods	Food Science	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Media Studies, Physics, Tamil
25	**A20PHO325**	Astrophysics	Physics	Bioscience, Chemistry, Computational Studies, Mathematics, Media Studies
26	**A20PHO326**	Basic of Modern Communication System	Physics	Bioscience, Chemistry, Computational Studies, Mathematics, Media Studies
27	**A20PHO327**	Bio-Physics	Physics	Bioscience, Chemistry, Computational Studies, Mathematics, Media Studies
28	**A20TMO328**	அடிப்படைத்தமிழ்	Tamil	Bioscience, Chemistry, Commerce and Management, Computational Studies, English,

				Food Science, Mathematics, Media Studies, Physics
29	**A20TMO329**	வாழ்வியல் இலக்கணம்	Tamil	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
30	**A20TMO330**	புதுக்கவிதைப் பட்டறை	Tamil	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics

Open Elective – II (Offered in Semester IV)

Sl. No.	Course Code	Course Title	Offering Department	Permitted Departments
1	**A20BTO401**	Fermented Food	Bioscience	Chemistry, Food Science, Physics
2	**A20BTO402**	Herbal Technology	Bioscience	Chemistry, Food Science, Physics
3	**A20BTO403**	Self-Hygiene	Bioscience	Chemistry, Food Science, Physics
4	**A20CHO404**	C++ Programming and its Application to Chemistry	Chemistry	Computational Studies, Mathematics, Physics
5	**A20CHO405**	Computational Chemistry Practical	Chemistry	Computational Studies, Mathematics, Physics
6	**A20CHO406**	Instrumental Methods of Analysis	Chemistry	Computational Studies, Mathematics, Physics
7	**A20CMO407**	Essential Legal Awareness	Commerce and Management	Bioscience, Chemistry, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
8	**A20CMO408**	Essentials of Insurance	Commerce and Management	Bioscience, Chemistry, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
9	**A20CMO409**	Practical Banking	Commerce and Management	Bioscience, Chemistry, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
10	**A20CPO410**	Database Management Systems	Computational Studies	Commerce and Management, Media Studies, Mathematics
11	**A20CPO411**	Introduction to Data Science using Python	Computational Studies	Chemistry, Commerce and Management, English, Media Studies, Mathematics, Physics
12	**A20CPO412**	Web Development	Computational Studies	Commerce and Management, Media Studies, Mathematics

13	**A20ENO413**	English for Competitive Exam	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics
14	**A20ENO414**	English Next-India	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics
15	**A20ENO415**	Functional English	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics
16	**A20MAO416**	Discrete mathematics	Mathematics	Chemistry, Computational Studies, Physics
17	**A20MAO417**	Operations Research	Mathematics	Chemistry, Commerce and Management, Computational Studies, Physics, Biotechnology, Nutrition and Dietetics
18	**A20MAO418**	Quantitative Aptitude - II	Mathematics	Chemistry, Commerce and Management, Computational Studies, Physics, Biotechnology, Nutrition and Dietetics
19	**A20VCO419**	Basics of News Reporting	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
20	**A20VCO420**	Scripting for media	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
21	**A20VCO421**	Video Editing	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
22	**A20NDO422**	Food Labelling	Food Science	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Media Studies, Physics, Tamil
23	**A20NDO423**	Hygiene and Sanitation	Food Science	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Media Studies, Physics, Tamil
24	**A20NDO424**	Nutrition for Adolescent	Food Science	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Media Studies, Physics, Tamil
25	**A20PHO425**	Digital Electronics	Physics	Bioscience, Chemistry, Computational Studies, Mathematics, Media Studies

26	**A20PHO426**	Geo-Physics	Physics	Bioscience, Chemistry, Computational Studies, Mathematics, Media Studies
27	**A20PHO427**	Space Science	Physics	Bioscience, Chemistry, Computational Studies, Mathematics, Media Studies
28	**A20TMO428**	சிறுகதைப் பயிற்சி	Tamil	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
29	**A20TMO429**	செய்தி வாசிப்பு பயிற்சி	Tamil	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
30	**A20TMO430**	நிகழ்த்துக்கலை	Tamil	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics

மொழித்தாள்

தமிழ்-I

(B.A., B.Sc., B.Com., B.B.A., & B.C.A., பாடப்பிரிவுகளுக்குமான பொதுத்தாள்)

	L	T	P	C	Hrs
A20TAT101	3	0	0	3	45

பாடத்திட்டத்தின் நோக்கம்

இரண்டாயிரம் ஆண்டுகால தமிழின் தொன்மையையும் வரலாற்றையும் அதன் விழுமியங்களையும் பண்பாட்டையும் எடுத்துரைப்பதாக இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.

தமிழ் இலக்கியம் உள்ளடக்கத்திலும், வடிவத்திலும் பெற்ற மாற்றங்கள், அதன் சிந்தனைகள்,அடையாளங்கள் ஆகியவற்றைக் காலந்தோறும் எழுதப்பட்ட இலக்கியங்களின் வழியாகக் கூறுவதற்கு இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.

மொழியின் கட்டமைப்பைப் புரிந்து கொள்வதாக இப்பாடத்திட்டம் வடிவமைக்கப்பட்டுள்ளது.

வாழ்வியல் சிந்தனைகள், ஒழுக்கவியல் கோட்பாடுகள், சமத்துவம், சூழலியல் எனப் பல கூறுகளை மாணவர்களுக்கு எடுத்துரைக்கும் விதத்தில் இப்பாடத்திட்டம் உருவாக்கப்பட்டுள்ளது.

சிந்தனை ஆற்றலைப் பெருக்குவதற்குத் தாய்மொழியின் பங்களிப்பினை உணர்த்த இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.

பாடத்திட்டத்தின் வெளிப்பாடுகள்

CO1-இலக்கியங்கள் காட்டும் வாழ்வியல் நெறிமுறைகளைப் பேணிநடத்தல்.

CO2 -நமது எண்ணத்தை வெளிப்படுத்தும் கருவியாகத் தாய்மொழியைப் பயன்படுத்துதல்.

CO3 -தகவல் தொடர்புக்குத் தாய்மொழியின் முக்கியத்துவத்தை உணர்த்தல்.

CO4 -தாய்மொழியின் சிறப்பை அறிதல்.

CO5 -இலக்கிய இன்பங்களை நுகரும் திறன்களை வளர்த்தல்.

அலகு-1 **(9 Hrs)**

இக்காலக் கவிதைகள்-1

1. பாரதியார்	–	கண்ணன் என் சேவகன்
2. பாரதிதாசன்	–	தமிழ்ப்பேறு
3. அப்துல் ரகுமான்	–	அவதாரம்
4. மீரா	–	கனவுகள் + கற்பனைகள் = காகிதங்கள்
5. து.நரசிம்மன்	–	மன்னித்துவிடு மகனே

அலகு-2 **(9 Hrs)**

இக்காலக் கவிதைகள்-2

1.ராஜா சந்திரசேகர்	–	கைவிடப்பட்ட குழந்தை
2. அனார்	–	மேலும் சில இரத்தக் குறிப்புகள்
3. சுகிர்தராணி	–	அம்மா
4. நா.முத்துக்குமார்	–	தூர்

அலகு-3 **(9 Hrs)**

சிற்றிலக்கியங்கள்

1. கலிங்கத்துப் பரணி	–	பொருதடக்கை வாள் எங்கே... (பாடல்-485)
2. அழகர்கிள்ளைவிடு தூது	–	இதமாய் மனிதருடனே...(பாடல்-45)
3. நந்திக் கலம்பகம்	–	அம்பொன்று வில்லொடிதல்...(பாடல்-77)
4. முக்கூடற் பள்ளு	–	பாயும் மருதஞ் செழிக்கவே...(பாடல்-47)
5. குற்றாலக் குறவஞ்சி	–	ஓடக் காண்பதுமே...(பாடல்-9)

காப்பியங்கள் **13**

2. மணிமேகலை–உலகறவி புக்க காதை– 'மாசுஇல் வால்ஒளி! – இந்நாள் போலும் இளங்கொடி கெடுத்தனை'. (28–அடிகள்)

அலகு–4 **(9 Hrs)**

தமிழ் இலக்கிய வரலாறு

1. சிற்றிலக்கியம்– தோற்றமும் வளர்ச்சியும்
2. புதுக்கவிதை– தோற்றமும் வளர்ச்சியும்
3. சிறுகதை –தோற்றமும் வளர்ச்சியும்
4. புதினம் –தோற்றமும் வளர்ச்சியும்
5. உரைநடை – தோற்றமும் வளர்ச்சியும்

உரைநடைப் பகுதி

1. உ.வே.சாமிநாதையர் – சிவதருமோத்திரச் சுவடி பெற்ற வரலாறு.
2. தஞ்சாவூர்க் கவிராயர் – கூஜாவின் கோபம்.
3. இரா. பச்சியப்பன் – மாடல்ல மற்றையவை.

அலகு 5 **(9 Hrs)**

மொழிப்பயிற்சி

1. கலைச்சொல்லாக்கம்
2. அகரவரிசைப்படுத்துதல்
3. மரபுத்தொடர்/பழமொழி
4. கலை விமர்சனம்
5. நேர்காணல்

உரைநடை நூல்கள்

1. சக்திவேல், சு., தமிழ் மொழி வரலாறு, மாணிக்கவாசகர் பதிப்பகம், சிதம்பரம், 1988.
2. சிற்பி பாலசுப்ரமணியம் மற்றும் நீலபத்மநாபன், புதிய தமிழ் இலக்கிய வரலாறு, தொகுதி–1, 2, 3, சாகித்திய அகாமி, புதுடெல்லி,2013.
3. பாரதியார், பாரதியார் கவிதைகள், குமரன் பதிப்பகம், சென்னை, 2011.

பார்வை நூல்கள்

1. கைலாசபதி, க., தமிழ் நாவல் இலக்கியம், குமரன் பதிப்பகம், வடபழனி, 1968.
2. சுந்தரராஜன், பே.கோ. சிவபாதசுந்தரம். சோ., தமிழில் சிறுகதை வரலாறும் வளர்ச்சியும், க்ரியா, சென்னை, 1989.
3. பரந்தாமனார், அ.கி., நல்ல தமிழ் எழுத வேண்டுமா, பாரி நிலையம், சென்னை, 1998.
4. பாக்கியமேரி, வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு, என்.சி.எச். பதிப்பகம், சென்னை, 2011.
5. வல்லிக்கண்ணன், புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும், அன்னம், சிவகங்கை, 1992.

இணையத்தளங்கள்

1. http://www.tamilkodal.com
2. http://www.languagelab.com
3. http://www.tamilweb.com

	FRENCH - I	L	T	P	C	Hrs
A20FRT101	(Common to B.A., B.Sc., B.Com., B.B.A. & B.C.A)	**3**	**0**	**0**	**3**	**45**

OBJECTIVES

- To enable the students read, understand, and write simplesentences.
- To grasp relevant grammar forcommunication
- To learn about the land, people and culture ofFrance.

UNITÉ - 1

Je m'appelle Elise. Et Vous ?

Vous Dansez ? D'accord

Monica, Yukiko et compagnie

UNITÉ - 2

Les Voisins de Sophie

Tu vas au Luxembourg ?

UNITÉ – 3

Nous Venons pour l'inscription

A Vélo, en tain, en avoin

Pardon, monsieru,le BHV s'il vous plait ?

UNITÉ - 4

Au marche

On déjeune ici ?

UNITÉ - 5

On va chez ma copine ?

Chez Susana

TextBook
PrescribedTextbook : *FESTIVAL 1* - Méthode de Français
Authors : Sylvie POISSON-QUINTON
Michèle MAHEO-LE COADIC
Anne VERGNE-SIRIEYS
Edition : CLE International, Nouvelle Édition révisée : 2009.

Reference Book : Festival 1

		L	T	P	C	Hrs
A20GET101	**GENERAL ENGLISH I** **(Common to B.A., B.Sc. and B.C.A.)**	**3**	**0**	**0**	**3**	**45**

Course Objectives

- To recognize the rhythms, metrics and other musical aspects of poetry.
- To read a variety of texts critically and proficiently.
- To enable the students to enjoy the flair of literature through the work of great writer.
- To make the students to know the functions of basic grammar and frame sentences without grammatical error.
- To enable them understanding the intrinsic nuances of writing in English language.

Course Outcomes

After the completion of this course, the students will be able to

CO1 – Comprehend and discuss the various facets of selected poems.
CO2 – Analyze and interpret texts written in English.
CO3 – Read drama with graduate-level interpretive and analytical proficiency.
CO4 – Improve the fluency and formation of grammatically correct sentence.
CO5 – Enhance the writing skills for specific purposes.

UNIT I POETRY **(9Hrs)**

1. John Milton: On His Blindness
2. William Wordsworth: Daffodils
3. Percy Bysshe Shelly: Ozymandias
4. Emily Dickinson: Because I could not stop for Death
5. Sarojini Naidu: The Queen's Rival

UNIT II PROSE **(9Hrs)**

1. Francis Bacon: Of Love
2. Charles Lamb: A Dissertation upon Roast Pig

UNIT III DRAMA **(9Hrs)**

1. Oscar Wilde: Lady Windermere's Fan

UNIT IV GRAMMAR **(9Hrs)**

1. Parts of Speech
2. Tenses
3. Subject-Verb Agreement

UNIT V COMPOSITION **(9Hrs)**

1. Essay Writing
2. Email

Text Books:

1. James Barrett, “Brookside Musings: A Selection of Poems and Short Stories: Board of Editors”, Orient LongmanLimited, 2009.
2. Wilde Oscar, “Lady Windermere's Fan. Published in The Importance of Being Earnest and Other Plays” , London: Penguin, 1940.
3. Wren & Martin, “High School English Grammar & Composition”. Blackie ELT Books, 2017.

Reference Books:

1. Lalitha Natarajan and Sasikala Natesan, "English for Excellence: Poetry”, Anuradha Publications, 2015.
2. Charles Lamb, “Selected Prose”, Penguin Classics. United Kingdom, 2013.
3. Usha Mahadevan, “Sunbeams: Empower with English”, Emerald Publishers, Chennai. 2016.

Web References:

1. https://www.englishcharity.com/of-love-by-francis-bacon-explanation/
2. https://www.poetry-archive.com/n/the_queens_rival.html
3. https://www.gradesaver.com/lady-windermeres-fan/study-guide/summary-act-i

A20BTT101

CELL BIOLOGY

L	T	P	C	Hrs
4	0	0	4	60

Course Objectives

- To understand the Fundamentals of Cells and its types.
- To study the cell structure and cellular organization.
- To understand the structure and Functions of cell organelles.
- To understand the Structure and organization of nucleus.
- To study about Cell division.

Course Outcomes

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

CO1 - Understand the cells are the basic unit of life and various types of cells.
CO2 - Know the basic cell structure and basement membrane in cells.
CO3 - Understand the structure and functions of cellular organelles.
CO4 - Understand the structure and functions of nucleus.
CO5- Understand the basic mechanisms cell division.

UNIT – I **(10 hours)**

History of cell Biology, cell as basic unit of life, Cell theory, Protoplasm theory, Organismal theory, Classification & characterization of cell types – Prokaryotes & Eukaryotes, Organization, Ultrastructure of plant cell, animal cell, bacterial cell and viruses.

UNIT – II **(10 hours)**

Structure and function of cell wall - Bacterial and Plant. Ultrastructure of plasma membrane – fluid mosaic model, membrane fluidity, Transport across membranes - Symport, antiport, uniport, active and passive transport, Intra cellular communication, Differentiation of cell surface: Basement membrane, tight junction, gap junctions, Desmosomes, hemidesmosomes. Cytoskeletal structures – microtubules, microfilaments (actin, myosin), Intermediate filament.

UNIT –III **(10 hours)**

Structure & Functions of cell organelles: Endoplasmic Reticulum (SER & RER), golgi apparatus, lysosomes, microbodies (peroxysomes and glyoxysomes), ribosomes and its types, centrioles, basal bodies. Structure and functions of mitochondria, chloroplast, organization of respiratory chain in mitochondria, photophosphosphorylation in chloroplast.

UNIT – IV **(15 hours)**

Structure and organization of nucleus, nuclear membrane, organization of chromosomes - structural organization of chromatids, centromere, chromatin, telomere, nucleosomes, euchromatin and heterochromatin, specialized structures- polytene and lambrush chromosomes

UNIT – V **(15 hours)**

Cell division - Cell cycle, mitosis and meiosis, regulations of cell cycle and check points and enzymes involved in cell cycle check points. Basics in cell signaling- signaling molecules and receptors, G protein coupled receptors, receptor protein tyrosin kinases, apoptosis and necrosis.

Text Books:

1. E.D. P. De Robertis and E.M.F. De Robertis, Jr. 2012 Cell and Molecular Biology (Eighth edition). B.I. Waverly Pvt.Ltd. New Delhi.
2. Harvey Lodish, Arnold Berk, S. Lawrence Zipursky, Paul Matsudaira, David Baltimore and James Dernell, 2009. Molecular Cell Biology (Fourth Edition). Media Connected – W.H.Freeman and Company.
3. P.S. Verma and V.K. Agarwal, 2012, Concepts of Cell Biology. S.Chand & Company Ltd., New Delhi;

Reference Books:

1. D.E Sadava, 1993. Cell Biology - Organelle Structure and Function. Jones and Bartlett Publishers
2. B Alberts, 2009 Essential Cell Biology (Third Edition), Garland Science; publishers
3. Alberts Bruce, 2008 Molecular Biology of the Cell (Fifth Edition), Garland Science; publishers

Web References:

1. https://www.google.com/search?q=History+of+cell+Biology
2. https://www.google.com/search?q=structure+and+function+of+cell+wall+ppt&sxsrf
3. https://www.toppr.com/guides/biology/the-fundamental-unit-of-life/cell-organelle/
4. https://www.microscopemaster.com/nucleus.html
5. https://www.tutorialspoint.com/cell_cycle_and_cell_division/index.asp

	L	T	P	C	Hrs
A20BTT102					
BIOCHEMISTRY- I BIOMOLECULES	**4**	**0**	**0**	**4**	**60**

Course Objectives

- To understand the fundamentals of carbohydrate.
- To study about the classification, structure and properties of amino acids
- To understand the classification, Structures and Biological importance of enzyme.
- To understand the classification, Structures and Biological importance of lipid.
- To study about composition, structure and biological importance of genetic material.

Course Outcomes

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

CO1 – Develop the fundamental idea about carbohydrate.
CO2 – Understand about the role and properties of amino acids.
CO3 – Understand about enzymes and its role in biological system.
CO4 – Understand the role of lipid and its structure.
CO5 - Understand about composition, structure and biological importance of genetic material.

UNIT-I **(10 hours)**

Carbohydrates: Classification of carbohydrates, Occurrence and structure of mono, di and polysaccharides (homo and heteropolysaccharides), asymmetry, stereo- isomerism and optical isomerism of sugars, anomeric form and mutarotation. Biological importance of carbohydrates (starch, cellulose, chitin)

UNIT-II **(15 hours)**

Amino acids & Proteins: Classification, structure and Properties of amino acids, Essential and non-essential amino acids, peptide bond and chemical bonds involved inprotein structure - Protein classification based on solubility, shape, composition and function, Structure of proteins (Primary, secondary tertiary and quaternary), Biologically important peptides (insulin, glutathione, vasopressin).

UNIT-II **(15 hours)**

Enzymes: Definition, Classification & nomenclature of enzymes - Specificity of enzyme action - Fischer's Lock and Key Hypothesis & Koshland's Induced Fit Hypothesis - Active site – coenzyme - Enzyme kinetics, Michaelis-Menten equation and Lineweaver-burk plot) - significance of K_m and V_{max} – enzyme inhibitors (reversible, irreversible and feedback inhibitions), Modes of enzyme inhibition, Regulatory enzymes (Allosteric & covalently modulated enzymes). Biological importance of enzymes (ribonuclease and chymotrypsin)

UNIT-IV **(10 hours)**

Lipids: Classification, nomenclatures, structure and functions of Simple, Compound and Derived lipids, Structure and functions of fatty acids (Essential Fatty Acids), Tri- acyl glycerol, phospholipids, sphingolipids, Glycolipids and Gangliosides. Biological importance of lipids (PUFA)

UNIT-V **(10 hours)**

Nucleic acid: Structure, Properties and types of nucleic acid, Composition of DNA and RNA - Watson and Crick model of DNA, Structure of purines and pyrimidines, Structure of Nucleosides and Nucleotides. Structural forms of DNA, Biological importance of Nucleic acids

Text Books:

1. Nelson and Cox, Lehninger. Principles of Biochemistry (7th Edition), W.HFreeman Publishers (2010).
2. Roy Tasker, Carl Rhodes. Stryer's Biochemistry (7th Edition) W. H. Freeman publishers(2012).
3.Voet D. Biochemistry (4th Edition), Academic Press (2012).

Reference Books:

1. Zubey G. Principles of Biochemistry, Oscar Publication (2000).
2. Devlin T. M. Text Book of Biochemistry with Clinical Correlations (4th Edition) Wiley & Sons Publication (2005).

Web References:

1. https://www.toppr.com/guides/chemistry/biomolecule/carbohydrates/
2. https://www.tutorialspoint.com.cach3.com/class_11th_proteins/protein_amino_acids.asp.html
3. https://byjus.com/biology/enzymes/
4. https://sciencemusicvideos.com/ap-biology/module-6-menu-biochemistry/biochemistry-3-lipids-interactive-tutorial/
5. https://www.britannica.com/science/nucleic-acid/Deoxyribonucleic-acid-DNA

	L	T	P	C	Hrs
A20BTD101					
CHEMISTRY- I					
	4	**0**	**0**	**4**	**60**

Course objectives

- To study about Atomic Structure and Chemical Bonding.
- To know about Chemical Thermodynamics, Energetics & Kinetics.
- To learn about Chemical Equilibrium and Redox Reactions.
- To learn about various types of solutions and preparations.
- To study about the classification of solvents.

Course Outcomes

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

CO1 – Acquire the knowledge about Atomic Structure and Chemical Bonding.
CO2 – Understand about Chemical Thermodynamics, Energetics & Kinetics.
CO3 – Understand the use of Integrals and able to apply it.
CO4 – Acquire the knowledge prepare various types of solutions.
CO5 – Understand about various types of solvents.

UNIT-I **(10 hours)**

Atomic Structure and Chemical Bonding: Atoms, elements, compounds and molecules. Electronic configuration of atom, Quantum mechanical model. Chemical bonding: classification, ionic bonding, covalent bonding, co-ordinate – covalent bonding, VSEPR, bond theory, shape of molecules, atomic orbital's, σ, π bonds, hybridization, resonance, bond properties, molecular orbital theory, metallic bonding, Intermolecular forces. Hydrogen bonds, Van der Waals forces.

UNIT-II **(15 hours)**

Chemical Thermodynamics, Energetics & Kinetics: Basic concepts ofthermodynamics, I law of thermodynamics, heat capacity & specific heat capacity, Enthalpy changes, bond enthalpies, Entropy and II law of thermodynamics, Entropy changes, Gibbs energy & its changes. Rate of chemical reaction, rate constant & orderof reaction – zero order, 1^{st} order, pseudo 1^{st} order, determination of order of reaction, theories of chemical kinetics, mechanism of reaction.

UNIT-III **(10 hours)**

Chemical Equilibrium and Redox Reactions: Equilibrium in chemical and physical processes, dynamic equilibrium & equilibrium constant homogeneous & heterogeneous, equilibria, Equilibrium constant units & application, factors affecting equilibrium. Redox reactions: rate of electrons in redox reactions, oxidation number balancing chemical equation, stoichiometry of redox reactions.

UNIT-IV **(15 hours)**

Solutions- I: Types of solutions, concentration of solutions, colligative properties, acids & bases, Bronsted-Lowry concept of acid and bases, ionization, acid-base titration, strong and weak electrolytes, degree of dissociation, hydrolysis, pH, pH scale, pH electrode, ionic strength. Equivalent & molecular mass, mole concepts, expressing concentration of solutions – mole fraction, molarity, molality, normality, molar volume, mass of substance, Mass – mole conversion, percent compositions, empirical & molecular formula, chemical stoichiometry.

UNIT-V **(10 hours)**

Solutions- II: Solvation energy, Polar and non-polar solvents, properties of water, Polarity of solvents, factors affecting solubility, dielectric constant of solvents, classification of solvents, dilution factor, serial dilution, solvent – solvent interaction, solute – solvent interaction in solutions. Colloids – types, properties, emulsions,coagulation. Distillation and its application.

Text Books:

1. B.R Puri., L.R Sharma and K. C Kalia. 31st edition *Advanced Inorganic Chemistry.* Delhi:Shoban Lal Nagin Chand and Sons, 2011.
2. B.R Puri., L.R Sharma and Pathania. 46th edition *Principles of Physical Chemistry.* VishalPublishing Company, 2012.
3. Chang Raymond *Chemistry.* 6th ed.2008.

Reference Books:

1. R. M. Verma *Analytical Chemistry- Theory and Practice*, 3rd edition CBS Publishers andDistributors Pvt. Ltd., 2007
2. Skoog, West, Holler and Crouch, *Fundamentals of analytical chemistry*, 8th edition, ThomsonAsia Pvt. Ltd, 2004.

Web References:

1. https://www.tutorialspoint.com/semiconductor_devices/semiconductor_devices_atomic_combinations.htm
2. https://www.learner.org/series/chemistry-challenges-and-solutions/the-energy-in-chemical-reactions-thermodynamics-and-enthalpy/
3. https://www.google.com/search?q=Chemical+Equilibrium++tutorial+point&sxsrf=ALeKk03suQ-Ly4aZT_KWsMRitMAyk6lNLA%3A162710397
4. https://www.toppr.com/guides/chemistry/solutions/types-of-solutions/
5. https://flexbooks.ck12.org/cbook/ck-12-middle-school-physical-science-flexbook-2.0/section/7.2/primary/lesson/solute-and-solven

A20AET101	ENVIRONMENTAL STUDIES	L	T	P	C	Hrs
	(Common for all B.A., B.Sc.,B.Com., B.B.A, B.C. A.)	2	0	0	2	20

Course Objectives

- To gain knowledge on the importance of natural resources and energy.
- To know the structure and function of an ecosystem
- To imbibe an aesthetic value with respect to biodiversity, understand the threats and its conservation andappreciate the concept of interdependence
- To know the causes of types of pollution and disaster management
- To observe and discover the surrounding environment through field work.

Course Outcomes

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

CO1 – Understand about the various resources
CO2 – Learn about the biodiversity
CO3 – Learn the different types of pollution and to prevent the pollution
CO4 – Know about the pollution Act
CO5 – Observe various environmental issues in surroundings

UNIT I INTRODUCTION TO ENVIRONMENTAL SCIENCES: NATURAL RESOURCES (6 Hrs)

Environmental Sciences - Relevance - Significance - Public awareness - Forest resources - Water resources -Mineral resources - Food resources - conflicts over resource sharing - Exploitation - Land use pattern - Environmental impact - fertilizer - Pesticide Problems - case studies.

UNIT II ECOSYSTEM, BIODIVERSITY AND ITS CONSERVATION (6 Hrs)

Ecosystem - concept - structure and function - producers, consumers and decomposers - Food chain - Food web -Ecological pyramids - Energy flow - Forest, Grassland, desert and aquatic ecosystem. Biodiversity - Definition - genetic, species and ecosystem diversity - Values and uses of biodiversity - biodiversity at global, national (India) and local levels - Hotspots, threats to biodiversity - conservation of biodiversity –Insitu&Exsitu.

UNIT III ENVIRONMENTAL POLLUTION AND MANAGEMENT (6 Hrs)

Environmental Pollution - Causes - Effects and control measures of Air, Water, Marine, soil, solid waste, Thermal, Nuclear pollution and Disaster Management - Floods, Earth quake, Cyclone and Landslides. Role of individuals inprevention of pollution - pollution case studies.

UNIT IV SOCIAL ISSUES - HUMAN POPULATION (6 Hrs)

Urban issues - Energy - water conservation - Environmental Ethics - Global warming - Resettlement and Rehabilitation issues - Environmental legislations - Environmental production Act. 1986 - Air, Water, Wildlife and forest conservation Act - Population growth and Explosion - Human rights and Value Education - Environmental Health - HIV/AIDS - Role of IT in Environment and Human Health - Women and child welfare - Public awareness - Case studies.

UNIT V FIELD WORK (6 Hrs)

Visit to a local area / local polluted site / local simple ecosystem - Report submission

24

Text Books:

1. Bharucha Erach, “Textbook of Environmental Studies for Undergraduate Courses”, Telangana, India:Orient Black Swan, 2rd Edition, 2013,
2. BasuMahua, Savarimuthu Xavier, “SJ Fundamentals of Environmental Studies”. Cambridge,United Kingdom: Cambridge University Press , 2017.
3. Agarwal, K.C “Environmental Biology”, Nidi Publ. Ltd. Bikaner, 2001 .

Reference Books:

1. Kumarasam.K., A. Alagappa Moses AND M.Vasanthy, “Environmental studies”, Bharathidasanuniversity pub, 1, trichy2004.
2. Rajamannar, “Environmental studies”, EVR College PUB, Trichy2004
3. Kalavathy, S. (ED.) ,“Environmental Studies”, Bishop Heber College PUB., Trichy 2004.

Web References:

1. https://www.youtube.com/watch?v=78prsPYm98g
2. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2792934/
3. https://www.frontiersin.org/articles/505570

A20BTL103	CELL BIOLOGY PRACTICALS	L	T	P	C	Hrs
		0	0	2	1	20

Course Objectives

- To gain the practical skills about cell Biology by experimenting microscope, micrometer, mitosis, meiosis, cell counting and dicot leaf section.

Course Outcomes

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

- Carryout cell Biology practical like microscope, micrometer, mitosis, meiosis, cell counting and dicot leaf section.

1. The Microscope
2. Micrometer
3. Permanent slide preparation
4. Mitosis in onion root tip cells
5. Meiosis in grasshopper testis
6. Cell counting and viability
7. Mitochondrial isolation
8. Blood smear preparation
9. Preparation of microscopic slide for dicot leaf section

Text Books:

1. Laboratory Manual of Cell Biology (Rina Majumdar, Rama Sisodia)
2. Student Solutions Manual for Molecular Cell Biology: Solutions Manual (Lodish Harvey),Publisher: Macmillan Learning
3. Laboratory manual on cell biology and microbiology (Dr. N. Banu, Ms. Pavithra. S), Publisher: Sara Book Publication

Reference Books:

1. Practical laboratory manual- CELL BIOLOGY (Gupta Amit), Publisher: LAP Lambert Academic Publishing.

Web References:

1.https://vulms.vu.edu.pk/Courses/BIO201/Downloads/paractical%20manual%20of%20cell%20bio%20201%2025-4-17.pdf

2. http://www.ihcworld.com/_protocols/lab_protocols/cell-biology-lab-manual-heidcamp.htm

A20BTL104	BIOMOLECULES PRACTICALS	L	T	P	C	Hrs
		0	0	2	1	20

Course Objectives

- To gain the practical skills about Analysis of various Biomolecules such as Protein, Amino acid, Carbohydrate etc.

Course Outcomes

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

- Perform the Analysis of various Biomolecules Such as Protein, Amino acid, Carbohydrate etc.

1. Quantitative Analysis of Proteins
2. Quantitative Analysis of Aromatic amino and Sulphur containing amino acids
3. Quantitative Analysis of Carbohydrates
4. Quantitative Analysis of Fats
5. Extraction of Starch from Potatoes
6. Extraction of Ovalbumin from Egg
7. Extraction of Lactalbumin from Milk
8. Extraction of RNA
9. Extraction of DNA

Text Books:

1. Manual of Practical Biochemistry (Mohammed Rafi), Publisher: Orient Blackswan Pvt Ltd
2. Biochemistry practical manual (Rajendiran Soundravally), Publisher: Elsevier
3. Practical Biochemistry (K Geetha Damodaran), Publisher: Jaypee Brothers Medical

Reference Books:

1. Practical Manual of Biochemistry (Kaushik G.G.) Publisher: CBS Publishers & Distributors

Web References:

1.https://bio.libretexts.org/Bookshelves/Biotechnology/Lab_Manual%3A_Introduction_to_Biotechnology/01%3A_Techniques/1.09%3A_Biomolecule_Detection

2. https://www.researchgate.net/publication/301647645_PRACTICAL_BIOCHEMISTRY

A20BTD202	CHEMISTRY- I PRACTICALS	L	T	P	C	Hrs
		0	0	2	2	30

Course Objectives

- To gain the practical skills about Calibration of fractional weights, Measurement of pH, Acid-Base Titration, Analysis of Dissolved Oxygen etc.

Course Outcomes

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

- Perform Calibration of fractional weights, Measurement of pH, Acid-Base Titration, Analysis of Dissolved Oxygen etc.

1. Calibration of fractional weights, pipettes and burettes, Preparation of standards, Solutions of different molarity and normality, Dilution – 0.1 M to 0.001 M solutions.
2. Measurement of pH of Solutions
3. Acid-Base Titration and Comparison of Strengths of Acids and Bases,
4. Determination of Order of a reaction.
5. Preparation of standard solution of oxalic acid and standardization of (a) NaOH solution and (b) KMnO4 solution.
6. Analysis of Dissolved Oxygen.
7. Preparation and Purification of Colloidal Sols by dialysis.
8. To determine the density of the liquid.

Text Books:

1. R. M. Verma *Analytical Chemistry- Theory and Practice*, 3rd edition CBS Publishers andDistributors Pvt. Ltd., 2007
2. Skoog, West, Holler and Crouch, *Fundamentals of analytical chemistry*, 8th edition, ThomsonAsia Pvt. Ltd, 2004.
3. Rageeb Md. Usman, Dr. Sunila T, “Practical Hand Book of Systematic Organic Qualitative Analysis”, Unicorn Publication Pvt. Ltd, 1st Edition, 2015.
4. Israel Arthur Vogel , “Vogel's Textbook of Practical Organic Chemistry”, Wiley Edition: 1st Edition, 1989.
5. Arthur Israel Vogel, “Elementary Practical Organic Chemistry” Prentice Hall Press; 3rd Edition, 1980.

Reference Books:

1. Venkateswaran. V, Veeraswmay. R, Kulandaivelu. A.R., “Basic Principles of Practical Chemistry”, New Delhi, Sultan Chand and Sons.2nd Edition, 1997.
2. Mendham. J, Denney. R.C, Bames. J.D, and Thomas, M. “Vogel’s Text book of Quantitative Analysis”, Pearson Education,1st Edition,1989.
3. Gopalan.R, Subramaniam.P.S and Rengarajan.K, “Elements of Analytical Chemistry”, Sultan Chand and Sons, 1st Edition, 2004.

Web References:

1.https://assets.cambridge.org/97805212/91125/frontmatter/9780521291125_frontmatter.pdf

2. https://www.csub.edu/chemistry/organic/manual/Lab14_QualitativeAnalysis.pdf

3. http://rushim.ru/books/praktikum/Mann.pdf

A20BTS101	COMMUNICATION SKILLS LAB	L	T	P	C	Hrs
	(Common to B.A., B.Sc., B.Com., B.B.A.& B.C.A.)	0	0	4	2	30

Course Objectives

- To improve the students 'speed in reading.
- To decode the correspondence between sound and spelling in English.
- To train students to organize, revise and edit ideas to write clearly and effectively.
- To enhance the sense of social responsibility and accountability of the students.
- To expound the significance of time and stress management.

Course Outcomes

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

CO1– Understand the pattern to communicate effectively.
CO2– Impart Speaking skills with confidence.
CO3– Use writing strategies to improve the drafting skills and comprehending of articles.
CO4–Demonstrate leadership qualities to Participate in Group Discussion and Interview efficiently.
CO5–Expertise in Managerial skills.

UNITICOMMUNICATIONSKILLSSPEAKING (6Hrs)

Aspects of speaking - Process and techniques of effective speech – Presentations - topic to be given to students for short speech.

UNITIISELF-MANAGEMENTSKILLS (6Hrs)

Time Management - Stress management – Perseverance – Resilience - Mind mapping–Self-confidence

UNITIIICOMMUNICATIONSKILL-READING (6Hrs)

Phonics– Self-Introduction –Vocabulary–Comprehension-skimming and scanning.

UNITIVSOCIALSKILLS (6Hrs)

Negotiation and Persuasion –Leadership–Teamwork–Problem solving –Empathy–Decision making.

UNITVCOMMUNICATIONSKILL-WRITING (6Hrs)

Descriptive –Narrative–Persuasive–Expository–Picture composition

Text Books

1. Syamala,V,"EffectiveEnglishCommunicationforyou",Chennai:EmeraldPublishers,2002
2. Balasubramanian, T," A Textbook of English Phonetics for Indian Students",New Delhi: Trinity Press 1981
3. Sardana,C.K.,"The Challenge of Public Relations",New Delhi: Har-AnandPublications,1995.

Reference Books

1. Morley, David and Philip Neilson, editors", The Cambridge Companion to Creative Writing",Cambridge:2012.
2. Eastwood,John,"Oxford Grammar",Oxford UniversityPress,1999.
3. Prasad,HariMohan,"AHandbookofSpottingErrors:"McGrawHillEducation, 2010.
4. Murphy,JohnJ,"PullingTogether:10RulesforHigh-PerformanceTeamwork", SimpleTruths,2016.

Web References

1. www.softwaretestinghelp.com›how-to-crack-the-gd
2. www.businessballs.com›communication-skills›prese...
3. www.teachingenglish.org.uk›article›public-speaking...
4. www.teachingenglish.org.uk›article›public-speaking...
5. www.monster.com›career-advice›article›boost-you...

மொழித்தாள்

தமிழ்– II

(B.A., B.Sc., B.Com., B.B.A., & B.C.A., பாடப்பிரிவுகளுக்குமான பொதுத்தாள்)

	L	T	P	C	Hrs
A20TAT202	3	0	0	3	45

பாடத்திட்டத்தின் நோக்கம்

இரண்டாயிரம் ஆண்டுகால தமிழின் தொன்மையையும் வரலாற்றையும் அதன் விழுமியங்களையும் பண்பாட்டையும் எடுத்துரைப்பதாக இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.

தமிழ் இலக்கியம் உள்ளடக்கத்திலும், வடிவத்திலும் பெற்ற மாற்றங்கள், அதன் சிந்தனைகள்,அடையாளங்கள் ஆகியவற்றைக் காலந்தோறும் எழுதப்பட்ட இலக்கியங்களின் வழியாகக் கூறுவதற்கு இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.

மொழியின் கட்டமைப்பைப் புரிந்து கொள்வதாகவும் பாடத்திட்டம் வடிவமைக்கப்பட்டுள்ளது.

வாழ்வியல் சிந்தனைகள், ஒழுக்கவியல் கோட்பாடுகள், சமத்துவம், சூழலியல் எனப் பல கூறுகளை மாணவர்களுக்கு எடுத்துரைக்கும் விதத்தில் இப்பாடத்திட்டம் உருவாக்கப்பட்டுள்ளது.

சிந்தனை ஆற்றலைப் பெருக்குவதற்குத் தாய்மொழியின் பங்களிப்பினை உணர்த்த இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.

பாடத்திட்டத்தின் வெளிப்பாடுகள்

CO1 - இலக்கியங்கள் காட்டும் வாழ்வியல் நெறிமுறைகளைப் பேணிநடத்தல்.
CO2 - நமது எண்ணத்தை வெளிப்படுத்தும் கருவியாகத் தாய்மொழியைப் பயன்படுத்துதல்.
CO3 - தகவல் தொடர்புக்குத் தாய்மொழியின் முக்கியத்துவத்தை உணர்தல்.
CO4 - தாய்மொழியின் சிறப்பை அறிதல்.
CO5 - இலக்கிய இன்பங்களை நுகரும் திறன்களை வளர்த்தல்.

அலகு–1 **(9 Hrs)**

எட்டுத்தொகை:

1. குறுந்தொகை (படல்–130).
2. நற்றிணை (பாடல்–27).
3. அகநானூறு (பாடல்–86)
4. ஐங்குறுநூறு (பாடல்–203)
5. கலித்தொகை– பாலைத்திணை (பாடல்–9)
6. புறநானூறு (பாடல்–235)

பத்துப்பாட்டு:

1.சிறுபாணாற்றுப்படை (அடிகள்–126–143)
2. முல்லைப்பாட்டு (6–21)

அலகு–2 **(9 Hrs)**

பதினெண் கீழ்க்கணக்கு:

1. திருக்குறள்– வெகுளாமை (அதிகாரம்–31), காதல் சிறப்புரைத்தல் (அதிகாரம்–113)
2. நாலடியார் – நல்லார் எனத்தான் (221)
3. திரிகடுகம்– கோலஞ்சி வாழும் குடியும் (33)
4. இனியவை நாற்பது– குழவி தளர்நடை (14)
5. கார் நாற்பது– நலமிகு கார்த்திகை (26)
6. களவழி நாற்பது–கவளங்கொள் யானை (14)

அலகு–3 **(9 Hrs)**

சைவம்– பன்னிரு திருமுறைகள்

1. திருஞானசம்பந்தர் – வேயுறு தோளிபங்கன் (இரண்டாம் திருமுறை)
2. திருநாவுக்கரசர் – மனமெனும் தோணி (நான்காம் திருமுறை)
3. சுந்தரர் – ஏழிசையாய் இசைப்பயனாய் (ஏழாம் திருமுறை)

4. மாணிக்கவாசகர் – ஆதியும் அந்தமும் இல்லா (திருவெம்பாவை)
5. திருமூலர் – அன்பு சிவம் இரண்டு (திருமந்திரம்)

வைணவம் – நாலாயிரத் திவ்வியப் பிரபந்தம்

1. பேயாழ்வார் – திருக்கண்டேன் பொன்மேனி....
2. பெரியாழ்வார் – கருங்கண் தோகை மயிற் பீலி....
3. தொண்டரடிப்பொடிஆழ்வார் – பச்சைமாமலை போல்....
4. ஆண்டாள் – கருப்பூரம் நாறுமோ? கமலப்பூ....
5. திருமங்கையாழ்வார் – வாடினேன் வாடி வருந்தினேன்....

இஸ்லாமியம்

சீறாப்புராணம்– பாடல் நின்ற பிணை மானுக்குப்...5 பாடல்கள் (பாடல் எண்கள் 61–65)

கிருத்துவம்

இரட்சண்ய யாத்ரீகம்– கடைதிறப்புப் படலம் –5 பாடல்கள் (பாடல் எண்கள்: 3,9,10,15,16)

அலகு – 4 **(9 Hrs)**

தமிழ் இலக்கிய வரலாறு

1. சங்க இலக்கியங்கள்
2. நீதி இலக்கியங்கள்
3. பக்தி இலக்கியங்கள்
4. காப்பியங்கள்

அலகு–5 **(9 Hrs)**

சிறுகதைகள்

1. புதுமைபித்தன் – அகலிகை
2. நா. பிச்சமூர்த்தி – வேப்பமரம்
3. அகிலன் – ஒரு வேளைச்சோறு
4. ஜி.நாகராஜன் – பச்சக் குதிரை
5. கி.ராஜநாராயணன் – கதவு
6. சா.கந்தசாமி – தக்கையின் மீது நான்கு கண்கள்

பார்வை நூல்கள் :

1. அரசு, வீ., இருபதாம் நூற்றாண்டு சிறுகதைகள் நூறு, அடையாளம் பதிப்பகம், திருச்சி, 2013.
2. அருணாச்சலம், பா., பக்தி இலக்கியங்கள், பாரி நிலையம், சென்னை, 2010.
3. தமிழண்ணல், புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு, மீனாட்சி புத்தக நிலையம், மதுரை, 2000.
4. பாக்கியமேரி, வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு, என்.சி.பி.எச். பதிப்பகம், சென்னை, 2011.
5. பசுபதி, மா. வே., செம்மொழித் தமிழ் இலக்கண இலக்கியங்கள், தமிழ்ப் பல்கலைக்கழகம், 2010 .

உரைநடை நூல்கள் :

1. அன்பு, பா., மா.பொ.சி யின் ஒரு இலக்கிய நூல்கள் ஒரு மதிப்பீடு, உலக தமிழ் ஆராய்ச்சி நிறுவனம், சென்னை, 1983.
2. பிள்ளை, கே.கே., தமிழக வரலாறும் மக்களும் பண்பாடும், உலக தமிழ் ஆராய்ச்சி நிறுவனம், சென்னை, 2000.
3. ஜெயமோகன், நவீன இலக்கிய அறிமுகம், உயிர்மெய் பதிப்பகம், சென்னை, 1995.

இணையத்தளங்கள் :

1. http://www.tamilkodal.com
2. http://www.languagelab.com
3. http://www.tamilweb.com

	FRENCH – II	L	T	P	C	Hrs
A20FRT202	(Common to B.A., B.Sc., B.Com., B.B.A. & B.C.A)	**3**	**0**	**0**	**3**	**45**

OBJECTIVES

- To enable the students read, understand, and write simple sentences.
- To grasp relevant grammar for communication
- To learn about the land, people and culture of France.

UNITÉ - 1

Qu'est -ce qu'on leur offre ?

On solde !

Découvrir Paris en bus avec l'open Tour

UNITÉ - 2

Si vous gagne vous ferez quoi

Parasol ou parapluie ?

UNITÉ - 3

Quand il est midi á Paris

Vous allez Vivre

L'avenir du Français

UNITÉ - 4

Souvenirs d'enfance

j'ai fait mes études á Lyon 2

UNITÉ – 5

Retour des Antilles

Au voleur ! Au voleur

Text Books

Prescribed Text book : *FESTIVAL 1* - Méthode de Français
Authors : Sylvie POISSON-QUINTON
Michèle MAHEO-LE COADIC
Anne VERGNE-SIRIEYS
Edition : CLE International, Nouvelle Édition révisée : 2009.

Reference Book Festival 1

		L	T	P	C	Hrs
A20GET202	**GENERAL ENGLISH- II** **(Common to B.A, B.Sc. and BCA)**	**3**	**0**	**0**	**3**	**45**

Course Objectives

To recognize poetry from a variety of cultures, languages and historic periods

- To develop the intensive study of language by critical reading
- To identify the various genres and analyze the works of writers in English
- To expand the basic understanding of targeted grammatical structures
- To understand the conventions of writing in English

Course Outcomes

After the completion of this course, the students will be able to

CO1–Understand and appreciate poetry as a literary art form.
CO2–Comprehend and recognize relationship between ideas, events and facts.
CO3–Learn to explore characters and their conflicts,dilemmas and extend their response to stories.
CO4–Apply grammatical structures meaningfully and appropriately in or land written form.
CO5– Write effectively and coherently.

UNITIPOETRY (9 Hrs)

1. Lord Byron: She Walks in Beauty
2. Robert Frost: Stopping by Woods on a Snowy Evening
3. Nissim Ezekiel:Night of the Scorpion
4. RabindranathTagore: Where the Mind is Without Fear

UNITIIPROSE (9 Hrs)

Ernest Hemingway-A Day's Wait

1. Anton Chekhov: The Lottery Ticket

UNITIII FICTION (9 Hrs)

Jane Austen- Prideand Prejudice

UNITIVGRAMMAR (9 Hrs)

1.Voice–Conditionals -Coherence

UNITV COMPOSITION (9 Hrs)

1. Letter Writing
2. Report Writing

Text Books

1. WisdomandExperience:AnAnthologyforDegreeClasses.BoardofEditors",OrientLongmanLimited,2007
2. "The Approach to Life: A Selection of EnglishProse",OrientLongmanLimited,2009.
3. "Brookside Musings: A Selection of Poems and Short Stories: Board of Editors", Orient, Longman Limited,2009.

Reference Books

1. LalithaNatarajanandSasikalaNatesan,"EnglishforExcellence:Poetry",AnuradhaPublicationsLiteraryPursuits: BoardofEditors,OrientLongmanLimited,2015.
2. S.C.Gupta,"EnglishGrammar&Composition",Arihant,2014
3. Rabindranath Tagore, Where the mind is without fear",London :TheIndiaSociety,1912.
4. RaymondMurphyandSuraiPongtongcharoen,"EnglishGrammarinUse",CambridgeUniversity,1985.

Web References

1. https://poets.org/poem/she-walks-beauty
2. https://www.poetryfoundation.org/poems/46467/the-flea
3. https://www.classicshorts.com/stories/lottery.html
4. http://short-storylovers.blogspot.com/2012/07/thief-by-ruskin-bond.html
5. http://www.gutenberg.org/files/1342/1342-h/1342-h.htm

		L	T	P	C	Hrs
A20BTT204	**FUNDAMENTALS OF MICROBIOLOGY**	**4**	**0**	**0**	**4**	**60**

Course objective

- To understand the basics of microbiology and to know the role in environment.
- To ensures the students to understand about the structure and function of microorganisms.
- To understand the Instrumentation, principles and applications of types of microscopes
- To impart practical skills of isolation and manipulating conditions for their propagation.
- To ensures the students to understand about control of microorganisms.

Course Outcomes

After the completion of this course, the students will be able to

CO1 – Define the science of microbiology, its development and importance in human welfare.
CO2 – Describe historical concept of spontaneous generation and the experiments performed to disprove.
CO3 – Describe some of the general methods used in the study of microorganisms.
CO4 – Recognize and compare structure and function of microbes and factors affecting microbial growth.
CO5 – Demonstrate aseptic microbiological techniques in the laboratory and check sources of microbial contamination and their control.

UNIT - I **(10 hours)**

Microbial Diversity: Basics of microbiology, History and Scope of microbiology, General features and Classification of Archaea, Bacteria, Fungi, Algae, Protozoa, Viruses and Prions. Differences between prokaryotic and eukaryotic organisms.

UNIT- II **(15 hours)**

Ultrastructure of Bacteria: Sub-cellular structures - Cell wall of bacteria and its biosynthesis, Cell envelope - capsule and slime layer, Cellular appendages - pili, flagella and fimbriae, Cell membrane, inclusion bodies, Plasmid DNA and chromosomal DNA. Bacterial genetics - conjugation, transduction (generalized and specialized), and transformation.

UNIT - III **(15 hours)**

Microscopy: Staining - Principles and types of staining (simple and differential) Microscopy **-**Instrumentation, principles and applications of light microscopes (bright field, dark field, phase contrast, fluorescent microscopes) and electron microscopes (transmission and scanning electron microscopes)

UNIT - IV **(10 hours)**

Microbial Nutrition: Classification of microorganisms based on their nutritional types, Preparation of media, types of media, culturing of microbes, Microbial growth curve, viral replication: lytic and lysogenic cycles, Isolation, preservation and maintenance of microorganisms, Aerobic and Anaerobic culturing of bacteria, Effect of biotic and abiotic factors on the growth of organisms.

UNIT – V **(10 hours)**

Microbial Control: Sterilization, disinfection, antisepsis, fumigation. Physical control: Temperature (moist heat, autoclave, dry heat, hot air oven and incinerators), desiccation, osmotic pressure, radiation, UV-light, electricity, ultrasonic sound waves, filtration. Chemical control: Antiseptics and disinfectants (halogens, alcohol, gaseous sterilization)

Text Books:

1. M.J. Pelczar Jr. E.C.S. Chan and N.R. Kreig, Microbiology (5th edition), Tata MaCraw-Hill, New Delhi;
2. R. Ananthanarayanan. and C.K.Jayaram Panickar, Text book of Microbiology (9th edition), Orient Longman Publications, New Delhi
3. Lansing M. Prescott, John. P. Harley, Donald A. Klein, 1999. Microbiology (9th edition) WCB MaCraw-Hill, New York;

Reference books:

1. Sundararajan S (2003). College Microbiology, revised edition, Vardhana publications, Banglore.
2. R.C. Dubey, D.K.Maheswari, A Text book of Microbiology (2005), S.Chand & Company Ltd. New Delhi

Web References:

1. https://www.tutorialspoint.com/biological_classification/index.asp
2. https://www.encyclopedia.com/science/encyclopedias-almanacs-transcripts-and-maps/bacterial-ultrastructure
3. http://www.auburn.edu/academic/classes/biol/4101/estridge2/tutorial1a.pdf
4. https://www.scientistcindy.com/microbial-nutrition-and-growth.html
5. http://www.lamission.edu/lifesciences/lecturenote/mic20/Chap07Control.pdf

		L	T	P	C	Hrs
A20BTT205	**BIOCHEMISTRY- II INTERMEDIARY METABOLISM**	**4**	**0**	**0**	**4**	**60**

Course Objectives

- To understand the Fundamentals of Bioenergetics.
- To study about Carbohydrate Metabolism.
- To understand the General aspects of amino acid metabolism.
- To understand the concepts of Lipid Metabolism.
- To understand about Nucleic Acid Metabolism.

Course Outcomes

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

CO1 – Know the law of thermodynamics, electrons and high energy compounds.
CO2 – Understand carbohydrate metabolism through various pathways like glycolysis and citric acid cycle.
CO3 - Develop the knowledge on biosynthesis of amino acids,reulation and amino acid metabolism.
CO4 - Understand about different types of fatty acidsand its biosyntesis, absorption and transport.
CO5 – Understand the biosynthesis of nuclic acid, degradation and nucleotides as regulatory molecules.

UNIT-I **(10 hours)**

Bioenergetics: Enzyme & its forms, laws of thermodynamics, free energy change, enthalpy, entropy, equilibrium constant, flow of electrons, electron carriers, redox potential, redox coupling & ATP bioenergetics, High energy compounds.

UNIT-II **(15 hours)**

Carbohydrate Metabolism: Glycolysis, Fermentation, Citric acid cycle, Oxidative Phosphorylation & Electron transport chain, Gluconeogenesis, Pentose phosphate pathway, Glyoxylate shunt, Glycogen metabolism (glycogenesis and glycogenolysis)

UNIT-III **(15 hours)**

Amino Acids Metabolism: General aspects of amino acid metabolism, Transamination, Transamidation, Deamination, Uric acid biosynthesis, Nitrogen excretion - Urea cycle, Amino acid catabolism, Amino acid biosynthesis - Fixation of ammonia into amino acid, biosynthesis of amino acids (Tryptophan and Methionine), Regulation of amino acid biosynthesis.

UNIT-IV **(10 hours)**

Lipid Metabolism: Biosynthesis of fatty acids - long chain, unsaturated, Triacylglycerols, phospholipids, comparison of fatty acid synthesis and degradation; Oxidation of fatty acids – even chain saturated fatty acids, Unsaturated fatty acids, odd chain fatty acids (α, β, ω), ketone bodies, cholesterol metabolism, dietary absorption of lipids, Transport forms (VLDL, LDL, HDL, chylomicron).

UNIT-V **(10 hours)**

Nucleic Acid Metabolism: Biosynthesis of purines and pyrimidines, feedback inhibition of purine & pyrimidine biosynthesis, NMP conversion to NTP, Nucleotide degradation, salvage pathways, degradation of purine and pyrimidines to uric acid & urea, nucleotides as regulatory molecules, non-enzymatic transformation of nucleotides & nucleic acids.

Text Books:

1. Voet. D. Biochemistry (4th Edition), Academic Press2012.
2. Zubey.G - Principles of Biochemistry (4th edition) Oscar Publication 2000.
3. Wilson and Walker Principles and Techniques of Practical Biochemistry, (7th edition),Cambridge University Press 2010.

Reference books:

1. Nelson and Cox, Lehninger. Principles of Biochemistry (7th Edition), W.H FreemanPublishers 2010
2. Roy Tasker, Carl Rhodes. Stryer's Biochemistry (7th Edition). W. H. Freemanpublishers 2012.

Web References:

1. http://www.nmr.sinica.edu.tw/~thh/lectures/Biophysics/Chap_3Bioenerget
2. https://global.oup.com/us/companion.websites/fdscontent/uscompanion/us/static/companion.websites/9780199730841/McKe
3. https://www.lecturio.com/magazine/metabolism-amino-acids/
4. https://opentextbc.ca/anatomyandphysiologyopenstax/chapter/lipid-metabolism/
5. https://chem.libretexts.org/Bookshelves/Environmental_Chemistry/Toxicology_MSDT/02%3A_Biochemistry_and_Molecular_Genetics/2

		L	T	P	C	Hrs
A20BTD203	**CHEMISTRY- II**	**4**	**0**	**0**	**4**	**60**

Course Objectives

- To understand the Fundamentals of Organic Chemistry.
- To study the basic of Stereo Chemistry.
- To understand the Nuclear Chemistry.
- To understand the chemical analysis of different substances.
- To study about Bio-Inorganic Chemistry.

Course Outcomes

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

CO1 - Develop the basic knowledge about organic chemical substances.
CO2 – know the concepts of asymmetric carbon atoms and Stereo Chemistry applications.
CO3 - Develop the knowledge about nuclear chemistry for various analytical purpose.
CO4 - Develop the analytical knowledge to apply on various solutions.
CO5 - Understand the Essential & trace elements in biological process.

UNIT-I **(10 hours)**

Introduction to Organic Chemistry: Nomenclature, tetravalency of carbon,structure, isomerism, steric hindrance, resonance structure, functional groups – alcohols, phenols, esters, aldehydes, ketones, acids, hydrocarbons – aliphatic & aromatic hydrocarbons, electrophiles and nucleophiles.

UNIT-II **(10 hours)**

Stereo Chemistry: Isomerism: types, structures, configurational, isomers, concepts ofasymmetric carbon atoms, enantiomers, diastereoisomers, optical isomerism, optical activity, elements of symmetry, chirality, meso compounds, racemic modifications, absolute configuration: R/S and D/L configuration, chirality of organic compounds with special reference to amino acids and sugars.

UNIT-III **(15 hours)**

Nuclear Chemistry: Atomic nucleus, nature of radiation, measurement of radioactivity stability of atomic nucleus, neutron/proton ratio, neutron, electron, positron, α, β, γ rays, stability of radioactive decay, radioactive rate of decay, half-life, traces, liquid scintillation counting – solid state counting, Geiger counter, radiocarbondating, medicinal use of isotopes, radiation & hazards. Differences between ionizing and non-ionizing radiation.

UNIT-IV **(15 hours)**

Chemical Analysis: Gravimetric analysis: Principles and methods of analyses, Application of gravimetry and precipitation in biology. Volumetric analysis: primary and secondary standards of substances (solutions), principles of acids and bases. Acid-base titration, redox and metal ion indicators. Analysis of real samples, samplingtechniques, methods of dissolutions of solid samples for chemical analysis, salting in and salting out. Accuracy and precision in quantitative analyses, errors, standard deviations.

UNIT-V **(10 hours)**

Bio-Inorganic Chemistry: Essential & trace elements in biological processes, metalloporphyrins & with special reference to haemoglobin and myoglobin, biological role of alkali and alkali earth metals with special reference to Ca+.

Text Books:

1. Anil Kumar de and Arnab Kumar de. Inorganic Chemistry and analysis. 2 nd ed. New ageinternational publication: 2005.
2. B. S. Bahl and A Bahl Advanced Organic Chemistry.20th ed. S. Chand & Co, 2011.
3. Finar I. L. A Text Book of Organic Chemistry Vol I&II. 6th ed. LBS & Longman group Ltd.Reprinted in 2008.

Reference books:

1. S.M. Mukherji, S. P. Singh, and R. P. Kapoor. Organic Chemistry. 3rd, 12th Reprint, NewDelhi: New Age International (P) Ltd. Publishers, 2009.
2. Ege, Seyhan N. Organic Chemistry – Structure and Reactivity. 5th ed. Delhi: AITBSpublishers, 2003.
3. Y. Bruice, Paula Organic Chemistry. 6th ed. New Jersey: Prentice-Hall International Inc,2010.

Web References:

1.https://www.tutorialspoint.com/basic_principles_of_organic_chemistry/index.asp
2.https://www.sciencedirect.com/topics/chemistry/stereochemistry
3.https://www.visionlearning.com/en/library/Chemistry/1/Nuclear-Chemistry/59
4.https://www.tutorialspoint.com.cach3.com/class_11th_biomolecules/biomolecules_chemical_analysis.asp.html
5.https://www.deshbandhucollege.ac.in/pdf/resources/1585324665_BSc(H)-BSc-PS-LS-VI-Bioinorganic-2.pdf

		L	T	P	C	Hrs
A20AET202	**PUBLIC ADMINISTRATION**	**2**	**0**	**0**	**2**	**30**

(Compulsory Course designed as per the directions issued by Government of India, MHRD,)
Department of Higher Education (Central University Bureau)

F.No.19-6.2014-Desk U Dated 19-05-2014)

Course Objectives

- To introduce the elements of public administration
- To help the students obtain a suitable conceptual perspective of public administration
- To introduce them the growth of institution devices to meet the need of changing times
- To instill and emphasize the need of ethical seriousness in contemporary Indian Public Administration

Course Outcomes

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

CO1 – Understand the concepts and evolution of Public Administration.
CO2 – Be aware of what is happening in the Public Administration in the country.
CO3 – Explain the Territory Administration in the State and the Centre.
CO4 – Appreciate emerging issues in Indian Public Administration.

UNIT I INTRODUCTION TO PUBLIC ADMINISTRATION (7 Hrs)

Meaning, nature and Scope of Public Administration and its relationship with other disciplines- Evolution of Public Administration as a discipline — Woodrow Wilson, Henry Fayol , Max Weber and others - Evolution of Public Administration in India — Arthashastra — Colonial Administration upto 1947

UNIT II PUBLIC ADMINISTRATION IN INDIA (8 Hrs)

Enactment of Indian Constitution - Union Government – The Cabinet – Central Secretariat -– All India Services – Training of Civil Servants – UPSC – NitiAyog – Statutory Bodies: The Central Vigilance Commission – CBI - National Human Rights Commission – National Women's Commission –CAG

UNIT III STATE AND UNION TERRITORY ADMINISTRATION (8 Hrs)

Differential Administrative systems in Union Territories compared to States Organization of Secretariat: - Position of Chief Secretary, Functions and Structure of Departments, Directorates – Ministry of Home Affairs supervision of Union Territory Administration — Position of Lt.Governor in UT — Government of Union Territories Act 1963 — Changing trend in UT Administration in Puducherry and Andaman and Nicobar Island

UNIT IV EMERGING ISSUES IN INDIAN PUBLIC ADMINISTRATION (7 Hrs)

Changing Role of District Collector – Civil Servants – Politicians relationship – Citizens Charter - Public Grievance Redressal mechanisms — The RTI Act 2005 – Social Auditing and Decentralization – Public Private partnership.

Text Books:

1. Avasthi and Maheswari, “Public Administration”, Lakshmi Narain Agarwal, 1st Edition, 2016.
2. Ramesh K.Arora, “Indian Public Administration: Institutions and Issues”, New Age International Publishers, 3rdEdition, 2012.
3. RumkiBasu, “Public Administration: Concept and Theories”, Sterling, 1st Edition, 2013.

Reference Books:

1. Siuli Sarkar, “Public Administration in India”, Prentice Hall of India, 2nd Edition, 2018.
2. M. Laxmikanth, “Public Administration”, McGraw Hill Education, 1st Edition, 2011.
3. R.B.Jain, “Public Administration in India, 21st Century Challenges for Good Governance”, Deep andDeepPublications, 2002.

Web References:

1. http://cic.gov.in/
2. http://www.mha.nic.in/
3. http://rti.gov.in/
4. http://www.cvc.nic.in/

	FUNDAMENTALS OF MICROBIOLOGY PRACTICALS	L	T	P	C	Hrs
A20BTL206		0	0	2	1	30

Course objective

- To learn the sterilization techniques, culture media preparation, culture method, staining techniques and the characterization experiments.

Course Outcomes

After the completion of this course, the students will be able to

- Perform the sterilization techniques, culture media preparation, culture method, staining techniques and microbial characterization experiments.

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1. Sterilization Techniques & sterilization of Media, Glass wares
2. Media Preparation (solid & liquid)
3. Types of culture method Streak plate, Pour plate & Spread plate
4. Isolation & Enumeration of Microorganism from water and Soil
5. Staining Techniques–Simple, Gram's & Spore Staining
6. Motility of bacteria by Hanging drop technique
7. Characterization of microorganisms -IMVIC tests
8. Measurement of Growth rate of bacteria - Turbidometric method
9. Antibiotic sensitivity Test - Kirby Bauer method.

Text Books:

1. Microbiology Practical Manual, 1st Edition (Jain Amita) Elsevier India
2. Practical and applied microbiology (Anuradha De) 5th edition, Publisher: The National Book Book Depot
3. Mackie & Mccartney Practical Medical Microbiology, Publisher: Elsevier India 14th edition
4. Practical Manual for Undergraduates Microbiology (Mukesh Kumar) Publisher: Jain Brothers

Reference Books:

1. Practical Handbook of Microbiology (Emanual goldman,lorrence H Green) Publisher: Taylor & Francis Inc.

Web References:

1. https://www.cdc.gov/infectioncontrol/guidelines/disinfection/sterilization/index.html
2. https://microbiologysociety.org/publication/education-outreach-resources/basic-practical-microbiology-a- manual.html

A20BTL206	INTERMEDIARY METABOLISM PRACTICALS	L	T	P	C	Hrs
		0	0	2	1	30

Course objective

- To learn the techniques to estimate various type of Biomolecules such as carbohydrate, protein, amino acid DNA and RNA.

Course Outcomes

After the completion of this course, the students will be able to

- To perform the techniques to estimate various type of Biomolecules such as carbohydrate, protein, amino acid DNA and RNA.

1. Estimation of carbohydrates by Anthrone method
2. Estimation of proteins by Lowry method
3. Estimation of protein by Bradford method
4. Estimation of reducing sugars by DNS method
5. Estimation of total and HDL Cholesterol
6. Estimation of free amino acids by Ninhydrin method
7. Estimation of DNA by DPA method
8. Estimation of RNA by Orcinol method

Text Books:

1. Manual of Practical Biochemistry (Mohammed Rafi), Publisher: Orient Blackswan Pvt Ltd
2. Biochemistry practical manual (Rajendiran Soundravally), Publisher: Elsevier
3. Practical Biochemistry (K Geetha Damodaran), Publisher: Jaypee Brothers Medical

Reference Books:

1. Practical Manual of Biochemistry (Kaushik G.G.) Publisher: CBS Publishers & Distributors

Web References:

1. http://amrita.olabs.edu.in/?sub=79&brch=17&sim=205&cnt=2
2. https://www.onlinebiologynotes.com/ninhydrin-test-principle-requirements-procedure-and-result/
3. https://www.slideshare.net/jeevithaseyan/estimation-of-dna-by-diphenylamine-method

A20BTD204	CHEMISTRY- II PRACTICALS	L	T	P	C	Hrs
		0	0	2	2	30

Course objective

- To learn the Qualitative analysis of organic samples, Separation of organic compounds, Gravimetric analysis of biological samples, Hardness of water and volumetric Analysis.

Course Outcomes

After the completion of this course, the students will be able to

- To perform the Qualitative analysis of organic samples, Separation of organic compounds, Gravimetric analysis of biological samples, Hardness of water and volumetric Analysis.

1. Qualitative analysis of Alcohol
2. Qualitative analysis of Aldehydes
3. Qualitative analysis of Nitro Compounds
4. Qualitative analysis of Carboxyl group
5. Separation of organic compounds from mixtures: Benzoic acid and Sucrose.
6. Gravimetric analysis of biological samples,
7. Determination of Hardness of water.
8. Volumetric Analysis:
    - Determination of acetic acid in commercial vinegar using NaOH.
    - Determination of alkali content – antacid tablet using HCl.
    - Systematic semi-micro qualitative analysis of a mixture of two simple salts

Text Books:

1.Rageeb Md. Usman, Dr. Sunila T, “Practical Hand Book of Systematic Organic Qualitative Analysis”, Unicorn Publication Pvt. Ltd, 1st Edition, 2015.

2. Israel Arthur Vogel , “Vogel's Textbook of Practical Organic Chemistry”, Wiley Edition: 1st Edition, 1989.

3. Arthur Israel Vogel, “Elementary Practical Organic Chemistry” Prentice Hall Press; 3rd Edition, 1980.

Reference Books:

1. Venkateswaran. V, Veeraswmay. R, Kulandaivelu. A.R., “Basic Principles of Practical Chemistry”, New Delhi, Sultan Chand and Sons.2nd Edition, 1997.
2. Mendham. J, Denney. R.C, Bames. J.D, and Thomas, M. “Vogel’s Text book of Quantitative Analysis”, Pearson Education,1st Edition,1989.
3. Gopalan.R, Subramaniam.P.S and Rengarajan.K, “Elements of Analytical Chemistry”, Sultan Chand and Sons, 1st Edition, 2004.

Web References:

1. https://assets.cambridge.org/97805212/91125/frontmatter/9780521291125_frontmatter.pdf
2. https://www.csub.edu/chemistry/organic/manual/Lab14_QualitativeAnalysis.pdf
3. http://rushim.ru/books/praktikum/Mann.pdf

A20BTS202 **MEDICAL LABORATORY TECHNOLOGY**

L	T	P	C	Hrs
0	0	4	2	30

Course Objectives

- To gain basic knowledge on medical laboratory procedures
- To understand methods of measurable clinical parameters
- To understand basics of histopathology
- To understand the principles of biomedical equipment used in diagnosis
- To understand the principles Diagnostic Methods

Course Outcomes

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

CO1 - Understand the concepts OF Organization of clinical laboratory and Safety measures.
CO2 - Understand Collection, processing.
CO3 - Describe methods of histopathological studies
CO4 - Preservation of blood and clinical samples.
CO5 - Define diagnostic principles and methods

UNIT I **(10 hours)**

Basic laboratory principles -Organization of clinical laboratory and Safety measures - personnel hygiene,code of conduct. Overview of Lymphatic system, Urinary system, respiratory system and circulatory system.

UNIT II **(10 hours)**

Sample collection - Urine, sputum, Blood. Types of blood collection: capillary puncture-venipuncture, Anticoagulants. Composition of blood. Outline of Hematopoiesis. ABO blood grouping, Rh typing. Blood transfusion- Donor selection, Screening of donor (history, age, weight, Hb, pulse, BP, temperature, interval, registration), Post donation care, Preservation of samples.

UNIT III **(10 hours)**

Blood cells count: Total count, differential cell count, platelet count, Hemoglobin Estimation, Packed cell volume (PCV) , Erythrocyte Sedimentation Rate [E.S.R.] – Westergren's Method, Bleeding time, clotting time, Latex agglutination test. Pregnancy test.

UNIT IV **(10 hours)**

Introduction to Histopathology, Tissue preparation, labeling, Fixation – Simple fixative, compound fixative, histochemical fixative, Dehydration- Ethyl alcohol – Acetone, Clearing, impregnation, embedding- Paraffin wax, sectioning. Microtome and its application. Staining of tissues - H&E Staining. Bio-Medical waste management- an overview.

UNIT V **(10 hours)**

Diagnostic Methods- Outline of Radio imaging, X-Ray, MRI, CT, Ultra sound scan, Mamography,ECG, EEG, Nephalometry, sphygmomanometer. Autoanalyser-Types of AutoAnalysers-Semi and Fully automated Electrolyte Analyser (ISE). Need for Automation, Advantages of Automation.

Practical

1. Blood collection
2. Differential count of Leucocyte
3. Estimation of Haemoglobin
4. Packed Cell Volume [PCV]
5. Erythrocyte Sedimentation rate [ESR]
6. Bleeding Time, Clotting Time.
7. Latex Agglutination
8. Liver function tests (SGPT, SGOT)
9. Pregnancy test

Reference books:

1. GradWohl, Clinical Laboratory-methods and diagnosis, Vol-IKanai L. Mukherjee, Medical Laboratory Technology Vol. I.Tata McGraw Hill 1996, NewDelhi.
2. Gradwohls, 2000. Clinical Laboratory Methods and Diagnosis. (ed) AlesC.3.Sonnenwirth and Leonard jarret, M.D. B.I. Publications, NewDelhi
4. Sood Ramnik,(2015), Text book of Medical Laboratory Technology,2nd edition,Jaypee Publications
5. Bernadette F. Rodak, George A. Fritsma, Kathryn Doig (2007) Hematology: Clinical Principles and Applications 3rd Ed, Elsevier HealthSciences.
6. RamanicSood,LaboratoryTechnology(Methodsandinterpretation)4thEd.J.P.Bros,NewDelhi
7. Mukharji, Medical LaboratoryTechniques, Vol - I, II & III, 5th Edn. Tata McGrawHill, Delhi.

Web References:

1. https://www.who.int/csr/resources/publications/biosafety/Biosafety7.pdf
2. file:///C:/Users/admin/Downloads/IARC%20Sci%20Pub%20163_Chapter%20 3.pdf
3. https://www.cancer.gov/publications/dictionaries/cancer-terms/def/blood-cell-count
4. https://histologylab.ctl.columbia.edu/HistologyLabManual.pdf
5. https://scert.kerala.gov.in/wp-content/uploads/2020/06/16-mlt.pdf

	NATIONAL SERVICE SCHEME	L	T	P	C	Hrs
A20EAL201	(Common to all B.A., B.Sc., B.Com., B.B.A., B.C.A.)	0	0	2	1	30

Course Objectives

- To introduce about various activities carried out by national service scheme.
- To gain life skills through community service.
- To gain awareness about various service activities performed in higher educational institutions.
- To give exposure about the use of technology to uplift the living standar
- ds of rural community.
- To induce the feeling of oneness through harmony of self and society.

Course Outcomes

After the end of the course, the students will able to

CO1 – Recognize the importance of national service in community development.
CO2 – Convert existing skills into socially relevant life skills.
CO3 – Differentiate various schemes provided by the government for the social development.
CO4 – Identify the relevant technology to solve the problems of rural community.
CO5 – Associate the importance harmony of nation with long term development.

UNIT I INTRODUCTION TO NATIONAL SERVICE SCHEME (6 Hrs)

History and objectives, NSS symbol, Regular activities, Special camping activities, Village adaptation programme, Days of National and International Importance, Hierarchy of NSS unit in college. Social survey method and Data Analysis. NSS awards and recognition. Importance of Awareness about Environment, Health, Safety, Genderissues, Government schemes for social development and inclusion policy etc.,

UNIT II LIFE SKILLS AND SERVICE LEARNING OF VOLUNTEER (6 Hrs)

Communication and rapport building, problem solving, critical thinking, effective communication skills, decisionmaking, creative thinking, interpersonal relationship skills, self- awareness building skills, empathy, coping with stress and coping with emotions. Understanding the concept and application of core skills in social work practice, Team work, Leadership, Event organizing, resource planning and management, time management, gender equality, understanding rural community and channelizing the power of youth.

UNIT III EXTENSION ACTIVITIES FOR HIGHER EDUCATIONAL INSTITUTIONS (6 Hrs)

Objective and functions of Red Ribbon Club, Swatchh Bharath Abhiyan, Unnat Bharat Abhiyan, Jal Shakthi Abhiyan, Road Safety Club, Environmental club and Electoral literacy club.

UNIT IV USE OF TECHNOLOGY IN SOLVING ISSUES OF RURAL INDIA (6 Hrs)

Understanding community issues, economic development through technological development. Selection of appropriate technology, Understanding issues in agriculture, fishing, artisans, domestic animals, health and environment.

UNIT V NATIONAL INTEGRATION AND COMMUNAL HARMONY (6 Hrs)

The role of Youth organizations in national integration, NGOs, Diversity of Indian Nation, Importance of National integration communal harmony for the development of nation, Indian Constitution, Building Ethical human Relationships, Universal Human Values, Harmony of self and Harmony of nation.

Reference Books:

1. Joseph, Siby K and Mahodaya Bharat (Ed.), " Essays on Conflict Resolution", Institute of Gandhian Studies, Wardha,2007.
2. Barman Prateeti and Goswami Triveni (Ed.), " Document on Peace Education", Akansha Publishing House, New Delhi, 2009
3. Sharma Anand and G. Davi," Gandhian Way, Academic Foundation", New Delhi Myers Social Psychology. New Delhi: Tata Mc.Graw Hill, 2007.
4. Taylor E. Shelly et.al , "Social Psychology ",12th Edition New Delhi, Pearson Prentice Hall Singh, 2006.
5. Madhu, "Understanding Life Skills, background paper prepared for education for all: The leap toequality, Government of India report", New Delhi, 2003.
6. Sandhan " Life Skills Education, Training Module, Society for education and development",2005.
7. Jaipur. Radakrishnan Nair and Sunitha Rajan , "Life Skill Education: Evidences form the field",RGNIYD publication,Sriperumbudur,2012.
8. National Service Scheme Manual (Revised), Government of India, Ministry of Youth Affairs andSports, New Delhi.
9. M. B. Dishad, "National Service Scheme in India: A Case study of Karnataka, trust Publications,2001.

Web References:

1. http://www.thebetterindia.com/140/national-service-scheme-nss/
2. http://en.wikipedia.org/wiki/national-service-scheme 19=http://nss.nic.in/adminstruct
3. http://nss.nic.in/propexpan
4. http://nss.nic. in
5. http://socialworknss.org/about.html