SRI MANAKULA VINAYAGAR
ENGINEERING COLLEGE
(AN AUTONOMOUS INSTITUTION)

SCHOOL OF ARTS AND SCIENCE

BACHELOR OF SCIENCE
IN
CHEMISTRY

ACADEMIC REGULATIONS 2023
(R-2023)
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 Chemistry

Vision and Mission

Vision

To develop the department as world class centre of excellence in all aspects of higher education and research with an expertise in chemical sciences.

Mission

M1: Quality Education:

To inculcate quality inter-disciplinary training to improve the welfare of humanity.

M2: Practical knowledge:

To provide laboratory training in the field of chemistry in both public and private sectors.

M3: Research:

To educate our students for research to meet the global environmental issues

M4: Knowledge:

To produce graduates of International distinction, committed to integrity, professionalism and lifelong learning by widening their knowledge horizons in range and depth.

SEMESTER – I

STRUCTURE FOR UNDERGRADUATE PROGRAMME

Sl. No	Course Category	Breakdown of Credits
1	Modern Indian Language (MIL)	6
2	English (ENG)	6
3	Discipline Specific Core Courses (DSC)	67
4	Discipline Specific Elective Courses (DSE)	16
5	Inter-Disciplinary courses (IDC)	20
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)	-
11	Internship	3
12	Online certificate Course	-
Total		**138**

SCHEME OF CREDIT DISTRIBUTION – SUMMARY

Sl. No	Course Category	Credits per Semester						Total Credits
		I	II	III	IV	V	VI	
1	Modern Indian Language (MIL)	3	3	-	-	-	-	06
2	English (ENG)	3	3	-	-	-	-	06
3	Discipline Specific Core Courses (DSC)	10	10	10	06	16	15	67
4	Discipline Specific Elective Courses (DSE)	-	-	4	4	4	4	16
5	Inter-disciplinary courses (IDC)	4	4	6	6	-	-	20
6	Skill Enhancement Courses (SEC)	2	2	2	2	2	2	12
7	Employability Enhancement Courses (EEC*)	-	-	-	-	-	-	-
8	Ability Enhancement Compulsory Courses (AECC)	1	1	1	1	-	-	04
9	Open Elective (OE)	-	-	2	2	-	-	04
10	Extension Activity (EA)	-	-	-	-	-	-	-
11	Internship				3			03
12	Online certificate Course	-	-	-	-	-	-	-
Total		**23**	**23**	**25**	**24**	**22**	**21**	**138**

**** EEC will not be included for the computation of "Total of credits as well as CGPA".***
****Modern Indian Languages are to be selected from the list given in Annexure I***

Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A23TAT101C/ A23FRT101C	Language – I*	MIL	3	0	0	3	25	75	100
2	A23GET101C	General English I	ENG	3	0	0	3	25	75	100
3	A23CHT101D	General Chemistry - I	DSC	4	0	0	4	25	75	100
4	A23CHT102D	Analytical Chemistry	DSC	4	0	0	4	25	75	100
5	A23MAD103C	Allied Mathematics- I	IDC	3	1	0	4	25	75	100
Practical										
6	A23CHL101D	Volumetric Analysis & Chromatography	DSC	0	0	4	2	50	50	100
Skill Enhancement Course										
7	A23ENSA02C	Soft Skill	SEC	2	0	0	2	100	0	100
Ability Enhancement Compulsory Course										
8	A23AETA01C	Public Administration	AECC	2	0	0	1	100	0	100
Employability Enhancement Course										
9	A23CHC101D	Certificate Course	EEC	0	0	4	0	100	0	100
First Semester Total							**23**	**475**	**425**	**900**

Modern Indian Languages are to be selected from the list given in Annexure I

SEMESTER – II										
Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A23TAT202C / A23FRT202C	Language – II**	MIL	3	0	0	3	25	75	100
2	A23GET202C	General English II	ENG	3	0	0	3	25	75	100
3	A23CHT203D	General Chemistry - II	DSC	4	0	0	4	25	75	100
4	A23CHT204D	Physical Chemistry - I	DSC	4	0	0	4	25	75	100
5	A23MAD206C	Allied Mathematics- II	IDC	3	1	0	4	25	75	100
Practical										
6	A23CHL202D	Organic Qualitative Analysis Practical	DSC	0	0	4	2	50	50	100
Skill Enhancement Course										
7	A23ENSA01C	Communication Skill lab	SEC	0	0	4	2	100	0	100
Ability Enhancement Compulsory Course										
8	A23AETA02C	Environmental Studies	AECC	2	0	0	1	100	0	100
Employability Enhancement Course										
9	A23CHC202D	Certificate Course	EEC	0	0	4	0	100	0	100
Extension Activity										
10	A23EAS201C	National Service Scheme	EA	0	0	2	0	100	0	100
Second Semester Total							**23**	**575**	**425**	**1000**

Modern Indian Languages are to be selected from the list given in Annexure I

SEMESTER – III										
Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A23CHT305D	Organic Chemistry - I	DSC	4	0	0	4	25	75	100
2	A23CHT306D	Inorganic Chemistry - I	DSC	4	0	0	4	25	75	100
3	A23PHD301C	Allied Physics –I	IDC	4	0	0	4	25	75	100
4	A23CHE3XXD	DSE - I*	DSE	4	0	0	4	25	75	100
5	A23XXO30XC	Open Elective-I**	OE	2	0	0	2	25	75	100
Practical										
6	A23CHL303D	Inorganic Qualitative Analysis -I and Preparation of Inorganic Compounds	DSC	0	0	4	2	50	50	100
7	A23PHI301C	Allied Physics Laboratory-I	IDC	0	0	4	2	50	50	100
Skill Enhancement Course										
8	A23MASA01C	Quantitative Aptitude and Logical Reasoning	SEC	2	0	0	2	100	-	100
Ability Enhancement Compulsory Course										
9	A23AETA03C	Indian Constitution	AECC	2	0	0	1	100	-	100
Employability Enhancement Course										
10	A23CHC303D	Certificate Course	EEC	0	0	4	0	100	-	100
Third Semester Total							25	525	475	1000

Discipline Specific Electives are to be selected from the list given in Annexure II
***** Open electives are to be selected from the list given in Annexure III***

SEMESTER – IV										
Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A23CHT407D	Physical Chemistry - II	DSC	4	0	0	4	25	75	100
2	A23PHD402C	Allied Physics –II	IDC	4	0	0	4	25	75	100
3	A23CHE4XXD	DSE - II*	DSE	4	0	0	4	25	75	100
4	A23XXO40XC	Open Elective-II**	OE	2	0	0	2	25	75	100
Practical										
5	A23CHL404D	Inorganic Qualitative Analysis –II Practical	DSC	0	0	4	2	50	50	100
6	A23PHI402C	Allied Physics Laboratory –II	IDC	0	0	4	2	50	50	100
Internship										
7	A23CHN401D	Internship	DSC	0	0	6	3	40	60	100
Skill Enhancement Course										
8	A23CHS401D	Food and Preservation Chemistry	SEC	2	0	0	2	100	-	100
Ability Enhancement Compulsory Course										
9	A23AETA04C	Value Education	AECC	1	0	0	1	100	-	100
Employability Enhancement Course										
10	A23CHC404D	Certificate Course	EEC	0	0	4	0	100	-	100
Fourth Semester Total							**24**	**540**	**460**	**1000**

Discipline Specific Electives are to be selected from the list given in Annexure II
***** Open electives are to be selected from the list given in Annexure III***

SEMESTER – V										
Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A23CHT508D	Organic Chemistry - II	DSC	4	0	0	4	25	75	100
2	A23CHT509D	Inorganic Chemistry - II	DSC	4	0	0	4	25	75	100
3	A23CHT510D	Physical Chemistry - III	DSC	4	0	0	4	25	75	100
4	A23CHE5XXD	DSE - III*	DSE	4	0	0	4	25	75	100
Practical										
5	A23CHL505D	Gravimetric Analysis and Preparation of Organic Compounds	DSC	0	0	4	2	50	50	100
6	A23CHL506D	Industrial Chemistry Practical	DSC	0	0	4	2	50	50	100
Skill Enhancement Course										
7	A23CHS502D	Research Methodology for Chemistry	SEC	2	0	0	2	100	-	100
Online Course										
8	A23CHM501D	Online Certificate Course	OCC	0	0	2	0	100	-	100
Fifth Semester Total							**22**	**400**	**400**	**800**

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

SEMESTER – VI										
Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A23CHT611D	Inorganic Chemistry - III	DSC	4	0	0	4	25	75	100
2	A23CHT612D	Organic Chemistry - III	DSC	4	0	0	4	25	75	100
3	A23CHE6XXD	DSE - IV*	DSE	4	0	0	4	25	75	100
Practical										
4	A23CHL607D	Physical Chemistry Practical	DSC	0	0	4	2	50	50	100
5	A23CHP601D	Project	DSC	0	0	10	5	40	60	100
Skill Enhancement Course										
6	A23CHS603D	Trends In Chemistry	SEC	2	0	0	2	100	-	100
Sixth Semester Total							**21**	**265**	**335**	**600**

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

Annexure – I

MODERN INDIAN LANGUAGES (MIL)

(FOR THOSE WHO ARE ADMITTED FROM AY 2023-24)

Language I *- Offered in First Semester		
Sl. No.	Course Code	Course Title
1	A23FRT101C	French – I
2	A23HNT101C	Hindi – I
3	A23TAT101C	Tamil – I
Language II ** – Offered in Second Semester		
Sl. No.	Course Code	Course Title
4	A23FRT202C	French – II
5	A23HNT202C	Hindi – II
6	A23TAT202C	Tamil – II

Annexure – II

DISCIPLINE ELECTIVE COURSES

Discipline Specific Elective – I (Offered in Semester III)		
Sl. No.	**Course Code**	**Course Title**
1	A23CHE301D	Industrial Chemistry
2	A23CHE302D	Nano and Green Chemistry
3	A23CHE303D	Polymer Chemistry
Discipline Specific Elective – II (Offered in Semester IV)		
Sl. No.	**Course Code**	**Course Title**
1	A23CHE404D	Chemistry of hydrocarbon
2	A23CHE405D	Group Theory and Spectroscopy
3	A23CHE406D	Applied Chemistry - I
Discipline Specific Elective – III (Offered in Semester V)		
Sl. No.	**Course Code**	**Course Title**
1	A23CHE507D	Applied Chemistry - II
2	A23CHE508D	Pharmaceutical Chemistry
3	A23CHE509D	Molecular Modeling and Drug Designing
Discipline Specific Elective – IV (Offered in Semester VI)		
Sl. No.	**Course Code**	**Course Title**
1	A23CHE610D	Medicinal Chemistry
2	A23CHE611D	Agricultural Chemistry
3	A23CHE612D	Computer Aided chemistry

Annexure – III

OPEN ELECTIVE COURSES TO THE OTHER DEPARTMENT STUDENTS

Open Elective – I (Offered in Semester III)				
Sl. No	**Course Code**	**Course Title**	**Offering Department**	**Permitted Departments**
1	**A23CHO301C**	Food Analysis (Practical)	Chemistry	Bioscience, Computational Studies, Food Science, Mathematics, Physics
2	**A23CHO302C**	Molecules of Life (Practical)	Chemistry	Bioscience, Computational Studies, Food Science, Mathematics, Physics
3	**A23CHO303C**	Water Analysis (Practical)	Chemistry	Bioscience, Computational Studies, Food Science, Mathematics, Physics

Open Elective – II (Offered in Semester IV)				
Sl. No.	**Course Code**	**Course Title**	**Offering Department**	**Permitted Departments**
1	**A23CHO401C**	C++ Programming and its Application to Chemistry	Chemistry	Computational Studies, Mathematics, Physics
2	**A23CHO402C**	Computational Chemistry Practical	Chemistry	Computational Studies, Mathematics, Physics
3	**A23CHO403C**	Instrumental Methods of Analysis	Chemistry	Computational Studies, Mathematics, Physics

Department	**TAMIL**	Programme: B.Sc. Chemistry						
Semester	**First**	Course Category Code: **MIL**			*End Semester Exam Type: **TE**			
Course Code	**A23TAT101C**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**TAMIL – I**	**3**	**0**	**0**	**3**	**25**	**75**	**100**
(Common to	**B.A, B.Sc., BBA., B.COM., BCA., B.COM CS.,**)							
Prerequisite	• • • • • • • • • • • • • tFg;gpy; jkpio xU ghl• • • • • • • • • • • • • • • Ntz;Lk;.							
Course Objectives	• nrt;tpyf;fpa jd;ik nfhz;l jkpo;nkhopapd; rpwg;gpid vLj;Jiug;gjhf ,g;ghlj;jpl;lk; mikf;fg;gl;Ls;sJ.							
	• ,uz;lhapuk; Mz;Lfhyj; jkpopd; njhd;ikiaAk; tuyhw;iwAk; mjd; tpOkpaq;fisAk; gz;ghl;ilAk; vLj;Jiug;gjhf ,g;ghlj;jpl;lk; mikf;fg;gl;Ls;sJ.							
	• jkpo; ,yf;fpak; cs;slf;fj;jpYk;> tbtj;jpYk; ngw;wkhw;wq;fs;> mjd; rpe;jidfs;> milahsq;fs; Mfpatw;iwf; fhye;NjhWk; vOjg;gl;l ,f;fpaq;fspd; topahff; $Wtjw;F ,g;ghlj;jpl;lk; mikf;fg;gl;Ls;sJ.							
	• tho;tpay; rpe;jidfs;> xOf;ftpay; Nfhl;ghLfs;> rkj;Jtk;> #oypay; vdg; gy $Wfis khztHfSf;F vLj;Jiuf;Fk; tpjj;jpy; ,g;ghlj;jpl;lk; cUthf;fg;gl;Ls;sJ.							
	• rpe;jid Mw;wiyg; ngUf;Ftjw;Fj; jha;nkhopapd; gq;fspg;gpid czHj;j ,g;ghlj;jpl;lk; mikf;fg;gl;Ls;sJ.							
Course Outcome	**On completion of the course, the students will be able to**							BT Mapping (Highest Level)
	CO1	,yf;fpaq;fs; czHj;Jk; tho;tpay; newpKiwfisg; Ngzp elj;jy;.						**K3**
	CO2	ekJ vz;zj;ij ntspg;gLj;Jk; fUtpahfj; jha;nkhopiag; gad;gLj;Jjy;.						**K3**
	CO3	jfty; njlHGf;Fj; jha;nkhopapd; Kf;fpaj;Jtj;ij czHjy;.						**K2**
	CO4	jha;nkhopapd; rpwg;ig mwpjy;.						**K2**
	CO5	,yf;fpa ,d;gq;fis EfUk; jpwd;fis tsHj;jy;.						**K3**
UNIT-I	**,f;fhy ,yf;fpak;- kuGf;ftpijfs;- GJf;ftpijfs;- rpWfij**				**Periods: 09**			
kuGf;ftpijfs; - ghujpahH-nts;spg; gdpkiyapd; kPJyhTNthk;... (13 ghly;fs;)- ghujpjhrd;-Gul;rpf;ftp (Ngud;Gf; nfhz;ltNu...Kjy; - ftpQDf;Fk; fhjypf;Fk; kPl;rpje;jhH tiu) jq;fg;gh - gdpg;ghiw Edpfs; - tho;f;if Xtpak;. **GJf;ftpijfs;-**mg;Jy; uFkhd; - tlY}Uk; thHjhTk; - Afp - capHg;G (,aw;ifapd; vYk;G Kwpg;G) – **rpWfij -** MH.#lhkzp - rhk;gYf;Fs;.								**CO1**
UNIT-II	**ehlfk; -ciueil- ehty;**				**Periods: 09**			
ehlfk; - gpugQ;rd; - Kl;il - **ciueil** - ,uh.Ntq;flhrygjp - me;jf; fhyj;jpy; fhg;gp ,y;iy –**ehty; -** ,uh.KUfNts; - kpspHfy;								**CO2**
UNIT-III	**gf;jp ,yf;fpak; -irtk;- itztk; - fpwpj;Jtk; - ,];yhk;**				**Periods: 09**			
gf;jp ,yf;fpak; -irtk;-jpUQhdrk;ge;Jh - Kjy; jpUKiw - NjhLilanrtpad;...ghly; kl;Lk; - jpUehTf;furH - ehd;fhk; jpUKiw - $w;whapdthW...ghly; kl;Lk;- Re;juH - Vohk; jpUKiw - gpj;jhgpiw#B...ghly; kl;Lk; - khzpf;fthrfH - jpUthrfk; - Gy;yha; GOtha;...ghly; kl;Lk; - jpU%yH - jpUke;jpuk; - MHf;Fk; ,Lkpd;...ghly; kl;Lk; - fhiuf;fhyk;ikahH-jpUtpul;il kzpkhiy - md;ghy; miltnjt;thW...ghly; kl;Lk;. **itztk; -** ngha;ifaho;thH - itak; jfspaha;...ghly; kl;Lk; -G+jj;jho;thH - md;Ng jfspaha;...ghly; kl;Lk; - Ngaho;thH - jpUf;fz;Nld; nghd;Nkdp...ghly; kl;Lk; - ek;kho;thH - jpUtha;nkhop - csd; vdpd;...ghly; kl;Lk; - nghpaho;thH - nghpaho;thH jpUnkhop - thf;Fj; J}a;ik...ghly; kl;Lk; -Mz;lhs; - ehr;rpahH jpUnkhop– vd;G cUfp ,dNty;...ghly; kl;Lk; - **fpwpj;Jtk; -** ,ul;rz;a kNdhfuk; - Mtpf;FWnte;JaH...Kjy; ciday;yJ gw;WNjh tiu - **,];yhk; -** Fzq;Fb k];jhd; rhfpG– uFkhd; fz;zp -milj;j kdf;Nfhl;il...Kjy; vd;fz; tiu								**CO3**
UNIT-IV	**rpw;wpyf;fpak; - Kj;njhs;shapuk**; - **cyh- fyk;gfk;- gs;S- ,ilf;fhyg; GytHfs;**				**Periods: 09**			
rpw;wpyf;fpak; - Kj;njhs;shapuk; - 1.NtuWifgk;gpr; Riuaha;...2.khiy tpiygfHthH... 3.vd;id ciuay; ...vdj; njhlq;Fk; ghly;fs; kl;Lk; - **cyh** - FNyhj;Jq;fNrhod; cyh - jhis mutpe;jr; rhjp...Kjy; epyntd;whs; tiu - **fyk;gfk; -** jpUtuq;ff;fyk;gfk; - cUkhwpg; gygpwg;Gk;...Kjy; MBH thry; tiu - **gs;S -** Kf;$lw;gs;S - ehl;Ltsk; - fiwgl;Ls;sJ...vdj;njhlq;Fk; ghly; kl;Lk; -**J}J**-mofH fps;istpL J}J - ,d;nrhy;iy.....Kjy; cgNjrkhf ciug;gha; tiu **,ilf;fhyg; GytHfs; -** ,uhkypq;f mbfs; - k`hNjtkhiy–gbj;Njd;...Kjy; ngha; cyfpay; tiu – tPukhKdptH jpUf;fhtY}Hf; fyk;gfk; - jio–Nghjtpo;g;...vdj;njhlq;Fk; ghly; kl;Lk; - K.K`k;kJj`h - /nfsJK`pa;apj;jPd; gps;isj; jkpo; - tapWGilf;f cz;fpd;wPH...ghly; kl;Lk;.								**CO4**

UNIT-V	nkhopg;gapw;rp-,yf;fpa tuyhW	Periods: 09	
nkhopg;gapw;rp - 1.typkpFk; ,lq;fs; >typkpfh ,lq;fs;.- 2.mfuthpirg;gLj;Jjy;.-3.NeHfhzy; - **,yf;fpa tuyhW -** ,f;fhy ,yf;fpak;> gf;jp ,yf;fpak;> rpw;wpyf;fpak; Fwpj;j ghlg;gFjpia xl;baJ.			**CO5**
Lecture Periods: 45	**Tutorial Periods:-**	**Practical Periods:-**	**TotalPeriods:45**

Text Books

1. **ghujpahH – ghujpahH ftpijfs;> Kindle Edition**> Published June 2, 2020.
2. **rptFkhH. v];.> - nfhq;FNjH tho;f;if>** ghly; njhFg;G E}y; - njhFjp -1 Aidnll; iul;lH];> nrd;id -86. Kjw;gjpg;G 2003.
3. **#lhkzp.MH. - jdpikj; jspH> NjHe;njLj;j rpWfijfs;>** fhyr;RtL gjpg;gfk;> Kjy; gjpg;G: nrg;lk;gH 2013.
4. **gpugQ;rd; - [Ptejp (ehlfq;fs;) – ftpjh gg;spNf\d;> 8> khrpyhkzp njU> ghz;bg[hH> jp.efH> nrd;id -600 017**
5. **KUfNts;. ,uh.> - kpspHfy;>** Ik;nghopy; gjpg;gfk;> jpUg;G+H> ,uz;lhk; gjpg;G> 2014.

Reference Books

1. **ty;ypf;fz;zd;> GJf;ftpijapd; Njhw;wKk; tsh;r;rpAk;> =nrz;gfh gjpg;gfk;**> [dthp>1> 2020.
2. **rpw;gpghyRg;gpukzpak; kw;Wk; ePygj;kehgd; (g.Mrp.) – Gjpa jkpo; ,yf;fpa tuyhW> njhFjp-1>2>3>** rhfpj;jpa mfhnjkp> GJnly;yp> 2013.
3. **ghf;fpaNkhp> tifik Nehf;fpy; jkpo; ,yf;fpa tuyhW (nrk;ik kw;Wk; tphpTg; gjpg;G)>** ghhpepiyak;. nrd;id>
4. **Mde;jd;> KidtH.R.> - jkpo; ,yf;fpa tuyhW>** fz;kzp gjpg;gfk;> jpUr;rp-2. ,Ugj;jp %d;whk; gjpg;G– 2015.
5. **gue;jhkdhH> m.fp.> - ey;y jkpo; vOj Ntz;Lkh>** ghhp epiyak;> nrd;id> 1998.

Web References

1. http://www.tamilvu.org
2. http://www.tamilweb.com
3. http://www.tamilkodal.com
4. www.store.tamillexican.com
5. www.kala.tamilforu.blogspot.com
6. www.noolagam.com

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO 3
1	3	3	3	3	3	3	3	3
2	3	3	3	3	3	3	3	3
3	3	2	3	3	2	3	3	3
4	2	3	2	1	2	2	3	2
5	3	3	3	3	3	3	3	3

Correlation Level: 1: Low, 2: Moderate, 3: High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**FRENCH**	Programme: B.Sc. Chemistry	
Semester	**First**	Course Category Code: **MIL**	*End Semester Exam Type: **TE**

Course Code	A23FRT101C	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**FRENCH I**	**3**	**0**	**0**	**3**	**25**	**75**	**100**
(Common to B.A.., B.SC., and BCA Branches)								

Prerequisite	French language in class 12th	
Course Objectives	To introduce the basics of French language to the students	
	To enable the students to read, understand and write simple sentences	
	To help them to grasp the fundamentals of French grammar	
	To make the students to formulate correct phrases	
	To introduce them French and Francophone countries and their cultures	
Course Outcomes	***On completion of the course, the students will be able to***	BT Mapping (Highest Level)
	CO1 have a general understanding of the language	**K1**
	CO2 analyze and interpret simple phrases written in French	**K2**
	CO3 have the basics of French grammar	**K3**
	CO4 communicate and ask basic questions in French language	**K4**
	CO5 appreciate the diversity and multiplicity of French and Francophone world	**K5**

UNIT-I	**S'introduire**	**Periods:09**	
1. Le francais, les Francais, la France 2. Je m'appelle Elise, et vous ? 3. Saluer, se presenter, remercier 4. Vous dansez ? D'accord 5. Interroger quelqu'un et donner des informations			**CO1**
UNIT-II	**Demander des questions sur quelqu'un**	**Periods:09**	
1. Monica, Yokiko et compagnie 2. Dire ce qu'on l'aime 3. Les voisins de Sophie 4. Demander des informations sur quelqu'un			**CO2**
UNIT-III	**Expliquer quelque chose**	**Periods:09**	
1. Tu vas au Luxembourg ? 2. Dire où on va, dire d'où on vient 3. Nous venons pour l'inscription 4. A vélo, en train, en avion… 5. Expliquer un itinéraire, proposer quelque chose			**CO3**
UNIT-IV	**Poser des questions et commander**	**Periods:09**	
1. Pardon monsieur, le BHV s'il vous plait 2. Au marché 3. Acheter quelque chose, demander le prix 4. On déjeune ici ? 5. Aller au restaurant, comprendre un menu			**CO4**
UNIT-V	**Inviter et proposer quelque chose**	**Periods:09**	
1. On va chez ma copine ? 2. Proposer quelque chose 3. Demander et donner des informations sur quelqu'un 4. Chez Susana 5. Etre invité chez quelqu'un			**CO5**

Lecture Periods: 45	**Tutorial Periods:**	**Practical Periods:-**	**Total Periods: 45**

Text Books

1. Sylvie Poisson Quinton and Michèle Maheo, *Festival 1 Méthode de Français*, CLE editions, 2009
2. Nathalie Hirschsprung and Tony Tricot, *Cosmopolite 1*, Hachette editions, 2017
3. Caroline Veltcheff and Stanley Hilton, *Preparation du Delf A1*, Hachette editions, 2011

Reference Books

1. Régine Mérieux and Yves Loiseau, *Latitudes 1*, Didier editions, 2017
2. Annie Berthet and Emmanuelle Daili, *Alter Ego + A1*, Hachette editions, 2012
3. Bruno Giradeau, *Réussir le Delf A1*, Didier editions, 2019
4. Richard Lescure, *Delf A1 150 Activités,* Langers and CLE, 2005
5. Manisha Verma, *La grammaire élémentaire française*, Notion Press, 2010

Web References

1. https://www.tv5monde.com
2. https://www.rfi.fr
3. https://www.lemonde.fr
4. https://www.frenchpodcasts.com
5. https://www.coursera.org

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (PO)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	3	3	3	3	3	3	3	3
2	3	3	3	3	2	3	3	3
3	3	3	3	3	3	3	2	3
4	2	3	2	2	3	3	3	3
5	3	3	3	3	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**ENGLISH**	Programme: B.Sc. Chemistry						
Semester	**First**	Course Category Code: **ENG**			End Semester Exam Type: **TE**			
Course Code	**A23GET101C**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**GENERAL ENGLISH - I**	**3**	**0**	**0**	**3**	**25**	**75**	**100**
(Common to B.A.., B.SC., AND BCA Branches)								
Prerequisite	Basic part-two language and knowledge gained from Grammar and Vocabulary							

Course Objectives	To recognize the rhythms, metrics and other aspects of Literature	
	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	
	To enable them understanding the intrinsic nuances of writing in English language	

Course Outcomes	***On completion of the course, the students will be able to***		BT Mapping (Highest Level)
	CO1	Comprehend and discuss the various facets of selected poems	**K3**
	CO2	Analyze and interpret texts written in English	**K3**
	CO3	Read drama with graduate-level interpretive and analytical proficiency	**K3**
	CO4	Improve the fluency and formation of grammatically correct sentence	**K3**
	CO5	Enhance the writing skills for specific purposes	**K3**

UNIT-I	**POETRY**	**Periods:09**	
6. Rudyard Kipling – *IF* 7. William Wordsworth – *Daffodils* 8. Percy Bysshe Shelley – *Ozymandias* 9. William Ernest Henley – *Invictus* 10. Rabindranath Tagore – *On the Nature of Love*			**CO1**
UNIT-II	**PROSE**	**Periods:09**	
5. Bertrand Russell – *The Road to Happiness* 6. Charles Lamb – *A Dissertation upon Roast Pig*			**CO2**
UNIT-III	**SHORT STORIES**	**Periods:09**	
6. Oscar Wilde – *The Devoted Friend* 7. R. K. Narayan – *God and the Cobbler*			**CO3**
UNIT-IV	**DRAMA**	**Periods:09**	
6. H H Munro – *The Death Trap* 7. J.M. Synge – *Riders to the Sea*			**CO4**
UNIT-V	**GRAMMAR AND COMPOSITION**	**Periods:09**	
6. Parts of Speech 7. Subject-Verb Agreement 8. Letter Writing 9. Essay Writing			**CO5**

Lecture Periods:45	**Tutorial Periods:0**	**Practical Periods:-**	**Total Periods:45**

Text Books

4. Narayan, R.K, *Malgudi days*, Indian Thought Publication, 2019
5. Synge John Millington, *Riders to the Sea*, Sahitya Sarowar Publisher, 2022
6. P. C. Wren, H. Martin, *High School Wren and Martin English Grammar and Composition*, S. Chand & Company Pvt. Ltd, 2022.

Reference Books

1. Lamb, Charles, *Selected Prose*, Penguin Classics Publication, 2nd Edition, 2013.
2. S.C. Gupta, *English Grammar & Composition Very Useful for All Competitive Examinations*, Arihant Publications, 2014.
3. Saki, H. H. Munro, F. Carruthers Gould, *The Complete Works of Saki: Illustrated Edition: Novels, Short Stories, Plays, Sketches & Historical Works, including Reginald, The Chronicles of Clovis, ... The Death-Trap*, The Westminster Alice Kindle Edition, e-artnow, 2018.
4. J.M. Synge, S.C. Narula. *Riders to the Sea*. Surjeet Publication. 2018.
5. S.C.Gupta. *A Handbook for Letter Writing*. Arihant Publication. 2016.

Web References

1. https://www.englishcharity.com/of-love-by-francis-bacon-explanation/
2. https://www.gradesaver.com/charles-lamb-essays/study-guide/summary-a-dissertation-upon-roast-pig
3. https://allpoetry.com/On-The-Nature-Of-Love
4. http://sittingbee.com/god-and-the-cobbler-r-k-narayan/
5. https://www.toppr.com/guides/essays/

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3
1	3	3	3	3	3	3	3	3
2	3	3	3	3	3	3	3	3
3	3	2	3	3	2	3	3	3
4	2	3	2	1	2	2	3	2
5	3	3	3	3	3	3	3	3

Correlation Level

High	Moderate	Low
3	2	1

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Chemistry**	Programme: B.Sc., Chemistry						
Semester	**First**	Course Category Code: **DSC**			*End Semester Exam Type: **TE**			
Course Code	**A23CHT101D**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**GENERAL CHEMISTRY - I**	**4**	**-**	**-**	**4**	**25**	**75**	**100**
Pre requisite	Higher Secondary Chemistry Book							
Course Objectives	• To understand about atomic various models, atomic structure and stability of atom • To gain knowledge on periodicity and periodic properties of elements • To improve knowledge on organic nomenclature, structure, properties and polar effects of molecules • To understand the molecular symmetry and operations • To learn about basic concepts in the stereochemistry							

Course Outcome	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Develop knowledge on the various atomic model and electronic configuration	**K3**
	CO2 Analyze periodicity and periodic properties of elements	**K3**
	CO3 Apply the knowledge on organic nomenclature in the various field	**K3**
	CO4 Understand molecular symmetry and various symmetry operations	**K3**
	CO5 Use the basic concepts of stereochemistry in the organic molecules	**K2**

UNIT-I	**ATOMIC STRUCTURE**	**Periods:12**
Rutherford model of the atom- defects of Rutherford model - Discovery of neutron, Bohr model of an atom- merits and demerits- Hydrogen atom spectra – Sommerfeld modification- de Broglie's concept- dual nature, quantum numbers- shapes of s, p, d atomic orbitals. Arrangement of electrons in atoms- Hund's rule – Pauli exclusion principle- Heisenberg's uncertainty principle. Aufbau principle and n+l rule. Electronic configuration of atoms up to atomic number 30 and stability of half filled and completely filled orbitals		**CO1**
UNIT-II	**PERIODICITY AND PERIODIC PROPERTIES**	**Periods:12**
Cause of periodicity. Classification of elements in to s, p, d and f blocks. : Atomic properties- Elementary ideas of Covalent radius Van der Waals radius-Ionic radius and their periodic trends. Ionisation Energy, Electron affinity, Electro negativity and their periodic trends–Pauling and Mulliken-Jaffe scale of Electro negativity.		**CO2**
UNIT-III	**ORGANIC NOMENCLATURE, STRUCTURE AND PROPERTIES**	**Periods:12**
Classification and nomenclature of organic compounds – IUPAC systems. Structure and shape of aliphatic organic molecules: Hybridization – Definition, sp^3 hybridization of carbon (methane) – sp^2 hybridization in alkenes (ethane) and sp hybridization in alkynes (ethane). Electronic Displacement Effects: Inductive Effect, Electromeric Effect, Resonance and Hyper conjugation. Reactive Intermediates: Carbocations, Carbanions, free radicals, carbenes and nitrenes (Structure and stability).		**CO3**
UNIT-IV	**STEREOCHEMISTRY**	**Periods:12**
Conformations of ethane and butane. Wedge, Newmann, Sawhorse and Fischer and their Interconversion. chirality due to stereo centre (upto two carbon atoms). Enantiomerisms, Diastereomerisms and Meso compounds. Threo and erythro; D and L; cis – trans nomenclature; Configuration: CIP Rules: R/ S (for only one chiral carbon atoms) and E / Z Nomenclature (for ethene). Optical and Geometrical isomerism.		**CO4**
UNIT-V	**STATES OF MATTER (GAS AND LIQUID)**	**Periods:12**
Gaseous State: Postulates and derivation of the kinetic gas equation - Kinds of velocities - mean, RMS, most probable velocities (definition only) – Collision frequency – mean free path - Deviation of real gas from ideal behaviour- Derivation of Van der Waal's equation. **Liquid State**: Physical properties of liquids – Vapour pressure – surface tension – coefficient of viscosity – Effect of temperature and pressure on viscosity – concentration terms – molarity (M), Normality (N), molality (m), formality, mole fraction, percentage concentration.		**CO5**

Lecture Periods:60	**Tutorial Periods: -**	**Practical Periods:-**	**Total Periods:60**

Text Books

1. Principles of Inorganic Chemistry, B. R. Puri, L. R. Sharma and K. C. Kalia, Shoban Lal Nagin Chand and Co., New Delhi, 2018.
2. R. T. Morrison and R. N. Boyd, Organic Chemistry, 7th edn., Printice-Hall of India Limited, New Delhi, 2010.

3. Principles of Physical Chemistry, B.R Puri, L.R Sharma, M.S. Pathania, 47 th edition, 2016, Vishal publishing.

Reference Books

1. Inorganic Chemistry, D. F. Shriver, P. W. Atkins, W. H. Freeman and Co, London, 2010.
2. Inorganic Chemistry, J. E. Huheey, E. A. Kieter and R. L. Keiter, Harper Collins, New York, 2006, 4th edn.
3. Madan R.D., "Modern Inorganic Chemistry", S. Chand & Company, New Delhi, 2nd Edition, 2004.
4. I.L.Finar, "Organic chemistry Vol 1", Pearson Edition, Singapore, 6th Edition, 2005.
5. P.L. Soni, "Text Book of Organic Chemistry", Sultan Chand, New Delhi, 1st Edition, 2005.
6. J. March and M. Smith, Advanced Organic Chemistry, 6th edn. John-Wiley and sons, 2007.
7. G. D. Tuli, B. S. Bahl, Arun Bahl, "Essentials of Physical Chemistry", S.Chand Publication, 24th Edition, 2000.
8. Stereochemistry of carbon compounds by L.Eliel Mac Graw Hill

Web References

1. https://bit.ly/3vB6v0N
2. https://bit.ly/3juWayu
3. https://byjus.com/chemistry/processes-of-metallurgy/
4. https://bit.ly/3Gb99iy
5. https://www.organic-chemistry.org/
6. https://nptel.ac.in/content/storage2/courses/122101001/downloads/lec-36.pdf

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

Cos	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	1	3	2	2	3	3	3	2
2	3	2	2	3	3	3	2	2
3	3	2	3	2	3	3	2	3
4	2	3	3	2	2	3	3	3
5	3	2	3	2	2	2	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Assessment Pattern as per Bloom's Taxonomy

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Chemistry**		Programme: B.Sc., Chemistry					
Semester	**First**		Course Category Code: **DSC**			*End Semester Exam Type: **TE**		
Course Code	**A23CHT102D**		Periods/Week			Credit	Maximum Marks	
			L	T	P	C	CAM	ESE	TM
Course Name	**ANALYTICAL CHEMISTRY**		**4**	**-**	**-**	**4**	**25**	**75**	**100**
Pre requisite	Basic Knowledge in the Higher Secondary standard Level								
Course Objectives	• To understand about handling of various chemicals and data analysis								
	• To gain knowledge on separation and purification of organic molecules by various methods								
	• To improve knowledge on various quantitative titration								
	• To understand the principles of gravimetric analysis and various precipitation procedures								
	• To learn about basic concepts of thermal analysis used in the chemical industries								
Course Outcome	**On completion of the course, the students will be able to**						BT Mapping (Highest Level)	
	CO1	Develop knowledge on the handling of various chemicals and data analysis					**K3**	
	CO2	Analyze separation and purification of organic molecules by various methods					**K3**	
	CO3	Apply the knowledge of various quantitative analyses in the chemical industries					**K3**	
	CO4	Understand principles of gravimetric analysis and various precipitation procedures					**K2**	
	CO5	Use the basic concepts of thermal analysis chemical industries					**K2**	

UNIT-I	**HANDLING OF CHEMICALS AND DATA ANALYSIS**	**Periods:12**	
Safety and hygiene in the Chemistry Lab -Storage and handling of chemicals, handling of acids, ethers, toxic and poisonous chemicals. Antidotes, threshold vapour concentration and first aid procedure. Material safety data sheet (MSDS), Control of substances hazardous to health (COSHH). Calibration of volumetric apparatus: burette, pipette and standard flask. Errors in chemical analysis - Accuracy and precision, Types of errors – Determinate and indeterminate errors. Methods of eliminating or minimizing errors. Precision: mean, median, average deviation and coefficient of variation. Significant figure and its relevance. Normal error curve and its importance.			**CO1**
UNIT-II	**SEPARATION AND PURIFICATION TECHNIQUES**	**Periods:12**	
Chromatographic techniques and applications - Principles of adsorption and partition chromatography: Paper, Thin layer, Column chromatography and ion exchange chromatography. General purification techniques - Purification of solid organic compounds: re-crystallization, sublimation. Use of miscible solvents. Use of drying agents and their properties. Purification of liquids.			**CO2**
UNIT-III	**QUANTITATIVE TITRIMETRY**	**Periods:12**	
Methods of expressing concentration of solutions – Molarity, molality, formality, normality, mole fraction, ppm and ppb. Law of volumetric analysis. Requirements for titrimetric analysis. Primary and secondary standards. Limitation of volumetric analysis. Types of Acid base titrations. Buffer solutions. Henderson equation. Preparation of acidic and basic buffers. Relative strength of acids and bases from Ka and Kb values. Theory and choice of indicators. Complexometric titrations - Stability of complexes. Titration involving EDTA. Usage of metal ion indicators.			**CO3**
UNIT-IV	**QUANTITATIVE GRAVIMETRY**	**Periods:12**	
Principles of gravimetric analysis- gravimetric factor- calculation involved- conditions for precipitation- theory of precipitation- types of precipitants- advantages- Purity of precipitates– Co-precipitation and Post precipitation-precipitation Precipitation from homogeneous solution; crucibles- types and maintenance- washing of the precipitates-Drying and ignition of precipitates.			**CO4**
UNIT-V	**THERMAL ANALYSIS**	**Periods:12**	
Thermo Analytical Methods: Principles of TGA and DTA – Hondas balance – precautions in using thermo Balance – Outlines of Instrumentation (block diagram only) – Application in $CaC_2O_4.H_2O$ and $(CH_3COO)_2Ca.H_2O$ -Thermometric titration – Principle and instrumentation – Conditions for Thermometric Titration – Titration of HCl Vs NaOH– Applications of thermometric titration.			**CO5**

Lecture Periods:60	**Tutorial Periods:-**	**Practical Periods:-**	**Total Periods:60**

Text Book

1. U. N. Dash, Analytical Chemistry: Theory and Practice, Sultan Chand and sons Educational Publishers, New Delhi, 2011.
2. R. Gopalan, P. S. Subramanian and K. Rengarajan, Elements of Analytical Chemistry, Sultan Chand, New Delhi, 2007.
3. B. Sivasankar, Instrumental Methods of Analysis, Oxford University Press, 2012.

Reference Books

1. D. A. Skoog, D. M. West and F. J. Holler, Analytical Chemistry: An Introduction, 5th edn., Saunders college publishing, Philadelphia, 1998.
2. R.A. Day and A.L. Underwood, Quantitative Analysis, 6thedn., Prentice Hall of India Private Ltd., New Delhi, 1993.
3. H. Kaur, Instrumental Methods of Chemical Analysis, Pragati Prakashan, Meerut, 2010.
4. V.K. Srivastava, K.K. Srivastava, Introduction to Chromatography: Theory and Practice,
S. Chand and Company, New Delhi, 1987.

Web References

1. https://bit.ly/3pz9NR1
2. https://bit.ly/3vCz4uA
3. https://bit.ly/3lBgbos
4. https://bit.ly/3lENibe

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

Cos	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	3	3	2	2	1	3	3	3
2	2	2	2	3	-	2	2	2
3	3	3	3	2	1	3	3	2
4	1	2	2	1	-	1	2	3
5	3	3	3	1	2	2	3	1

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Mathematics**		Programme: B.Sc Chemistry					
Semester	**First**		Course Category Code: **IDC**			*End Semester Exam Type: **TE**		
Course Code	**A23MAD103C**		Periods / Week			Credit	Maximum Marks	
			L	T	P	C	CAM	ESE	TM
Course Name	**ALLIED MATHEMATICS I**		**3**	**1**	**-**	**4**	**25**	**75**	**100**
(Common to B.Sc. Physics and B.Sc. Chemistry Branches)									
Prerequisite	Basic Electrical Engineering, Laplace Transform								
Course Outcome	**On completion of the course, the students will be able to**							BT Mapping (Highest Level)	
	CO1	Find Eigen values and Eigen vectors, diagonalization of a matrix.						**K2**	
	CO2	Find expansion of trigonometric values and solution of trigonometric solution.						**K3**	
	CO3	Analyze and solve Differential Equations.						**K4**	
	CO4	Understand the different types of integration.						**K3**	
	CO5	Solve double and Triple integral problems.						**K3**	
UNIT-I	**MATRICES**					**Periods: 12**			
Definitions - Rank of a Matrix- Consistency of system of equations - Characteristic equation -Eigen values and Eigen vectors of a real matrix- Diagonalization of matrices - Properties of Eigen values and Eigen vectors.									**CO1**
UNIT-II	**TRIGNOMETRY**					**Periods: 12**			
Expansions of cos nθ, sin nθ, tan nθ in terms of θ - Powers of sines and cosines of θ in terms of functions of multiples of θ – Expansions of sin θ and cos θ in a series of ascending powers of θ.									**CO2**
UNIT-III	**DIFFERENTIAL EQUATION**					**Periods: 12**			
Linear differential equations with constant coefficients - simultaneous linear differential equations - Solution by variation of parameter method.									**CO3**
UNIT-IV	**DEFINITE INTEGRALS**					**Periods: 12**			
Definite integrals – Integration by parts - Reduction formula.									**CO4**
UNIT-V	**MULTIPLE INTEGRALS**					**Periods: 12**			
Multiple Integrals - change of order of integration - Applications: Areas by double integration and volumes by triple integration(Cartesian).									**CO5**
Lecture Periods: 45	**Tutorial Periods: 15**		**Practical Periods: -**			**Total Periods: 60**			

Text Books

1.S. Durai Pandian and Laxmi Durai Pandian (1984) *Trigonometry*. Emerald Publishers, Chennai.

2. M.K. Venkataraman, Engineering Mathematics (First Year), 2rd Edition, The National PublishingCompany, Madras, 2001.

3. Shanti Narayan, "Integral Calculus", S Chand & Co. New Delhi, 2001.

Reference Books

1. A. Singaravelu "Algebra and Trigonometry", Vol.-I Meenakshi Agency, Chennai (2003).
2. P.R. Vittal, "Trigonometry, Margham" Publications, Chennai.(2004)
3. P. Kandasamy, K. Thilagavathy, "Mathematics of B.SC", Vol I & II, S. Chand Company Ltd, NewDelhi — 2004.
4. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley, Tenth edition, 2019
5. B.V.Ramana, "Higher Engineering Mathematics", Tata McGraw-Hill, New Delhi, Sixth edition 2018.

Web References

1. https://nptel.ac.in/courses/111/105/111105122/
2. https://www.khanacademy.org/math/precalculus/x9e81a4f98389efdf:trig/x9e81a4f98389efdf:inverse-trig/v/inverse-trig-functions-arcsin
3. https://www.khanacademy.org/math/statistics-probability
4. http://www.yorku.ca/yaoguo/math1025/slides/chapter/kuttler-linearalgebra –slides-Systemsofquation-handout.pdf
5. https://nptel.ac.in/courses/111/105/111105122/

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

Cos	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	3	2	3	2	-	2	3	1
2	3	2	3	2	1	3	2	1
3	3	2	3	3	-	2	3	1
4	2	3	2	-	3	3	2	2
5	3	2	-	3	1	3	2	1

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Chemistry**	Programme: B.Sc., Chemistry						
Semester	**First**	Course Category Code: **DSC**			*End Semester Exam Type: **TE**			
Course Code	**A23CHL101D**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**VOLUMETRIC ANALYSIS & CHROMATOGRAPHY**	**0**	**0**	**4**	**2**	**50**	**50**	**100**
Pre requisite	Higher Secondary Chemistry Book							
Course Objectives	• To understand about concentration of the solutions • To gain knowledge on acid and base titration with indicator usage • To improve knowledge on permanganometry titration • To understand the principles of chromatography • To learn about basic concepts of crystallization in the purification techniques							

Course Outcome	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Develop knowledge on preparation of solutions with different concentration	**K2**
	CO2 Analyze acid base titration in the industry level	**K3**
	CO3 Apply the knowledge of permanganometry titration in the chemical industries	**K3**
	CO4 Apply and analyze the chromatography separation concepts	**K3**
	CO5 Use the basic concepts of crystallization in the purification techniques with required apparatus	**K2**

List of Experiments **Periods: 30**

1. Preparation of standard solutions of different Molarities and Normalities.
2. Estimation of HCl by NaOH using a standard Oxalic acid solution
3. Estimation of Na_2CO_3 by HCl using a standard Na_2CO_3 Solution.
4. Estimation of Oxlaic acid by KMnO4 using a standard Oxalic acid solution
5. Estimation of $KMnO_4$ by Thio using a standard Potassium dichromate Solution
6. Estimation of Copper (II) Sulphate by $K_2Cr_2O_7$ solution.
7. Separation of mixtures by Chromatography: Measure the Rf value in each case(combination of two compounds to be given)
8. Identify and separate the components of a given mixture of two amino acids (glycine, aspartic acid, glutamic acid, tyrosine or any other amino acid) by paper chromatography
9. Identify and separate the sugars present in the given mixture by paper chromatography.

Recrystallization of benzoic acid

Lecture Periods:	**Tutorial Periods:**	**Practical Periods:-30**	**Total Periods:30**

Text Books

1. Pandey O.P, Bajpai D.N. &Giri S., "Practical Chemistry (For B.Sc. I, II and III Year Students)", S. Chand Limited, 1st Edition 1972.
2. Mendam J, Denney RC, Barnes JD, Thomas MJK, "Text book of quantitative chemical analysis", 6th Edition 2008.
3. Mohammed Awad Ali Khalid, "Redox Principles and advanced application", 1st Edition, 2017.

Reference Books

1. Venkateswaran. V, Veeraswmay. R, Kulandaivelu. A.R., "Basic Principles of Practical Chemistry", New Delhi, Sultan Chand and Sons.,1st 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://en.wikipedia.org/wiki/Acid%E2%80%93base_titration
2. https://en.wikipedia.org/wiki/Permanganometry
3. http://staff.buffalostate.edu/nazareay/che112/chromate.htm

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

Cos	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	3	3	2	2	1	3	2	3
2	2	2	3	3	1	2	2	2
3	3	3	3	2	1	2	2	2
4	2	1	2	1	-	1	2	3
5	3	3	3	1	2	3	3	1

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)			End Semester Examination (ESE) Marks	Total Marks
	Model Exam	Record	Attendance		
Marks	30	10	10	50	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**ENGLISH**	Programme: B.Sc., Chemistry						
Semester	**First**	Course Category Code: **SEC**			End Semester Exam Type: -TE			
Course Code	**A23ENSA02C**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**SOFT SKILLS**	**2**	**0**	**0**	**2**	**100**	**0**	**100**

Prerequisite	Knowledge gained from Journal reading and Newspaper reading	
Course Objectives	To train students in Soft skills in order to enable them to be professionally competent	
	To facilitate the students for Goal setting and Goal Achieving skills	
	To enrich the sense of social responsibility and accountability of the students	
	To help the students to train them for Stress Management and Time Management	
	To train the students to work with team environment and Creative thinking	
Course Outcomes	***On completion of the course, the students will be able to***	BT Mapping (Highest Level)
	CO1 enhance the Soft skills and compete professionally	**K3**
	CO2 achieve Goal setting and Goal Achieving skills	**K3**
	CO3 improve theirsocial responsibility and accountability skills	**K3**
	CO4 enrich Stress Management and Time Management	**K3**
	CO5 demonstrate the quality of a Team ship and Creative thinking	**K3**

UNIT-I	**POSITIVE ATTITUDE**	**Periods:06**	
Skills-Personal Skills: Knowing Oneself/Self-Discovery - Confidence Building - Defining Strengths of Attitude - formation of attitudes - psychological factors - the power of positive attitude - the benefits of positive attitude – developing positive attitude - negative attitude – the causes of negative attitude - the consequences of negative attitude - how to change negative attitude			**CO1**
UNIT-II	**GOAL SETTING**	**Periods:06**	
Introduction - importance of goal setting - goal definition - types of goals - what exactly goal setting - why people don't set goals - how to choose the right goals - SMART GOALS - Career goals - benefits of career goal setting - goal setting tips			**CO2**
UNIT-III	**STRESS AND TIME MANAGEMENT**	**Periods:06**	
Definition of Stress management - types of stress - causes of stress - stress management and reduction techniques - Definition of Time management - Setting goals, planning – prioritizing - setting deadlines - multi-tasking - practicing self-discipline - overcoming procrastination			**CO3**
UNIT-IV	**TEAMWORK SKILLS**	**Periods:06**	
Communication as Social Construction - Dynamics of professional Group communication - Group and Team - Team Building Process - Managing conflict and appreciating/respecting differences - Decision making & effective negotiation - Types of teams - Understanding, Identity and nurturing sensitivity (in terms of gender, orientation, language)			**CO4**
UNIT-V	**PROBLEM SOLVING THROUGH CREATIVE THINKING**	**Periods:06**	
Thinking Creatively - Improving Perceptions - Creative thinking as an essential skill - Techniques of creative thinking (such as brainstorming, lateral thinking, mind mapping, rich pictures, role play) - Practical problem solving through creative thinking - Case Study			**CO5**

Lecture Periods:- 30	**Tutorial Periods:-**	**Practical Periods:**	**Total Periods:30**

Text Books

1. Sabina Pillai, Agna Fernandez, *Soft Skills and Employability Skills*, Cambridge University Press, 2017.
2. Jeff Butterfield, *Soft Skills for Everyone*, Cengage India Private Limited, 2nd Edition, 2020.
3. Alex K, *Soft Skills*, S Chand & Company, 1st Edition, 2014.

Reference Books

1. Barun Mitra, Personality Development and Soft Skills 2, Oxford University Press, 2016.
2. Prashant Sharma, Soft Skills 3rd Edition: Personality Development for Life Success, BPB Publications, 2021.
3. Ghosh, B.N, Managing Soft Skills for Personality Development, Tata McGraw Education Publication, 1st Edition, 2012.
4. R.S.Aggarwal. A Modern Approach to Non-Verbal. S Chand Publication. 2017.
5. K. K. Sinha, *Business Communication*, Galgotia Publishing, 4th Edition, 2011.

Web References

1. https://www.mindtools.com/a5ykiuq/personal-goal-setting
2. https://www.healthlinkbc.ca/health-topics/stress-management-managing-your-time
3. https://www.herzing.edu/blog/7-important-teamwork-skills-you-need-school-and-your-career
4. https://online.hbs.edu/blog/post/what-is-creative-problem-solving
5. https://www.lucidchart.com/blog/7-steps-to-creating-better-goals

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3
1	1	3	3	1	1	1	3	3
2	3	3	3	1	1	1	3	2
3	3	3	3	1	2	1	3	3
4	3	3	3	1	2	1	3	1
5	3	3	3	1	3	1	3	3

Correlation Level

High	Moderate	Low
3	2	1

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	80		-	10	10	-	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Chemistry**	Programme: B.Sc., Chemistry						
Semester	**First**	Course Category Code: AE**CC**			*End Semester Exam Type: **TE**			
Course Code	A23AETA01C	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**PUBLIC ADMINISTRATION**	**2**	**-**	**-**	**1**	**100**	**-**	**100**
	(Common to Branches)							

Pre requisite	Higher Secondary Chemistry Book
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 PublicAdministration

Course Outcome	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Understand the concepts and evolution of Public Administration.	**K3**
	CO2 Be aware of what is happening in the Public Administration in the country	**K3**
	CO3 Explain the Territory Administration in the State and the Centre	**K3**
	CO4 Appreciate emerging issues in Indian Public Administration	**K3**

UNIT-I	**INTRODUCTION TO PUBLIC ADMINISTRATION**	**Periods:7**	
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 andothers - Evolution of Public Administration in India – Arthashastra – Colonial Administration upto 1947			**CO1**

UNIT-II	**PUBLIC ADMINISTRATION IN INDIA**	**Periods:8**	
Enactment of Indian Constitution - Union Government – The Cabinet – Central Secretariat -– All India Services – Training of Civil Servants – UPSC – Niti Ayog – Statutory Bodies: The Central Vigilance Commission – CBI - National Human Rights Commission – National Women's Commission –CAG			**CO2**

UNIT-III	**STATE AND UNION TERRITORY ADMINISTRATION**	**Periods:8**	
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			**CO3**

UNIT-IV	**EMERGING ISSUES IN INDIAN PUBLIC ADMINISTRATION**	**Periods:7**	
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			**CO4**

Lecture Periods:30	**Tutorial Periods:**	**Practical Periods:-**	**Total Periods:30**

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, 3rd Edition, 2012.
3. Rumki Basu, "Public Administration: Concept and Theories", Sterling, 1st Edition, 2013.

Reference Books

1. Siuli Sarkar, "Public Administration in India", Prentice Hall of India, 2ndEdition, 2018.
2. M. Laxmikanth, "Public Administration", McGraw Hill Education, 1 Edition, 2011.

3. R.B.Jain, "Public Administration in India: 21st Century Challenges for Good Governance", Deep and Deep Publications, 1 Edition, 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/
5. https://www.india.gov.in/my-government/whos-who/lt-governors-administrators

* TE – Theory Exam, LE – Lab Exam

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	70		-	20	10	-	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**TAMIL**	Programme: **B.Sc. Chemistry**						
Semester	**II**	Course Category Code: **AEC**			*End Semester Exam Type: **TE**			
Course Code	**A23TAT202C**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**TAMIL – II**	**4**	**0**	**0**	**2**	**25**	**75**	**100**
(Common to **B.A, B.Sc., BBA., B.COM., BCA., B.COM CS.,**)								

Prerequisite	• • • • • • • • • • • • • tFg;gpy; jkpio xU ghl• • • • • • • • • • • • • • • Ntz;Lk;.
Course Objectives	• nrt;tpyf;fpa jd;ik nfhz;l jkpo ;nkhopapd; rpwg;gpid vLj;Jiug;gjhf ,g;ghlj;jpl;lk; mikf;fg;gl;Ls;sJ.
	• ,uz;lhapuk; Mz;Lfhyj; jkpopd; njhd;ikiaAk; tuyhw;iwAk; mjd; tpOkpaq;fisAk; gz;ghl;ilAk; vLj;Jiug;gjhf ,g;ghlj;jpl;lk; mikf;fg;gl;Ls;sJ.
	• jkpo; ,yf;fpak; cs;slf;fj;jpYk;> tbtj;jpYk; ngw;wkhw;wq;fs;>mjd; rpe;jidfs;>milahsq;fs; Mfpatw;iwf; fhye;NjhWk; vOjg;gl;l ,f;fpaq;fspd; topahff; $Wtjw;F ,g;ghlj;jpl;lk; mikf;fg;gl;Ls;sJ.
	• tho;tpay; rpe;jidfs;>xOf;ftpay; Nfhl;ghLfs;>rkj;Jtk;> #oypay; vdg; gy $WfiskhztHfSf;F vLj;Jiuf;Fk; tpjj;jpy; ,g;ghlj;jpl;lk; cUthf;fg;gl;Ls;sJ.
	• rpe;jid Mw;wiyg; ngUf;Ftjw;Fj; jha;nkhopapd; gq;fspg;gpid czHj;j ,g;ghlj;jpl;lk; mikf;fg;gl;Ls;sJ.

Course Outcome	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 ,yf;fpaq;fs; czHj;Jk; tho;tpay; newpKiwfisg; Ngzpelj;jy;.	**K3**
	CO2 ekJ vz;zj;ij ntspg;gLj;Jk; fUtpahfj; jha;nkhopiag; gad;gLj;Jjy;.	**K3**
	CO3 jfty; njlHGf;Fj; jha;nkhopapd; Kf;fpaj;Jtj;ij czHjy;.	**K2**
	CO4 jha;nkhopapd; rpwg;ig mwpjy;.	**K3**
	CO5 ,yf;fpa ,d;gq;fis EfUk; jpwd;fis tsHj;jy;.	**K3**

UNIT-I	**fhg;gpak;**	**Periods: 09**
rpyg;gjpfhuk; kzpNkfiy nghpaGuhzk; fk;guhkhazk; Njk;ghtzp rPwhg;Guhzk;	- tof;Fiufhij–fhtpAFePUk;...Kjy; Njhw;whd; capHtiu (8 thpfs;) -gspf;fiwGf;ffhij–kJkyHf; $e;jy;...Kjy; Gwkwpg; ghuha; tiu(106-121thpfs;) -,isahd ;FbkhwehadhH Guhzk; - cs;sk; md;Gnfhz;L...(17MtJ ghly; kl;Lk;) - Fk;gfHztijg;glyk; - cwq;Ffpd;w Fk;gfd;d... (45MtJghly; kl;Lk;) -ghykhl;rpg;glyk; - Cl;bdhHmUs;...(229 ghly; kl;Lk;) - kioaiog;gpj;jg; glyk; - NtapidKwpj;J vdj; njhlq;Fk ;(15MtJghly; kl;Lk;)	**CO1**
UNIT-II	**gjpndz; fPo;f;fzf;F E}y;fs;**	**Periods: 09**
jpUf;Fws; ehybahH rpWgQ;r%yk; Ie;jpizIk;gJ fhHehw;gJ fstopehw;gJ	- typawpjy; (48)>neQ;nrhLfpsj;jy; (125) - mUk;ngwy;...(ghly; vz;:34) -G+thJfha;f;Fk;...(ghly; vz;:22) - Ridtha;r; rpWePiu...(ghly; vz;:38) - fUtpisfz;kyHNghy; G+j;jd...(ghly; vz;:34) - Qhl;gpDnsQ;rpa (ghly; vz;:2)	**CO2**
UNIT-III	**rq;f ,yf;fpak; - vl;Lj;njhif**	**Periods: 09**
Iq;FWE}W FWe;njhif ew;wpiz mfehD}W GwehD}W ghpghly;	-ghly; vz;:44; -Njhop $w;W - ghly; vz;:224 - jiytp $w;W - ghly; vz;:284 - jiytd; $w;W - ghly; vz;:145 - nrtpyp $w;W - ghly; vz;:102 -xsitahH - ghly; vz;:3 - jpUkhy; tho;j;J (1-11thpfs;)	**CO3**
UNIT-IV	**gj;Jg;ghl;L**	**Periods: 09**
nghUeuhw;Wg;gil- rpWghzhw;Wg;gil- ngUk;ghzhw;Wg;gil-ghHitahj;j...Kjy; gjk; kpfg; gUFtPHtiu (95-105) FwpQ;rpg;ghl;L -mz;zy; neLq;NfhL...Kjy; rpte;jfz;Nzk;tiu(54-61) kJiuf;fhQ;rp neLey;thil	thhpAk; tbj;Jk;...Kjy; ngUe;jFghbdptiu(25-47) ige;jidmtiu...Kjy; ntd;wpNtY}H va;jpd; tiu (164-173) -ikgLngUe;Njhs;...Kjy; ngUk;ngaHkJiutiu (687-699) -FspHfhyf;fhl;rp- fy;nyd; Jtiyj;...Kjy; gz;ZKiwepWg;gtiu (64-70)	**CO4**
UNIT-V	**nkhopg;gapw;rp>,yf;fpa tuyhW**	**Periods: 09**

1.Kjy;>fU>chpg;nghUs; mwpjy; 2.myfpl;Ltha;g;ghL 3.mzpfs; mwpjy; **,yf;fpa tuyhW** fhg;gpak;>mw,yf;fpak;>rq;f ,yf;fpak; Fwpj;jg; ghlg;gFjpia xl;ba ,yf;fpa tuyhW.	**CO5**

Lecture Periods: 45	**Tutorial Periods:-**	**Practical Periods:-**	**Total Periods:45**

Text Books

1. **rptFkhH>v];.> -nfhq;FNjHtho;f;if>**ghly; njhFg;G E}y; - njhFjp -1>Aidnll; iul;lH];> nrd;id -86. Kjw;gjpg;G.2003.
2. **rhkpehijaH lhf;lH c.Nt.FWe;njhif %yKk; ciuAk;>** lhf;lHc.Nt.rhkpehijaH E}y; epiyak;> ntspaPl;nlz;: 277>ngrd;l; efH> nrd;id– 600 090.vl;lhk; gjpg;G– 2020.
3. **Ntq;fluhkd;> tpj;Jthd;.n`r;. (gjp.) - ew;wpiz %yKk; ciuAk;>**lhf;lHc.Nt.rhkpehijaH E}y; epiyak;> ntspaPl;nlz;: 277> ngrd;l; efH> nrd;id– 600 090. vl;lhk; gjpg;G– 2020.
4. **jpUts;StH- NrNahd; lhf;lH - jpUf;Fws;>**kapiyj; jpUts;StHjkpo;r; rq;fk;>184>gpuhl;Nt>nrd;id 600 108
5. **Ntq;flrhkpehl;lhH>e.K.> - fhHehw;gJ>fstopehw;gJ–**rhujhgjpg;gfk;>rhe;jpmLf;ffk;> =fpU\;zGuk; njU> ,uhag;Ngl;il>nrd;id -14. Kjw;gjpg;G: 2005.

Reference Books

1. **rpw;gpghyRg;gpukzpak; kw;Wk; ePygj;kehgd; (g.Mrp.) –Gjpajkpo; ,yf;fpatuyhW> njhFjp-1>2>3>**rhfpj;jpa mfhnjkp> GJnly;yp> 2013.
2. **ghf;fpaNkhp> tifikNehf;fpy; jkpo; ,yf;fpatuyhW (nrk;ik kw;Wk; tphpTg; gjpg;G)>**ghhpepiyak;. nrd;id>
3. **Mde;jd;. R. KidtH.> - jkpo; ,yf;fpatuyhW>** fz;kzpgjPg;gfk;> jpUr;rp-2. ,Ugj;jp %d;whk; gjpg;G– 2015.
4. **gue;jhkdhH>m.fp.>ey;yjkpo; vOjNtz;Lkh>**ghhpepiyak;> nrd;id> 1998.
5. **rk;gj;> ,uh.> (gjp) -njhy;fhg;gpaf; ftpijapay; tbtk;-ghLnghUs;-cj;jp-tifik>**GJr;Nrhp nkhopapay; gz;ghl;L Muha;r;rp epWtdk;> GJr;Nrhp-605 001. Kjw;gjpg;G–mf;NlhgH 2015.

Web References

1. http://www.tamilvu.org
2. http://www.tamilweb.com
3. http://www.tamilkodal.com
4. 4. www.store.tamillexican.com
5. 5.www.kala.tamilforu.blogspot.com
6. 6.www.noolagam.com

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

Cos	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO 3
1	3	3	3	3	3	3	3	3
2	3	3	3	3	3	3	3	3
3	3	2	3	3	2	3	3	3
4	2	3	2	3	2	2	3	2
5	3	2	3	2	3	3	3	3

Correlation Level: 1:Low, 2:Moderate, 3:High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**French**	Programme: **B.Sc. Chemistry**						
Semester	**Second**	Course Category Code: **AEC**			*End Semester Exam Type: **TE**			
Course Code	**A23FRT202C**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**FRENCH II**	**2**	**0**	**0**	**2**	**25**	**75**	**100**
(Common to B.A.., B.SC., AND BCA Branches)								

Prerequisite	French-I	
Course Objective	• To introduce the basics of French language to the students	
	• To enable the students to read, understand and write simple sentences	
	• To help them to learn the fundamentals of French grammar	
	• To make the students to formulate correct phrases	
	• To introduce them French and Francophone countries and their cultures	

Course Outcomes	***On completion of the course, the students will be able to***		BT Mapping (Highest Level)
	CO1	Have a general understanding of the language	**K3**
	CO2	Analyze and interpret simple phrases written in French	**K3**
	CO3	Have the basics of French grammar	**K3**
	CO4	Communicate and ask basic questions in French language	**K3**
	CO5	Appreciate the diversity and multiplicity of French and Francophone world	**K3**

UNIT-I		**Periods:09**
1. Qu'est-ce qu'on offre? 2. L'interro-négation. 3. On Solde 4. Le comparatif. 5. Les fêtes		**CO1**
UNIT-II		**Periods:09**
1. Découvrir Paris en bus avec l'open tour. 2. Les verbes pronominaux 3. Si vous gagnez, vous ferez quoi? 4. Le futur simple 5. Les superlatifs.		**CO2**
UNIT-III		**Periods:09**

1. Parasol ou parapluie 2. Le climat en France. 3. Quand il est midi à Paris? 4. L'emploi du temps:métro, boulot, restau. 5. Parler du temps qu'il fait.	**CO3**
UNIT-IV	**Periods:09**
1. Vous allez vivre à Paris? 2. Les régions de France 3. L'avenir du français. 4. La place des adjectifs. 5. Souvenirs d'enfance.	**CO4**
UNIT-V	**Periods:09**
1. J'ai fait mes études à Lyon. 2. Retour des Antilles 3. Raconter ses vacances. 4. Au voleur! Au voleur! 5. Les journaux en France.	**CO5**

Lecture Periods:45	**Tutorial Periods:**	**Practical Periods:-**	**Total Periods:45**

Text Books

1. Sylvie Poisson Quinton and Michèle Maheo, ***Festival 1 Méthode de Français***, CLE editions, 2009 (Leçon-13 to Leçon-24) (p.74-131)

Reference Books

1. Régine Mérieux and Yves Loiseau, *Latitudes 1*, Didier editions, 2017
2. Annie Berthet and Emmanuelle Daili, *Alter Ego + A1*, Hachette editions, 2012
3. Bruno Giradeau, *Réussir le Delf A1*, Didier editions, 2019

Web References

1. https://www.tv5monde.com
2. https://www.rfi.fr
3. https://www.lemonde.fr
4. https://www.frenchpodcasts.com
5. https://www.coursera.org

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (PO)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	3	3	3	3	3	1	2	3
2	3	3	3	3	3	1	2	3
3	3	3	3	3	3	1	2	3
4	2	3	3	3	3	1	2	3
5	1	2	1	1	1	1	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**ENGLISH**	Programme: **B.Sc. Chemistry**						
Semester	**II**	Course Category Code: **AEC**				End Semester Exam Type: **TE**		
Course Code	**A23GET201C**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**GENERAL ENGLISH - II**	**2**	**0**	**0**	**2**	**25**	**75**	**100**
(Common to B.A.., B.SC., AND BCA Branches)								
Prerequisite	Basic part-two language and knowledge gained from Grammar and Composition							
Course Objectives	To train students to identify poetic forms and issues related to contexts							
	To enable the student in the skill of reading for ideas							
	To enable the students to enjoy the literature through the work of great writer							
	To introduce drama as a social product and a literary form							
	To hone composition skills in students							
Course Outcomes	***On completion of the course, the students will be able to***					BT Mapping (Highest Level)		
	CO1 comprehend and discuss the various facets of selected poems					**K3**		
	CO2 evaluate and Criticize the prose texts.					**K3**		
	CO3 illustrate various reflections and instances in short stories with personal experiences					**K3**		
	CO4 develop critical appreciation based on the understanding of the prescribed texts					**K3**		
	CO5 enhance the writing skills for specific purposes					**K3**		
UNIT-I	**POETRY**					**Periods:09**		
1. Nissim Ezekiel -*Minority Poem* 2. Sarojini Naidu – *Indian Weaver* 3. Walt Whitman – *O Captain My Captain* 4. William Blake – *Tyger* 5. Rabindranath Tagore – *Paper Boat*								**CO1**
UNIT-II	**PROSE**					**Periods:09**		
1. Jawaharlal Nehru – *A Tryst With Destiny* 2. Martin Luther King – *I have a dream* 3. Swami Vivekananda – *Speech at world Parliament of Religion Chicago*								**CO2**
UNIT-III	**SHORT STORIES**					**Periods:09**		
1. Arthur Canon Doyle – *A Scandal in Bohemia* 2. Stephen Crane – *The Open Boat*								**CO3**
UNIT-IV	**DRAMA**					**Periods:09**		
1. Cedric Mount Short – *The Never Never Nest* 2. Fritz Karinthy – *Refund*								**CO4**
UNIT-V	**GRAMMAR AND COMPOSITION**					**Periods:09**		
1. Cause and Effect Analysis 2. Note Making 3. Picture Comprehension 4. Sentence Pattern 5. Sentence Punctuation								**CO5**
Lecture Periods: 45	**Tutorial Periods: 0**	**Practical Periods:-**			**Total Periods: 45**			
Text Books								

1. Pegasus, *Scandal in Bohemia & Other Stories*, B Jain Publisher, 2016.
2. Stephen Crane, *The Open Boat and Other Stories*, Createspace Independent Publisher, 2017.
3. Wren & Martin, *Primary School English Grammar and Composition*, Generics Publication, 2023.

Reference Books

1. Anjli Sehrawat, *Mother's Day : Bhagat Phoolsingh Women's University,* Notion Press Publication, 2022.
2. Martin Luther, Heming Daoudi, *Martin Luther King's I have a dream speech*, Kindle Edition, 2020.
3. Stephen Crane, *The Open Boat Stephen Crane*, Createspace Independent Publication, 2013.
4. Rabindranath Tagore, William Radice, *Selected Poems: Rabindranath Tagore*, Penguin Publication, 2000.
5. Swami Tapasyananda, *Swami Vivekananda his life and Legacy*, Ramakrishna Math Publication, 2008.

Web References

1. https://allpoetry.com/Minority-Poem
2. http://www.sourcecodeonline.com/list?q=the_never_never_nest_author_cedric_mount
3. https://www.cam.ac.uk/files/a-tryst-with-destiny/index.html
4. https://poets.org/poem/tyger
5. https://www.poetryfoundation.org/poems/45474/o-captain-my-captain

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3
1	3	2	3	2	3	3	3	3
2	2	3	3	3	2	2	2	2
3	3	2	2	3	1	3	2	3
4	2	3	3	2	1	2	3	2
5	3	3	3	3	3	2	2	3

Correlation Level

High	Moderate	Low
3	2	1

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Chemistry**	Programme: B.Sc., Chemistry						
Semester	**Second**	Course Category Code: **MJD**			*End Semester Exam Type: **TE**			
Course Code	**A23CHT203D**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**GENERAL CHEMISTRY - II**	**4**	**-**	**-**	**4**	**25**	**75**	**100**
Pre requisite	Higher Secondary Chemistry Book							

Course Objectives	• To know the basic concepts of chemical bonding and hybridization	
	• To explain behavior of "S" block elements	
	• To outline Boron family elements	
	• To understand alkanes and cycloalkanes	
	• To know about basic concepts of aromatic compounds	
Course Outcome	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Explain the basic concepts bonding and hybridization	**K3**
	CO2 Analyze bahaviour of S block elements	**K3**
	CO3 Understand General Characteristics of boron family	**K3**
	CO4 Illustrate nomenclature, physical and chemical properties of alkanes and cycloalkane.	**K3**
	CO5 Outline the chemistry of aromaticity and other chemical properties	**K2**

UNIT-I	**CHEMICAL BONDING AND HYBRIDIZATION**	**Periods:12**
Chemical bond - definition, types of chemical bonds. Ionic or electrovalent bond - Definition, Illustration of the formation of ionic bond (Examples: NaCl, CaF_2), Born Haber cycle. Covalent bond: Definition, types of covalent bond (single, double and triple), Illustration of the formation of covalent bond (Example: HF, H_2O). Coordinate bond: Definition, Illustration of the formation of coordinate bond (Example: H_2O_2, SO_2).Hydrogen bond: Definition, properties, types and significance of hydrogen bonding. Hybridization – concept - VB theory-sp, sp^2, sp^3, spd, spd^2 -VSEPR theory-Geometry of $SnCl_2$, NH_3.Molecular Orbital Theory- Homonuclear (H_2, Li_2) and Heteronuclear (CO, NO) diatomic molecules.		**CO1**
UNIT-II	**S -BLOCK ELEMENTS**	**Periods:12**
General characteristics - anomalous behaviour of lithium and beryllium – diagonal relationships of lithium with magnesium and beryllium with aluminium. Preparation, properties and uses of lithium hydride, sodium peroxide, potassium iodide, BeO, $BeCl_2$, calcium carbide, $CaCl_2$, super phosphate of lime, Plaster of Paris and lithopone- Biological importance		**CO2**
UNIT-III	**P- BLOCK ELEMENTS (BORON GROUP)**	**Periods:12**
Group 13 (boron group): General Characteristics, extraction of boron, Anomalous behaviour of Boron, Diagonal relationship of boron with silicon, reaction of B with other elements, water, air, acids, alkali, metals and non-metals. Preparation, Properties and structure of diborane. Structure of borazine, boric acid, borohydrides- Hydroboration- Ultramarine. Anomalous behaviour of Aluminium, Inert pair effect of Thallium.		**CO3**
UNIT-IV	**ALKANES AND CYCLOALKANES**	**Periods:12**
Alkanes: Preparation (Catalytic hydrogenation, from alkyl halide, By Wurtz reaction, By Corey- House synthesis), Physical and chemical properties (free radical halogenations reaction). Cycloalkanes: Definition, nomenclature, symbols of cycloalkanes Stability: Baeyer's strain theory and its limitations, Sache-Mohr theory. Conformations of cyclohexane.		**CO4**
UNIT-V	**AROMATIC COMPOUNDS**	**Periods:12**
Criteria for aromaticity – Huckel's rule– aromatic hydrocarbons – cations and anions – annulenes –heterocyclic compounds – consequences of aromaticity: pKa, solubility and dipole moment – molecular orbital description of aromaticity and anti–aromaticity. Electrophilic aromatic substitution– general mechanism – reaction coordinate diagram – mechanism of halogenation, nitration, sulphonation – principle of microscopic reversibility– Friedel–Craft's acylation – acylation followed by Clemmensen and Wolff–Kishner reductions – Gatterman– Koch carbonylation and Friedel–Craft's alkylation – Stille and Suzuki reactions.		**CO5**

Lecture Periods:60	Tutorial Periods: -	Practical Periods:-	Total Periods:60

Text Books

1. Principles of Inorganic Chemistry, B. R. Puri, L. R. Sharma and K. C. Kalia, Shoban Lal Nagin Chand and Co., New Delhi, 2018.
2. R. T. Morrison and R. N. Boyd, Organic Chemistry, 7th edn., Printice-Hall of India Limited, New Delhi, 2010.
3. Principles of Physical Chemistry, B.R Puri, L.R Sharma, M.S. Pathania, 47 th edition, 2016, Vishal publishing

Reference Books

1. Inorganic Chemistry, D. F. Shriver, P. W. Atkins, W. H. Freeman and Co, London, 2010.
2. Inorganic Chemistry, J. E. Huheey, E. A. Kieter and R. L. Keiter, Harper Collins, New York, 2006, 4th edn.
3. Madan R.D., "Modern Inorganic Chemistry", S. Chand & Company, New Delhi, 2nd Edition, 2004.

Web References

1.https://www.utdallas.edu/~scortes/ochem/OChem1_Lecture/Class_Materials/05_orbitals_hybrid_geom.pdf

2. https://universe.bits-pilani.ac.in/uploads/Dubai/rusalraj/Aromatic%20Compounds.pdf

3. https://colapret.cm.utexas.edu/courses/Chap2.pdf

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

Cos	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	1	3	3	2	3	3	3	2
2	2	2	2	3	2	2	2	2
3	3	3	3	2	3	3	3	3
4	2	3	3	3	2	3	2	2
5	3	2	3	2	2	2	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Assessment Pattern as per Bloom's Taxonomy

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Chemistry**	Programme: B.Sc., Chemistry						
Semester	**Second**	Course Category Code: **MJD**			*End Semester Exam Type: **TE**			
Course Code	**A23CHT204D**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**PHYSICAL CHEMISTRY- I**	**4**	**-**	**-**	**4**	**25**	**75**	**100**
Pre requisite	Higher Secondary Chemistry Book							
Course Objectives	• To analyze the basic concepts of nuclear chemistry							
	• To explain Nernst distribution law with application							
	• To outline catalysis process							
	• To understand physical properties like distribution, polarization, magnetism, etc							
	• To know about chemistry of polymer							

Course Outcome		On completion of the course, the students will be able to	BT Mapping (Highest Level)
	CO1	Explain the basic concepts of nuclear chemistry	**K3**
	CO2	Analyze Nernst distribution law and its applications	**K3**
	CO3	Relate the functions, types and reaction mechanism of catalysts	**K3**
	CO4	Illustrate physical properties of molecules like distribution, polarization, magnetism etc.	**K3**
	CO5	Outline the chemistry of polymer	**K2**

UNIT-I	**NUCLEAR CHEMISTRY & NATURAL RADIOACTIVITY**	**Periods:12**
NUCLEAR CHEMISTRY: Composition of the nucleus - Nuclear forces, Mass defect -'Binding energy – Binding energy per nucleon (Problems related to this) Nuclear stability and Binding energy. NATURAL RADIOACTIVITY: Types of radioactive rays, Detection and measurement of radioactivity - GM counter method and Wilson cloud chamber method, Fajan's - Russell - Soddy group displacement law – illustration, Laws of radioactive disintegration - derivation of radioactive disintegration constant, average life and half-life period (related simple problems).		**CO1**

UNIT-II	**DISTRIBUTION LAW**	**Periods:12**
Nernst Distribution law - thermodynamic derivation – limitations, association of solute in one of the solvent, dissociation of solute in one of the solvent, solute enters into chemical combination with one of the solvent - Applications of Nernst distribution law.		**CO2**

UNIT-III	**CATALYSIS**	**Periods:12**
Definition- different types of catalysts – homogenous and heterogeneous catalysis, acid-base catalysis, enzyme catalysis-Michaelis-Menton mechanism, auto catalysis- catalytic poisoning- promoters.		**CO3**

UNIT-IV	**MOLECULAR PROPERTIES AND STRUCTURE**	**Periods:12**
Electrical properties of molecules - polarization of a molecule in an electric field, Derivation of Clausius - Mosotti equation, Dipole moments and molecular structure, Magnetic properties of molecules - Magnetic permeability - Magnetic susceptibility - Measurement of magnetic susceptibility, Diamagnetism, Paramagnetism, Ferro magnetism and Anti-Ferromagnetism		**CO4**

UNIT-V	**POLYMER CHEMISTRY**	**Periods:12**
Classification of polymers – Functionality – Tacticity, addition and condensation polymerization, Thermoplastic resin and thermosetting resin, number average and weight average molecular weights, Moulding of polymers – injection and compression.		**CO5**

Lecture Periods:60	**Tutorial Periods: -**	**Practical Periods:-**	**Total Periods:60**

Text Books

1. Puri B.R., Sharma L.R. and Pathania M.S., "Principles of Physical chemistry", Vishal publication, Jalandhar-Delhi, India, 30th Edition, 2007.

2. Billmeyer Jr., F.W, "A text book of Polymer Chemistry", John Willey and Sons, UK. 3rd Edition,1984.
3. Glasstone S. A., "Text book of Physical Chemistry", McMillan India Ltd., 1st Edition, 1999..

Reference Books

1. Bahl B.S., Tuli G.D. and ArunBahl, "Essential of Physical chemistry", S.Chand publications, Ram nagar, New Delhi, India. 1st Edition,2004.
2. Arnikar H.J.,"Essentials of Nuclear Chemistry", New Age international (P) Ltd., New Delhi, India. 4th Edition,2005.
3. Gowarikar V., et al., "Polymer Science", Willey Eastern Limited, New York, USA. 1st Edition, 1986.

Web References

1. https://web.gccaz.edu/~lisys52871/00152note/nuclearchangnotes.pdf
2. https://chemistryonline.guru/distribution-law/
3. https://nptel.ac.in/content/storage2/courses/103103026/pdf/mod1.pdf

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

Cos	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	1	3	2	2	3	3	2	2
2	3	2	3	3	2	3	2	2
3	3	3	3	2	3	2	2	3
4	2	3	3	3	2	3	2	3
5	3	2	3	2	2	2	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Assessment Pattern as per Bloom's Taxonomy

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**MATHEMATICS**	Programme: **B.Sc. Chemistry**						
Semester	**II**	Course Category Code: MID				*End Semester Exam Type: **TE**		
Course Code	**A23MAD206C**	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**ALLIED MATHEMATICS II**	**3**	**1**	**0**	**4**	**25**	**75**	**100**
(Common to B.Sc. Physics and B.Sc. Chemistry Branches)								

Prerequisite	Basic Mathematics Knowledge		
Course Objectives	To find solutions of Solenoidal and Irrotational.		
	To bring the knowledge of vector calculus and its application in theorems		
	To understand the concept of complete integrals and general integrals.		
	To learn linear differential equations of higher order with constant coefficients		
	To introduce the concept of correlation and regression.		
Course Outcome	**On completion of the course, the students will be able to**		BT Mapping (Highest Level)
	CO1	Understand the concept of Scalar point functions and Vector point functions	**K3**
	CO2	Apply the various techniques of vector integration in solving Line and surface integrals.	**K3**
	CO3	Understand the use of Lagrange's equations	**K3**
	CO4	Solve higher order differential equations.	**K3**
	CO5	Solve problems related to central tendency and measures of dispersion.	**K2**

UNIT-I	**VECTOR ANALYSIS**	**Periods:12**	
Scalar point functions - Vector point functions – Gradient, divergence and curl - Directional derivatives - Unit to normal to a surface – Solenoidal and Irrotational vector field.			**CO1**
UNIT-II	**VECTOR ANALYSIS (continued)**	**Periods:12**	
Line and surface integrals – Gauss Divergence theorem, Stoke's theorem and Green's theorems (without proofs) - Simple problem based on these Theorems.			**CO2**
UNIT-III	**PARTIAL DIFFERENTIAL EQUATION**	**Periods:12**	
Formation of partial differential equation - complete integrals and general integrals - Equations solvable for p, equations solvable for y and equations solvable for x - Lagrange's equations.			**CO3**
UNIT-IV	**PARTIAL DIFFERENTIAL EQUATION(continued)**	**Periods:12**	
Partial derivatives - Total derivatives - Differentiation of implicit functions - Maxima and Minima of two variables - Partial differential equations of higher order with constant coefficients.			**CO4**
UNIT-V	**STATISTICS**	**Periods:12**	
Measures of central tendency – Arithmetic Mean, Median and Mode – Measures of dispersion – Range and its Coefficient, Standard deviation –Measures of Skewness – Pearson's coefficient of Skewness – Correlation – Rank correlation and regression.			**CO5**

Lecture Periods:45	**Tutorial Periods:15**	**Practical Periods:-**	**Total Periods:60**

Text Books

1. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley, Tenth edition, 2019
2. P. Duraipandian and S. Udayabaskaran, (1997) Allied Mathematics, Vol. I &II. Muhil Publishers, Chennai
3. B.V.Ramana," Higher Engineering Mathematics", Tata McGraw-Hill, New Delhi, Sixth edition 2018.
4. N.P. Bali and Manish Goyal," A Text Book of Engineering Mathematics", Lakshmi Publications, New Delhi, Ninth Edition, 2018

Reference Books

1. P. Balasubramanian and K.G.Subramanian, (1997)Ancillary Mathematics. Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan, (2005) Allied Mathematics, Vol. I & IIVikas Publications, New Delhi.

3. P.R.Vittal, (2003). Allied Mathematics, Marghan Publications, Chennai.
4. P.Kandasamy, K. Thilagavathy, (2003) Allied Mathematics Vol-I, II SChand& company Ltd., New Delhi-55.
5. Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai.

Web References

1. http://www.yorku.ca/yaoguo/math1025/slides/chapter/kuttler-linearalgebra –slidesSystemsofquation-handout.pdf
2. https://nptel.ac.in/courses/122/104/122104017/
3. https://nptel.ac.in/courses/111/105/111105122/
4. https://www.khanacademy.org/math/statistics-probability
5. https://www.khanacademy.org/math/precalculus/x9e81a4f98389efdf:trig/x9e81a4f98389efdf:inverse-trig/v/inverse-trig-functions-arcsin

COs/POs/PSOs Mapping

Cos	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	2	2	3	2	3	2	3	2
2	3	3	3	3	1	3	3	1
3	2	3	2	3	3	2	2	2
4	2	3	2	3	3	2	2	2
5	3	2	3	2	1	3	2	1

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Chemistry**	Programme: B.Sc., Chemistry						
Semester	**Second**	Course Category Code: **SEC**			*End Semester Exam Type: **PE**			
Course Code	A23CHL202D	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**ORGANIC QUALITATIVE ANALYSIS PRACTICAL**	**0**	**0**	**4**	**3**	**50**	**50**	**100**
Pre requisite	Higher Secondary Chemistry Book							
Course Objectives	• To identify the functional groups of unknown organic compounds. • To know the elements present in the compounds • To understand saturated / unsaturated compounds • To realize the nature of aliphatic / aromatic compounds • To visualize confirmatory tests of various functional groups							

Course Outcome	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Learn to approach a problem systematically and to interpret the result logically	**K2**
	CO2 Detect various functional groups present in an organic compound	**K3**
	CO3 Understand about Saturation and unsaturation nature of compounds	**K3**
	CO4 Identify aliphatic and aromatic compounds	**K3**
	CO5 Visualize confirmatory tests of various functional groups	**K2**

List of Experiments — **Periods: 30**

ANALYSIS OF ORGANIC COMPOUNDS

- Preliminary tests
- Detection of elements present
- Aromatic or Aliphatic
- Saturated or Unsaturated
- Nature of the functional group
- Confirmatory tests and Preparation of derivatives for the functional groups.

THE FOLLOWING FUNCTIONAL GROUP COMPOUNDS MAY BE GIVEN:

Aldehydes, Ketones, Amines, Amides, Diamide, Carbohydrates, Phenols, Acids, Esters and Nitro compounds.

Lecture Periods:	**Tutorial Periods:**	**Practical Periods:-30**	**Total Periods:30**

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

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

Cos	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	3	3	2	2	1	3	2	3
2	2	2	3	3	1	2	2	2
3	3	3	3	2	1	2	2	2
4	2	1	2	1	-	1	2	3
5	3	3	3	1	2	3	3	1

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)			End Semester Examination (ESE) Marks	Total Marks
	Model Exam	Record	Attendance		
Marks	30	10	10	50	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	ENGLISH	Programme: **B.Sc Chemistry.**						
Semester	II	Course Category Code: **MLD**			End Semester Exam Type:-**TE**			
Course Code	**A23ENSA01C**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**COMMUNICATION SKILLS**	**3**	**0**	**0**	**3**	**25**	**75**	**100**

Prerequisite	Knowledge gained from Communication and New paper reading	
Course Objectives	To improve the skill of rapid reading and communicate efficiently	
	To decode and impart speaking skills with confidence	
	To train students in analyzing articles and Newspaper	
	To enhance the sense of social responsibility and accountability of the students	
	To expound the significance in Managerial skills	
Course Outcomes	***On completion of the course, the students will be able to***	BT Mapping (Highest Level)
	CO1 understand the pattern to communicate effectively	**K3**
	CO2 impart Speaking skills with self-confidence	**K3**
	CO3 enhance their strategies in analyzing articles and Newspaper	**K3**
	CO4 the sense of social responsibility and accountability of the students	**K3**
	CO5 expertise in Managerial skills	**K3**

UNIT-I	**COMMUNICATION SKILLS - SPEAKING**	**Periods:06**	
1. Aspects of speaking 2. Process of effective Speech 3. Techniques for effectual Presentation			**CO1**
UNIT-II	**SELF-MANAGEMENT SKILLS**	**Periods:06**	
1. Time Management 2. Stress Management 3. Emotional Management			**CO2**
UNIT-III	**COMMUNICATION SKILLS - READING**	**Periods:06**	
1. Article analysis 2. Comprehension 3. Skimming and Scanning			**CO3**
UNIT-IV	**SOCIAL SKILLS**	**Periods:06**	
1. Leadership 2. Teamwork 3. Decision making			**CO4**
UNIT-V	**PUBLIC SPEAKING AND PRESENTATION**	**Periods:06**	
1. Rules and Techniques for Public Speaking 2. Practice session (both, Public Speaking and Presentation)			**CO5**

Lecture Periods:-	**Tutorial Periods:-**	**Practical Periods:30**	**Total Periods:30**

Text Books

1. Barun K. Mitra, Personality Development and Soft skills, Oxford University Press, 2nd Edition, 2016.
2. Syamala, V, Effective English Communication for you, Chennai: Emerald Publisher, 1st Edition, 2002.
3. Sanjay Kumar &PusphLata. Communication Skills, Oxford University Press, 2nd Edition, 2015.

Reference Books

1. Murphy, John J, Pulling Together: 10 Rules for High-Performance Teamwork, Simple Truth Publication, 1st Edition, 2010.
2. Balasubramanian, T, A Textbook of English Phonetics for Indian Students, Trinity Press, 1st Ed, 1981.
3. Sardana,C.K, The Challenge of Public Relations, New Delhi: Harnand Publication,1st Edition, 1995.
4. Sabina Pillai, Agna Fernandez, Soft Skills and Employability Skills, Cambridge University Press, 2017.
5. Jeff Butterfield, Soft Skills for Everyone, Cengage India Private Limited, 2nd Edition, 2020.

Web References

1. https://blog.dce.harvard.edu/professional-development/10-tips-improving-your-public-speaking-skills
2. https://corporatefinanceinstitute.com/resources/careers/soft-skills/management-skills/
3. https://zety.com/blog/how-to-introduce-yourself
4. https://www.butte.edu/departments/cas/tipsheets/readingstrategies/skimming_scanning.html
5. https://www.mayoclinic.org/tests-procedures/stress-management/about/pac-20384898

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3
1	3	3	3	2	3	1	3	3
2	3	3	3	2	3	1	3	2
3	3	3	3	2	2	1	3	2
4	3	3	3	3	3	1	3	2
5	3	3	2	2	2	1	2	2

Correlation Level

High	Moderate	Low
3	2	1

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	80		-	10	10	-	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Chemistry**		**Programme: B.Sc. Chemistry**						
Semester	**II**		Course Category Code: **VAC**				End Semester Exam Type: TE		
Course Code	**23AETA02C**		Periods/Week			Credit	Maximum Marks		
			L	T	P	C	CAM	ESE	TM
Course Name	**ENVIRONMENTAL STUDIES**		**2**	**0**	**0**	**2**	**100**	**0**	**100**
Prerequisite	Environmental issues and natural resources								
Course Objectives	To gain knowledge on the importance of natural resources and energy								
	To understand the structure and function of an ecosystem								
	To imbibe an aesthetic value with respect to biodiversity, understand the threats and its conservation and appreciate the concept of interdependence								
	To understand the causes of types of pollution and disaster management								
	To observe and discover the surrounding environment through field work								
Course Outcomes	***On completion of the course, the students will be able to***								BT Mapping Highest Level)
	CO1	Realize the importance of natural resources and various energy resources							**K1**
	CO2	Learn about the biodiversity							**K1**
	CO3	Learn the different types of pollution and to prevent the pollution							**K2**
	CO4	know about the pollution Act and social issues							**K1**
	CO5	understand Human related issued and environment							

UNIT-I	**INTRODUCTION TO NATURAL RESOURCES/ENERGY**	**Periods:06**
Natural Resources – Definition – Scope and Importance – Need for Public Awareness Renewable and Non-renewable Resources: Natural resources and associated problems. Forest resources and over-exploitation – Water resources and over- utilization – Mineral resource extraction and its effects - Food resources - food problems and Modern agriculture - Energy resources and its future.		**CO1**
UNIT-II	**ECOSYSTEMS**	**Periods:06**
Concept of an ecosystem-structure and function of an ecosystem-producers, consumers and decomposers-ecological succession- food chains(any 2 Examples)- food webs(any 2 Examples)-ecological pyramids.		**CO2**
UNIT-III	**ENVIRONMENTAL POLLUTION /DISASTER MANAGEMENT**	**Periods:06**
Definition-causes, effects and control measures of Air, Water and Soil pollution- e- waste management- Disaster management: Natural and manmade- food/earthquake/cyclone, tsunami and landslides.		**CO3**
UNIT-IV	**SOCIAL ISSUES AND THE ENVIRONMENT**	**Periods:06**
Sustainable development- Climate change: global warming, acid rain, ozone layer depletion and nuclear radiation- Environment Protection Act (any 2) air, water, wildlife and forest.		**CO5**
UNIT-V	**HUMAN POPULATION AND THE ENVIRONMENT**	**Periods:06**
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		**CO5**

Lecture Periods:30	**Tutorial Periods:-**	**Practical Periods:**	**Total Periods:30**

Text Books

1. K. De, "Environmental chemistry" 9th Ed; New age international (P) Ltd, New Delhi, 2010.
2. K. Raghavan Nambiar, "Text Book of Environmental Studies" 2ndEd, Scitech Publications (India) Pvt Ltd, India, 2010.
3. G. S. Sodhi, Fundamental concepts of environmental chemistry, I Ed, Alpha Science International Ltd, India, 2000.

Reference Books

1. B.K. Sharma, "Environmental chemistry" 11th Ed, Krishna Prakashan Media (P) Ltd, Meerut, 2009.2. S.S.Dara, and 2.
2. D.D. Mishra "A text book of environmental chemistry and pollution control, 5th Ed, S.Chandand Company Ltd, New Delhi, 2012.
3. Richard T. Wright, Environmental Science: Toward a Sustainable Future, 10thedition, Prentice Hall, 2008

Web References

1. www.ifpri.org/topic/environment-and-natural-resources
2. https://www.iucn.org/content/biodiversity
3. http://www.world.org/weo/pollution

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	70		-	20	10	0	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Chemistry**		**Programme: B.Sc. Chemistry**						
Semester	**II**		Course Category Code: **VAC**			End Semester Exam Type: TE			
Course Code	A23VAC201C		Periods/Week			Credit	Maximum Marks		
			L	T	P	C	CAM	ESE	TM
Course Name	Understanding India		**2**	**0**	**0**	**2**	**100**	**0**	**100**
Prerequisite									
Course Objectives									
Course Outcomes	***On completion of the course, the students will be able to***								BT Mapping Highest Level)
	CO1								**K1**
	CO2								**K1**
	CO3								**K2**
	CO4								**K1**
	CO5								
UNIT-I							**Periods:06**		
									CO1
UNIT-II							**Periods:06**		
									CO2
UNIT-III							**Periods:06**		
									CO3
UNIT-IV							**Periods:06**		
									CO5
UNIT-V							**Periods:06**		
									CO5
Lecture Periods:30		**Tutorial Periods:-**			**Practical Periods:**			**Total Periods:30**	
Text Books									
Reference Books									
Web References									

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	70		-	20	10	0	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus