SADAKATHULLAH APPA COLLEGE

(AUTONOMOUS)

(Reaccredited by NAAC at an 'A' Grade with a CGPA of 3.40 out of 4.00 in the III cycle An ISO 9001:2008 Certified Institution)

RAHMATH NAGAR, TIRUNELVELI- 11.

Tamilnadu

DEPARTMENT OF CHEMISTRY

MY LORD
VOUCHSAFE ME WISDOM

CBCS SYLLABUS (2015 - 2018)

For

B.Sc. Chemistry

(Applicable for students admitted in June 2015 and onwards)

(As per the Resolutions of the Academic Council Meeting held on 23.02.2016)

CONTENTS

B.Sc. Chemistry – (A)

COURSE STRUCTURE FOR STUDENTS WHO OPTED MATHEMATICS AS ALLIED I SUBJECT IN THE FIRST YEAR
(Applicable for students admitted in June 2015 and onwards)

ALLIED I - MATHEMATICS **ALLIED II - PHYSICS**

I SEMESTER				II SEMESTER			
P	**COURSE**	**H/W**	**C**	**P**	**COURSE**	**H/W**	**C**
I	Tamil / Arabic	6	3	**I**	Tamil / Arabic	6	3
II	English	6	3	**II**	English	6	3
III	Core - 1	4	5	**III**	Core - 3	4	5
	Core - 2	3	4		Core - 4	3	4
	Core Practical - I*	3	-		Core Practical - I*	3	3
	Allied I - Paper I	6	5		Allied I - Paper II	6	5
IV	Environmental Studies	2	1	**IV**	Value Education I / II	2	1
	TOTAL	**30**	**21**		**TOTAL**	**30**	**24**
III SEMESTER				**IV SEMESTER**			
I	Tamil / Arabic	6	3	**I**	Tamil / Arabic	6	3
II	English	6	3	**II**	English	6	3
III	Core - 5	3	4	**III**	Core - 6	3	4
	Core Practical - II*	3	-		Core Practical - II*	3	3
	Allied II - Paper I	3	4		Allied II - Paper II	3	4
	Allied II - Practical*	3	-		Allied II - Practical*	3	2
IV	Skill Based Elective - 1	3	2	**IV**	Skill Based Elective - 2	3	2
	Non Major Elective - 1	3	2		Non Major Elective - 2	3	2
				V	Extension Activities	--	1
	TOTAL	**30**	**18**		**TOTAL**	**30**	**24**
V SEMESTER				**VI SEMESTER**			
III	Core - 7	6	6	**III**	Core - 10	6	6
	Core - 8	5	5		Core - 11	5	5
	Core - 9	5	5		Core - 12 - Project	5	5
	Core Practical - III*	3	-		Core Practical - III*	3	3
	Core Practical - IV*	3	-		Core Practical - IV*	3	3
	Core Elective - 1	5	6		Core Elective - 2	5	6
	Core Elective Practical*	3	-		Core Elective Practical*	3	3
	TOTAL	**30**	**22**		**TOTAL**	**30**	**31**

*Practical Examination at the end of the Even Semester **G2-S**

B.Sc. Chemistry (2015 and Onwards) (With Mathematics & Physics Allied)						
DISTRIBUTION OF CREDITS, NO. OF PAPERS & MARKS						
Part	**Course**	**Semester**	**Hrs.**	**Credits**	**No. of Papers**	**Marks**
I	Tamil / Arabic	I to IV	24	12	4	400
II	English	I to IV	24	12	4	400
III	Core + Core Practical	I to VI	71	65	11 + 4	1500
	Core Elective + CE Practical + Project	V & VI	21	20	2 + 1 + 1	400
	Allied + Practical	I to IV	24	20	4 + 1	500
IV	Environmental Studies	I	2	1	1	100
	Social Value Education	II	2	1	1	100
	Skilled Based Elective	III & IV	6	4	2	200
	Non Major Elective	III & IV	6	4	2	200
V	Extension Activities	I to IV	--	1	--	100
		TOTAL	**180**	**140**	**39**	**3900**

SEMESTER WISE DISTRIBUTION OF HOURS

Part	**I**	**II**	**III**				**IV**			**Total**
Sem	**T/A**	**ENG**	**Core + Practical**	**CE**	**PRO**	**AL**	**SBE**	**NME**	**VE/ ES**	
I	6	6	7+3	-	-	6	-	-	2	**30**
II	6	6	7+3	-	-	6	-	-	2	**30**
III	6	6	3+3	-	-	3+3	3	3	-	**30**
IV	6	6	3+3	-	-	3+3	3	3	-	**30**
V	-	-	16+6	5+3	-	-	-	-	-	**30**
VI	-	-	11+6	5+3	5	-	-	-	-	**30**
TOT	**24**	**24**	**47+24=71**	**10+6=16**	**5**	**18+6=24**	**6**	**6**	**4**	**180**

DEPARTMENT OF CHEMISTRY

B.Sc. Chemistry (With Mathematics & Physics Allied)

(Applicable for students admitted in June 2015 and onwards)

TITLE OF THE PAPERS, CREDITS & MARKS

I SEMESTER								
P	**SUB**	**TITLE OF THE PAPER**	**S.CODE**	**H/W**	**C**	**MARKS**		
						I	**E**	**T**
I	TA 1	,;f;fhyj jk|0;	15UTAL11	6	3	25	75	100
	AR 1	Applied Grammar and Translation – I	15UARL11					
II	EN 1	Prose, Poetry and Remedial Grammar-I	15UENL11	6	3	25	75	100
III	C 1	General Chemistry	15UCHC11	4	5	25	75	100
	C 2	Methodology of practicals	15UCHC12	3	4	25	75	100
	CP I	Inorganic Quantitative Analysis & Preparation of Inorganic Complexes	-	3	-	Examination II Semester		
	AI 1	Statistics and Calculus	15UMAA11	6	5	25	75	100
IV	ES	Environmental Studies	15UEVS11	2	1	25	75	100
			TOTAL	**30**	**21**	**150**	**450**	**600**
II SEMESTER								
I	TA 2	rkaj jk|0; **OR**	15UTAL21	6	3	25	75	100
	AR 2	Applied Grammar and Translation – II	15UARL21					
II	EN 2	Prose, Poetry and Remedial Grammar - II	15UENL21	6	3	25	75	100
III	C 3	Organic Chemistry-I	15UCHC21	4	5	25	75	100
	C 4	Inorganic Chemistry-I	15UCHC22	3	4	25	75	100
	CP I	Inorganic Quantitative Analysis & Preparation of Inorganic Complexes	15UCHC2P	3	3	40	60	100
	AI 2	Algebra & Differential Equations	15UMAA21	6	5	25	75	100
	VE	Value Education-I	15USVE2A	2	1	25	75	100
		Value Education-II	15USVE2B					
			TOTAL	**30**	**24**	**190**	**510**	**700**

DEPARTMENT OF CHEMISTRY

B.Sc. Chemistry (With Mathematics & Physics Allied)

(Applicable for students admitted in June 2015 and onwards)

TITLE OF THE PAPERS, CREDITS & MARKS

III SEMESTER								
P	**SUB**	**TITLE OF THE PAPER**	**S.CODE**	**H/W**	**C**	**MARKS**		
						I	**E**	**T**
I	TA 3	gad;ghL;Lj; jk‌p;	15UTAL31	6	3	25	75	100
	AR 3	Prose and Letter Writing	15UARL31					
II	EN 3	One-Act Plays and Writing Skill	15UENL31	6	3	25	75	100
III	C 5	Physical Chemistry-I	15UCHC31	3	4	25	75	100
	CP II	Inorganic Qualitative Analysis	-	3	-	Examination IV Semester		
	AII 1	Allied Physics – I	15UPHA31	3	4	25	75	100
	AII P	Allied Physics Practical	-	3	-	Examination IV Semester		
IV	SBE 1	Chromatography	15UCHS31	3	2	25	75	100
	NME 1	Choose from the list	-	3	2	25	75	100
			TOTAL	**30**	**18**	**150**	**450**	**600**
IV SEMESTER								
I	TA 4	rq;fj; jk‌p;	15UTAL41	6	3	25	75	100
	AR 4	*Quran* and *Hadeeth*	15UARL41					
II	EN 4	A Practical Course in Spoken English	15UENL41	6	3	25	75	100
III	C 6	Inorganic Chemistry-II	15UCHC41	3	4	25	75	100
	CP II	Inorganic Qualitative Analysis	15UCHC4P	3	3	40	60	100
	AII 2	Allied Physics – II	15UPHA41	3	4	25	75	100
	AII P	Allied Physics Practical	15UPHA4P	3	2	40	60	100
IV	SBE 2	Polymer Chemistry	15UCHS41	3	2	25	75	100
	NME 2	Choose from the list	-	3	2	25	75	100
V	EX	Extension Activities (Choose from the list)	-	--	1	--	100	100
			TOTAL	**30**	**24**	**230**	**670**	**900**

DEPARTMENT OF CHEMISTRY

B.Sc. Chemistry (With Mathematics & Physics Allied)

(Applicable for students admitted in June 2015 and onwards)

TITLE OF THE PAPERS, CREDITS & MARKS

V SEMESTER								
P	**SUB**	**TITLE OF THE PAPER**	**S.CODE**	**H/W**	**C**	**MARKS**		
						I	**E**	**T**
III	C 7	Physical Chemistry-II	15UCHC51	6	6	25	75	100
	C 8	Organic Chemistry-II	15UCHC52	5	5	25	75	100
	C 9	Coordination Chemistry	15UCHC53	5	5	25	75	100
	CP III	Gravimetric Analysis Preparation of Organic Compounds	-	3	-	Examination VI Semester		
	CP IV	Physical Chemistry and Computer in Chemistry	-	3	-	Examination VI Semester		
	CE 1	A) Spectroscopy **OR**	15UCHE5A	5	6	25	75	100
		B) Material Science	15UCHE5B					
	CE P	Organic Analysis, Estimation and Physical Constants	-	3	-	Examination VI Semester		
			TOTAL	**30**	**22**	**100**	**300**	**400**
VI SEMESTER								
III	C 10	Physical Chemistry-III	15UCHC61	6	6	25	75	100
	C 11	Organic Chemistry-III	15UCHC62	5	5	25	75	100
	C 12	Project	15UCHP63	5	5	0	100	100
	CP III	Gravimetric Analysis Preparation of Organic Compounds	15UCHC6P1	3	3	40	60	100
	CP IV	Physical Chemistry and Computer in Chemistry	15UCHC6P2	3	3	40	60	100
	CE 2	Applied and Analytical Chemistry **OR**	15UCHE6A	5	6	25	75	100
		Medicinal Chemistry	15UCHE6B					
	CE P	Organic Analysis, Estimation and Physical Constants	15UCHE6P	3	3	40	60	100
			TOTAL	**30**	**31**	**195**	**505**	**700**

B.Sc. Chemistry – (B)

COURSE STRUCTURE FOR STUDENTS WHO OPTED BIOCHEMISTRY AS ALLIED I SUBJECT IN THE FIRST YEAR

(Applicable for students admitted in June 2015 and onwards)

ALLIED I – BIO-CHEMISTRY **ALLIED II - PHYSICS**

I SEMESTER				II SEMESTER			
P	**COURSE**	**H/W**	**C**	**P**	**COURSE**	**H/W**	**C**
I	Tamil / Arabic	6	3	**I**	Tamil / Arabic	6	3
II	English	6	3	**II**	English	6	3
III	Core - 1	4	5	**III**	Core - 3	4	5
	Core - 2	3	4		Core - 4	3	4
	Core Practical - I*	3	-		Core Practical - I*	3	3
	Allied I - Paper I	3	4		Allied I - Paper II	3	4
	Allied I Practical*	3	-		Allied I Practical *	3	2
IV	Environmental Studies	2	1	**IV**	Value Education I / II	2	1
	TOTAL	**30**	**20**		**TOTAL**	**30**	**25**
III SEMESTER				**IV SEMESTER**			
I	Tamil / Arabic	6	3	**I**	Tamil / Arabic	6	3
II	English	6	3	**II**	English	6	3
III	Core - 5	3	4	**III**	Core - 6	3	4
	Core Practical - II*	3	-		Core Practical - II*	3	3
	Allied II - Paper I	3	4		Allied II - Paper II	3	4
	Allied II - Practical*	3	-		Allied II - Practical *	3	2
IV	Skill Based Elective - 1	3	2	**IV**	Skill Based Elective - 2	3	2
	Non Major Elective - 1	3	2		Non Major Elective - 2	3	2
				V	Extension Activities	--	1
	TOTAL	**30**	**18**		**TOTAL**	**30**	**24**
V SEMESTER				**VI SEMESTER**			
III	Core - 7	6	6	**III**	Core – 10	6	6
	Core - 8	5	5		Core - 11	5	5
	Core - 9	5	5		Core - 12 - Project	5	5
	Core Practical - III*	3	-		Core Practical - III*	3	3
	Core Practical - IV*	3	-		Core Practical - IV*	3	3
	Core Elective -1	5	6		Core Elective - 2	5	6
	Core Elective Practical*	3	-		Core Elective Practical*	3	3
	TOTAL	**30**	**22**		**TOTAL**	**30**	**31**

*Practical Examination at the end of the Even Semester **G2-S**

B.Sc. Chemistry (2015 and Onwards) (With Biochemistry & Physics Allied)						
DISTRIBUTION OF CREDITS, NO. OF PAPERS & MARKS						
Part	**Course**	**Semester**	**Hrs.**	**Credits**	**No. of Papers**	**Marks**
I	Tamil / Arabic	I to IV	24	12	4	400
II	English	I to IV	24	12	4	400
III	Core + Core Practical	I to VI	71	65	11 + 4	1500
	Core Elective + CE Practical + Project	V & VI	21	20	2 + 1 + 1	400
	Allied + Practical	I to IV	24	20	4 + 2	600
IV	Environmental Studies	I	2	1	1	100
	Social Value Education	II	2	1	1	100
	Skilled Based Elective	III & IV	6	4	2	200
	Non Major Elective	III & IV	6	4	2	200
V	Extension Activities	I to IV	--	1	--	100
		TOTAL	**180**	**140**	**40**	**4000**

SEMESTER WISE DISTRIBUTION OF HOURS

Part	**I**	**II**	**III**				**IV**			**Total**
Sem	**T/A**	**ENG**	**Core + Practical**	**CE**	**PRO**	**AL**	**SBE**	**NME**	**VE/ES**	
I	6	6	7+3	-	-	3+3	-	-	2	**30**
II	6	6	7+3	-	-	3+3	-	-	2	**30**
III	6	6	3+3	-	-	3+3	3	3	-	**30**
IV	6	6	3+3	-	-	3+3	3	3	-	**30**
V	-	-	16+6	5+3	-	-	-	-	-	**30**
VI	-	-	11+6	5+3	5	-	-	-	-	**30**
TOT	**24**	**24**	**47+24= 71**	**10+6= 16**	**5**	**12+12= 24**	**6**	**6**	**4**	**180**

DEPARTMENT OF CHEMISTRY

B.Sc. Chemistry (With Bio-chemistry & Physics Allied)

(Applicable for students admitted in June 2015 and onwards)

TITLE OF THE PAPERS, CREDITS & MARKS

I SEMESTER								
P	**SUB**	**TITLE OF THE PAPER**	**S.CODE**	**H/W**	**C**	**MARKS**		
						I	**E**	**T**
I	TA 1	,;f;fhyj jk|0;	15UTAL11	6	3	25	75	100
	AR 1	Applied Grammar and Translation – I	15UARL11					
II	EN 1	Prose, Poetry and Remedial Grammar-I	15UENL11	6	3	25	75	100
III	C 1	General Chemistry	15UCHC11	4	5	25	75	100
	C 2	Methodology of practicals	15UCHC12	3	4	25	75	100
	CP I	Inorganic Quantitative Analysis & Preparation of Inorganic Complexes	-	3	-	Examination II Semester		
	AI 1	Carbohydrates, Nucleic Acids and Metabolism	15UCHA11	3	4	25	75	100
	AI P	Allied Bio-Chemistry Practical	-	3	-	Examination II Semester		
IV	ES	Environmental Studies	15UEVS11	2	1	25	75	100
			TOTAL	**30**	**20**	**150**	**450**	**600**
II SEMESTER								
I	TA 2	rkaj jk|0;	15UTAL21	6	3	25	75	100
	AR 2	Applied Grammar and Translation – II	15UARL21					
II	EN 2	Prose, Poetry and Remedial Grammar - II	15UENL21	6	3	25	75	100
III	C 3	Organic Chemistry-I	15UCHC21	4	5	25	75	100
	C 4	Inorganic Chemistry-I	15UCHC22	3	4	25	75	100
	CP I	Inorganic Quantitative Analysis & Preparation of Inorganic Complexes	15UCHC2P	3	3	40	60	100
	AI 2	Amino Acids, Lipids and Enzymes	15UCHA21	3	4	25	75	100
IV	AI P	Allied Bio-Chemistry Practical	15UCHA2P	3	2	40	60	100
	VE	Value Education-I	15USVE2A	2	1	25	75	100
		Value Education-II	15USVE2B					
			TOTAL	**30**	**25**	**230**	**570**	**800**

DEPARTMENT OF CHEMISTRY

B.Sc. Chemistry (With Bio-chemistry & Physics Allied)

(Applicable for students admitted in June 2015 and onwards)

TITLE OF THE PAPERS, CREDITS & MARKS

III SEMESTER								
P	**SUB**	**TITLE OF THE PAPER**	**S.CODE**	**H/W**	**C**	**MARKS**		
						I	**E**	**T**
I	TA 3	gad;ghL;Lj; jk|0;	15UTAL31	6	3	25	75	100
	AR 3	Prose and Letter Writing	15UARL31					
II	EN 3	One-Act Plays and Writing Skill	15UENL31	6	3	25	75	100
III	C 5	Physical Chemistry-I	15UCHC31	3	4	25	75	100
	CP II	Inorganic Qualitative Analysis	-	3	-	Examination IV Semester		
	AII 1	Allied Physics – I	15UPHA31	3	4	25	75	100
	AII P	Allied Physics Practical	-	3	-	Examination IV Semester		
IV	SBE 1	Chromatography	15UCHS31	3	2	25	75	100
	NME 1	Choose from the list	-	3	2	25	75	100
			TOTAL	**30**	**18**	**150**	**450**	**600**
IV SEMESTER								
I	TA 4	rq;fj; jk|0;	15UTAL41	6	3	25	75	100
	AR 4	*Quran* and *Hadeeth*	15UARL41					
II	EN 4	A Practical Course in Spoken English	15UENL41	6	3	25	75	100
III	C 6	Inorganic Chemistry-II	15UCHC41	3	4	25	75	100
	CP II	Inorganic Qualitative Analysis	15UCHC4P	3	3	40	60	100
	AII 2	Allied Physics – II	15UPHA41	3	4	25	75	100
	AII P	Allied Physics Practical	15UPHA4P	3	2	40	60	100
IV	SBE 2	Polymer Chemistry	15UCHS41	3	2	25	75	100
	NME 2	Choose from the list	-	3	2	25	75	100
V	EX	Extension Activities (Choose from the list)	-	**--**	1	--	100	100
			TOTAL	**30**	**24**	**230**	**670**	**900**

DEPARTMENT OF CHEMISTRY

B.Sc. Chemistry (With Bio-chemistry & Physics Allied)

(Applicable for students admitted in June 2015 and onwards)

TITLE OF THE PAPERS, CREDITS & MARKS

V SEMESTER								
P	**SUB**	**TITLE OF THE PAPER**	**S.CODE**	**H/W**	**C**	**MARKS**		
						I	**E**	**T**
III	C 7	Physical Chemistry-II	15UCHC51	6	6	25	75	100
	C 8	Organic Chemistry-II	15UCHC52	5	5	25	75	100
	C 9	Coordination Chemistry	15UCHC53	5	5	25	75	100
	CP III	Gravimetric Analysis Preparation of Organic Compounds	-	3	-	Examination VI Semester		
	CP IV	Physical Chemistry and Computer in Chemistry	-	3	-	Examination VI Semester		
	CE 1	A) Spectroscopy **OR**	15UCHE5A	5	6	25	75	100
		B) Material Science	15UCHE5B					
	CE P	Organic Analysis, Estimation and Physical Constants	-	3	-	Examination VI Semester		
			TOTAL	**30**	**22**	**100**	**300**	**400**
VI SEMESTER								
III	C 10	Physical Chemistry-III	15UCHC61	6	6	25	75	100
	C 11	Organic Chemistry-III	15UCHC62	5	5	25	75	100
	C 12	Project	15UCHP63	5	5	-	100	100
	CP III	Gravimetric Analysis Preparation of Organic Compounds	15UCHC6P1	3	3	40	60	100
	CP IV	Physical Chemistry and Computer in Chemistry	15UCHC6P2	3	3	40	60	100
	CE 2	Applied and Analytical Chemistry **OR**	15UCHE6A	5	6	25	75	100
		Medicinal Chemistry	15UCHE6B					
	CE P	Organic Analysis, Estimation and Physical Constants	15UCHE6P	3	3	40	60	100
			TOTAL	**30**	**31**	**195**	**505**	**700**

B.Sc. Chemistry Course Structure (CBCS)
(Applicable for students admitted in June 2015 and onwards)

PART I AND PART II SUBJECTS

TITLE OF THE PAPERS, CREDITS & MARKS

GROUP II COURSES (TWO YEAR LANGUAGE COURSES) (B.A. English, B.A. Islamic Studies, B.A. Tamil, B.Sc. Mathematics, B.Sc. Physics, B.Sc. Chemistry, B.Sc. Zoology, B.Sc. Microbiology and B.Sc. Nutrition and Dietetics)							
SEM	**Title of the paper**	**S.CODE**	**H/W**	**C**	**I**	**E**	**T**
PART I – TAMIL							
I	,f;fhyj jk‰0;	15UTAL11	6	3	25	75	100
II	rkaj jk‰0;	15UTAL21	6	3	25	75	100
III	gad;ghL;Lj; jk‰0;	15UTAL31	6	3	25	75	100
IV	rq;fj; jk‰0;	15UTAL41	6	3	25	75	100
		TOTAL	**24**	**12**	**100**	**300**	**400**
PART I – ARABIC							
I	Applied Grammar and Translation – I	15UARL11	6	3	25	75	100
II	Applied Grammar and Translation – II	15UARL21	6	3	25	75	100
III	Prose and Letter Writing	15UARL31	6	3	25	75	100
IV	*Quran* and *Hadeeth*	15UARL41	6	3	25	75	100
		TOTAL	**24**	**12**	**100**	**300**	**400**
PART II – ENGLISH							
I	Prose, Poetry and Remedial Grammar – I	15UENL11	6	3	25	75	100
II	Prose, Poetry and Remedial Grammar – II	15UENL21	6	3	25	75	100
III	One – Act Plays and Writing Skill	15UENL31	6	3	25	75	100
IV	A Practical Course in Spoken English	15UENL41	6	3	40	60	100
		TOTAL	**24**	**12**	**115**	**285**	**400**

DEPARTMENT OF CHEMISTRY
B.Sc. Chemistry Syllabus
(Applicable for students admitted in June 2015 and onwards)
PART III – CORE, CORE ELECTIVE AND PROJECT

SEM	SUB	TITLE OF THE PAPER	S.CODE	H/W	C	MARKS		
						I	E	T
I	C 1	General Chemistry	15UCHC11	4	5	25	75	100
	C 2	Methodology of practicals	15UCHC12	3	4	25	75	100
	CP I	Inorganic Quantitative Analysis & Preparation of Inorganic Complexes	-	3	-	Examination II Semester		
II	C 3	Organic Chemistry - I	15UCHC21	4	5	25	75	100
	C 4	Inorganic Chemistry - I	15UCHC22	3	4	25	75	100
	CP I	Inorganic Quantitative Analysis & Preparation of Inorganic Complexes	15UCHC2P	3	3	40	60	100
III	C 5	Physical Chemistry - I	15UCHC31	3	4	25	75	100
	CP II	Inorganic Qualitative Analysis	-	3	-	Examination IV Semester		
IV	C 6	Inorganic Chemistry - II	15UCHC41	3	4	25	75	100
	CP II	Inorganic Qualitative Analysis	15UCHC4P	3	3	40	60	100
V	C 7	Physical Chemistry - II	15UCHC51	6	6	25	75	100
	C 8	Organic Chemistry - II	15UCHC52	5	5	25	75	100
	C 9	Coordination Chemistry	15UCHC53	5	5	25	75	100
	CP III	Gravimetric Analysis and Preparation of Organic Compounds	-	3	-	Examination VI Semester		
	CP IV	Physical Chemistry and Computer in Chemistry	-	3	-	Examination VI Semester		
	CE 1	A) Spectroscopy **OR**	15UCHE5A	5	6	25	75	100
		B) Material Science	15UCHE5B					
	CE P	Organic Analysis, Estimation and Physical Constants	-	3	-	Examination VI Semester		
III	C 10	Physical Chemistry - III	15UCHC61	6	6	25	75	100
	C 11	Organic Chemistry - III	15UCHC62	5	5	25	75	100
	C 12	Project	15UCHP63	5	5	-	100	100
	CP III	Gravimetric Analysis and Preparation of Organic Compounds	15UCHC6P1	3	3	40	60	100
	CP IV	Physical Chemistry and Computer in Chemistry	15UCHC6P2	3	3	40	60	100
	CE 2	Applied and Analytical Chemistry **OR**	15UCHE6A	5	6	25	75	100
		Medicinal Chemistry	15UCHE6B					
	CE P	Organic Analysis, Estimation and Physical Constants	15UCHE6P	3	3	40	60	100
			TOTAL	**92**	**85**	**525**	**1375**	**1900**

PART III – ALLIED I – BIO-CHEMISTRY

Allied Bio-Chemistry for B.Sc. Chemistry Students								
SEM	**SUB**	**TITLE OF THE PAPER**	**S.CODE**	**H/W**	**C**	**MARKS**		
						I	**E**	**T**
I	AI 1	Carbohydrates, Nucleic Acids and Metabolism	15UCHA11	3	4	25	75	100
	AI P	Allied Bio-Chemistry Practical	-	3	-	Examination II Semester		
II	AI 2	Amino Acids, Nucleic Acids and Enzymes	15UCHA21	3	4	25	75	100
	AI P	Allied Bio-Chemistry Practical	15UCHA2P	3	2	40	60	100
			TOTAL	**12**	**10**	**90**	**210**	**300**

PART III – ALLIED I – MATHEMATICS

Allied Mathematics offered by Mathematics Department to B.Sc. Physics and B.Sc. Chemistry Students								
SEM	**P**	**TITLE OF THE PAPER**	**S.CODE**	**H/W**	**C**	**MARKS**		
						I	**E**	**T**
I	AI 1	Statistics and Calculus	15UMAA11	6	5	25	75	100
II	AI 2	Algebra & Differential Equations	15UMAA21	6	5	25	75	100
			TOTAL	**12**	**10**	**50**	**150**	**200**

PART III – ALLIED II – PHYSICS

Allied Physics offerred by Physics Department to B.Sc. Mathematics and B.Sc. Chemistry Students								
SEM	**P**	**TITLE OF THE PAPER**	**S.CODE**	**H/W**	**C**	**MARKS**		
						I	**E**	**T**
III	AII 1	Allied Physics – I	15UPHA31	3	4	25	75	100
	AII P	Allied Physics Practical	–	3	–	Examination IV Semester		
IV	AII 2	Allied Physics – II	15UPHA41	3	4	25	75	100
	AII P	Allied Physics Practical	15UPHA4P	3	2	40	60	100
			TOTAL	**12**	**10**	**90**	**210**	**300**

PART III – ALLIED II - CHEMISTRY

Allied Chemistry offered by Chemistry Department to B.Sc. Physics and B.Sc. Mathematics Students								
SEM	**SUB**	**TITLE OF THE PAPER**	**S.CODE**	**H/W**	**C**	**MARKS**		
						I	**E**	**T**
III	AII 1	Allied Chemistry - I	15UCHA31	3	4	25	75	100
	AII P	Allied Chemistry Practical	-	3	-	Examination IV Semester		
IV	AII 2	Allied Chemistry - II	15UCHA41	3	4	25	75	100
	AII P	Allied Chemistry Practical	15UCHA4P	3	2	40	60	100
			TOTAL	**12**	**10**	**90**	**210**	**300**

Part IV – Skill – Based Elective (For B.Sc. Chemistry Students)

SEM	P	TITLE OF THE PAPER	S.CODE	H/W	C	MARKS		
						I	E	T
III	1	Chromatography	15UCHS31	3	2	25	75	100
IV	2	Polymer Chemistry	15UCHS41	3	2	25	75	100
			TOTAL	**6**	**4**	**50**	**150**	**200**

Part IV – Non – Major Elective (For Other Major Students)

SEM	P	TITLE OF THE PAPER	S.CODE	H/W	C	MARKS		
						I	E	T
III	1	Water Management	15UCHN31	3	2	25	75	100
IV	2	Applied Chemistry	15UCHN41	3	2	25	75	100
			TOTAL	**6**	**4**	**50**	**150**	**200**

Part IV – EVS & Value Education (For All Major Students)

SEM	P	TITLE OF THE PAPER	S.CODE	H/W	C	MARKS		
						I	E	T
I	1	Environmental Studies	15UEVS11	2	1	25	75	100
II	2	Islamic Value Education **OR**	15USVE2A	2	1	25	75	100
		Value Education	15USVE2B					
			TOTAL	**4**	**2**	**50**	**150**	**200**

PART – V – Extension Activities

SEM	Extension Activities (Choose any one)	S.CODE	H/W	C	MARKS		
					I	E	T
I to IV	Enviro Club	15UEXEVC	–	1	–	100	100
	NCC	15UEXNCC					
	NSS	15UEXNSS					
	Physical Education	15UEXPHY					
	Red Ribbon Club	15UEXRRC					
	Sadakath Outreach Programme	15UEXSOP					
	Youth Red Cross	15UEXYRC					
	Youth Welfare	15UEXYWL					
			–	**1**	**–**	**100**	**100**

PART – 1 TAMIL			
Kjy; gUtk			
Part – 1	,f;fhyj; jkpo;		15 UTAL11
Hrs/Week : 6	Hrs/Sem : 90	Hrs/Unit : 18	Credits : 3

Nehf;fk; :

- jkpo;g; giLg;gpyf;fpaq;fshd GJf;ftpijfs; rpWfijfs; Mfpatw;iw vOj itj;jy;.
- r%fk; gw;wpa rpe;jidfisg giLg;gpyf;fpaq;fs; %yk; Vw;gLj;Jjy;.

myF - 1

jkpo;r; nra;As; - GJf;ftpijfs;

1. my;yh`; - kfhftp ghujpahh
2. jkpOf;F mKnjd;W ngah - ghNte;jh ghujpjhrd
3. ghLy; - gL;Lf;NfhL;iL fy;ahzRe;juk;
4. Mapuk; jpUehkk ghb - ftpf;Nfh mg;Jy; uFkhd;
5. Njrg;gpjhTf;F xU njUg ghLfdpd mQ;ryp - K. Nkj;jh
6. le;J nghpJ MW rpwpJ - ituKj;J
7. kio nfhLf;Fk; - ftpauR fz;zjhrd
8. vj;jpirapypUe;J vwpag;gLLJ - fy;ahz;[p
9. rpNdfpjdpd jho;thd tPL - fyhg;gphpah
10. J}f;fk; tpw;w fhRfs; - urpft;Qhdpahh
11. Njhoh NkhrpfPudhh - Qhdf;$j;jd;
12. taYk tho;Tk - eh.Kj;Jf;Fkhh
13. fLTs; Nghw;wp - ftpkzp
14. ez;gNd - fyPy; [Pg;uhd;

myF -2 (rpWfijf; fsQ;rpak;)

1. fhQ;rid - GJikg;gpj;jd;
2. $wy - tz;zjhrd;
3. nrhh;f;f fd;dpif - fUzhkzhsd;
4. fhyj;jpd; Mtu;j;;;jdk - Njhg;gpy; KfkJkPuhd;
5. fdtpy; cjph;e;j g+ - ehWk;g+ehjd;
6. uh[kPd - fPuD}h [h`ph;uh[h
7. rq;fhj;jp - jPd

myF- 3 ciueil

1. gbg;gJ RfNk – nt. ,iwad;G ,.M.g.
   ePA+ nrQ;Ru Gf `T]; (gp) ypL nrd;id.

myF- 4 ,yf;fpa tuyhW

1. jkpo;g; GJf;ftpijfs; Njhw;wKk; tsh;r;rpAk;
2. jkpo;r rpWfijfs Njhw;wKk; tsh;r;rpAk;
3. jLk; gjpj;j jkpo;r rpWfijahrphpah;fs;
4. jw;fhyj jkpo;g; GJf;ftpijfs;> rpWfijfspd; Nghf;F

myF- 5 ,yf;fzk;

1. vOj;J tif gw;wpa tpsf;fk;
   KjnyOj;Jfs;> rhh;ngOj;Jfs;> RL;nLOj;Jfs;> tpdhntOj;Jfs;
2. nkho Kjy; vOj;Jf;fs;> nkho ,Wj vOj;Jfs;
3. ty;ypdk; kpFkpLq;fs;> kpfh ,Lq;fs

PART – 1 TAMIL			
,uz;Lhk; gUtk;			
Part – 1	rkaj; jkpo		15 UTAL21
Hrs/Week : 6	Hrs/Sem : 90	Hrs/Unit : 18	Credits : 3

Nehf;fk; :

- gyrkaf; fUj;Jf;fis xg;gpL;Lr rka ey;ypzf;fj;NjhL khzth;fs; tho ,g;gUtk; Jiz Ghpfpwj.
- jkpo;ehL muRg; gzpahsh Njh;thizaj Njh;Tf;F khzth;fis Maj;jg;gLj;Jjy;

myF- 1

jkpo;r; nra;As; (Jiw ntspaPL)

irtk

1. Njthuk;
   jpUehTf;furh; - khrpy; tPizAk;...
   - ehkhu;f;Fk; Fbay;Nyhk...
   - mg;gd; eP mk;ik eP...
   jpUQhdrk;ge;jh; - NjhLiLa nrtpad;...
   - NtAW Njhsp gq;fd...
   - kUe;jit ke;jpuk...
   Re;ju%h;j;jp ehadhh - gpj;jh gpiw#b...

2. jpUthrfk;
   khzpf;fthrfh - ghy epide;J}L;Lk...
3. jpUntk;ghit - MjpAk; me;jKk; ,y;yh...
4. jpUke;jpuk
   jpU%yh; - xd;Nw FyKk; xUtNd NjtDk;...

itztk

5. ngha;ifaho;thu - itak; jfspah...
   G+jj;jho;thu; - md;Ng jfspah...
   Ngaho;thu - jpUf;fz;NLd;...

6. jpUg;ghit
   Mz;Lhs; - khu;fopj jpq;fs;...

7. tisahgjp - kf;fL nry;tk;

ngsj;jk

8. Gj;jgpuhd; - K.uh.ngUkhs;

fpwpj;jtk

9. ,NaR fhtpak (rpy gFjpfs;)- fz;zjhrd

,l;yhk

10. egpfs; ehaf khd;kpa kQ;rhp - rjhtjhdp nra;Fj;jk;gpg;ghtyh (Fwpg;gpLL ghLy;fs;)
11. Fzq;Fb k];jhd; ghLy;fs; - ghrf;fapw;W tiy
12. Qhdg; Gfo;r;rp - jf;fiy gPh;KfkJ mg;gh
13. myfpyh mUSk; - ,iwaUL ftpkzp. fh.mg;Jy;fg+h

ePj ,yf;fpaq;fs

14. jpUf;Fws; (thd; rpwg;G)
15. ehybahh; - fy;tp fiuapy
16. ,d;dhehw;gJ - Md;wtpj;j...

myF- 2 Gjpdk

"fy;kuk;" - jpyftjp

myF - 3 ciueil (jkpo;j; Jiw ntspaPL)

1. egpfs; ehafk; (]y;) md;gpd; jhafk;
2. rjf;fj;Jy;yh`; mg;gh mth;fspd; tho;Tk; gzpAk;
3. ftp.fh.K.n~hpg - j.K.rh fhrhikjPd
4. ftpf;Nfh mg;Jy;uFkhdpd ftpijfs;
5. jkpo; ,yf;fpaq;fspy kdpjNear rpe;jidfs
6. ,izaj;jpy; jkpo

myF- 4 (Nghl;bj Njh;Tj; jahhpg;G)

,yf;fpa tuyhW

1. irtk;> itztk;› fpwpj;Jtk;> ,Ryhk; tsh;j;j jkpo;
2. Gfo; ngw;w jkpo E}y;fs;> E}yhrphpah;fs;
3. jkpo;ehL muRg; gzpahsh Njh;thizak; eLj;Jk; NghL;bj Njh;Tf;Fhpa nghJj;jkpo; ghLj;jpLLk; - Xh mwpKfk;

myF- 5 ,yf;fzk;

Nth;r;nrhy; mwpjy;> mfuthpirg;gb khw;wpaikj;jy› nra;tpid> nra;ag;ghL;Ltpid> jd;tpid> gpwtpid> cLd;ghL> vjph;kiw› nra;jp thf;fpak;› fyit thf;fpak;› ngah;tpid> ,iL› chpr;nrhw;fspd; ,yf;fzk; kw;Wk; ngah;r;nrhy;> tpidr;nrhy; tifs;> yfu› sfu› zfu› ufu› wfu NtWghLfs;.

PART – 1 TAMIL			
%d;whk gUtk			
Part – 1	gad;ghL;Lj; jkpo		15 UTAL31
Hrs/Week : 6	Hrs/Sem : 90	Hrs/Unit : 18	Credits : 3

Nehf;fk; :

- jkpopd fhg;gpa ,yf;fpa tsj;ij khztH;fSf;F czh;j;Jjy
- ,e;jpa MLrpg; gzpj;Njh;Tf;F khztH;fis Maj;jg;gLj;Jjy
- nra;jp ntspg;ghL;L cj;jpfisf fw;Wj je;J khztH;fis CLftpayhsh;fshf khw;Wjy;.

myF- 1

jkpo;r; nra;As; (Jiw ntspaPL)

1. rpyg;gjpfhuk; - tof;Fiuf; fhij
2. kzpNkfiy - ghj;jpuk; ngw;w fhij
3. nghpaGuhzk; - nka;g;nghUs; ehadhh Guhzk;
4. fk;guhkhazk; - Re;jufhz;Lk; (Ch NjL gLyk;)
5. ,NaR fhtpak - rpYitg;ghL
6. rPwhg;Guhzk; - kjpdj;jhh <khd; nfhzL gLyk;
7. Fj;G ehafk; - tz;zf; fsQ;rpag; Gyth (fhg;gpag; ghtpfk; kL;Lk;)

myF- 2

,e;jpa MLrpg; gzpf;Fj jahh;gLj;Jk; Nehf;fpyike;j gad;ghL;Lf; fLLiu E}y; I.V.V]; Njh;Tk; mZFKiwAk -nt.,iwad;G ,.M.g.> epa+ nrQ;Rhp Gf `T];> mk;gj;J}hp nrd;id – 98.

myF- 3

Clf mwpKfk

,jopay; mwpKfk;

r%fKk; ,jo;fSk;

thndhyp> njhiyf;fhL;rp epfo;r;rpfis mikf;Fk; Kiw

rpwg;Gf; fL;Liu vOJjy;

,jo;fspd; mbg;giLf; nfhs;iffs;

jw;fhy ehspjo;fspy jkpo

myF - 4

jkpo; ,yf;fpa tuyhW

- lk;ngUk; fhg;gpaq;fs;
- IQ;rpW fhg;gpaq;fs;
- rpw;wpyf;fpaq;fs; (cyh> J}J> gps;isj; jkpo;> guzp)

myF - 5

,yf;fzk

(jkpo;ehL muRg; gzpahsh Njh;thizaj;jpd; nghJj; jkpo ,yf;fzg; gFjp)

gpioj; jpUj;jk;> re;jpg; gpiofs;> xUik – gd;ikg; gpiofs) kuGg gpiofs;> tOTr; nrhw;fis ePf;Fjy;> gpwnkhopr; nrhw;fis ePf;Fjy;> Nth;nrhy;iyr; Njh;T nra;jy

ghh;it E}y;fs; :

jkpo; ,yf;fpa tuyhW - Kidth;.R.Mde;jd
fz;kzpg; gjpg;gfk;>
jpUr;rp – 02.

,jopay; EZf;fq;fs; - nrz;gfh gjpg;gfk;
nrd;id – 17.
njhiyNgrp : 24331510

Fj;G ehafk; Ma;Tiu - Lhf;Lh.K.mg;Jy;fhPk;
cyf jkpohuha;r;rp epWtdk;> nrd;id.

rPwhg;Guhzk; %yKk; nghopg;GiuAk; - `h[p vk;.KfkJ a+Rg;
,uz;Lhk; ghfk;

PART – 1 TAMIL			
ehd;fhk; gUtk;			
Part – 1	rq;fj jkpo		15 UTAL41
Hrs/Week : 6	Hrs/Sem : 90	Hrs/Unit : 18	Credits : 3

Nehf;fk; :

- rq;fj jkpo Fwpj;j rpe;jidfis khztH;fSf;F VW;gLj;Jjy
- ,iza CLfj;jpy; jkpo; ,Lk ngw;Ws;s ,Lj;jpid czh;j;jp khztH;fis ,izaj;ijg gad;gLj;j itj;jy

myF- 1

jkpo;r; nra;As; (Jiw ntspaPL)

ew;wpiz> FWe;njhif> lq;FEW}W› gjpw;Wg;gj;J> ghpghLy;> fypj;njhif> mfehD}W› GwehD}W kw;Wk; gj;Jg; ghL;by; Ky;iyg;ghL;L KOtJk

myF- 2

ciueil

rpw;gpNa cd;idr nrJf;FfpNwd · itukj;J

myF- 3

,izaj; jkpo; (jkpo;j;Jiw ntspaPL)

,izaj jkpo - Kidth; r.kfhNjtd;

,uz;Lhk; gjpg;G - Nguh.m.K.ma+g;fhd;

Kidth;.m.Nr.Nrf;rpe;jh

- ,izak; - Xh mwpKfk; · cyfshtpa jkpo;
- tiyj;jsq;fs; - ,izaj;jsj;NjL nghwp
- ,izag; gad;ghL - jkpopy; tiyg; g+f;fs;

myF- 4

,yf;fpa tuyhW

vL;Lj; njhif> gj;Jg; ghL;L E}y;fs;

myF- 5

,yf;fzk;

- jkpoh tho;tpy; mfKk; GwKk;
- Itif epyq;fspd Kjy;> fU› chpg; nghUL;fs;
- mwj;njhL epw;wy
- fsT> fw;G tpsf;fk;

Gwj;jpizfs; : 12 mwpKfk;

ghh;it E}y;fs;

jkpo; ,yf;fpa tuyhW

Kidth; R.Mde;jd

fz;kzp gjpg;gfk;

jpUr;rp – 620002.

,izaj jkpo (jkpo;j;Jiw ntspaPL)

rjf;fj;Jy;yh`; mg;gh fy;Y}hp

jpUney;Ntyp.

Part - I ARABIC			
Applicable for Group II Courses (Two Year Language Courses) such as B.A. English, B.A. Tamil, B.A. Islamic Studies, B.Sc., Mathematics, B.Sc., Physics, B.Sc., Chemistry, B.Sc, Zoology, B.Sc, Microbiology and B.Sc., Nutrition and Dietetics.			
PAPER-I	***APPLIED GRAMMAR AND TRANSLATION-I***		**15UARL 11**
Hrs/ Week: 6	**Hrs/ Sem: 90**	**Hrs/ Unit: 18**	**Credits: 3**

Unit I :-

Lessons 1 to 5 (Reader)

Unit II :-

Lessons 6 to 10

Unit III :-

Grammar Portions

1) Al Mufrad wal- muthanna wal jam'
2) Huroof ul Jarr
3) Asmaa – ul Ishaarah.
4) Adawaatul Istifhaam
5) Ad Damaair – ul – Munfasilah Val Muthasilah
6) Al-Idaafah
7) Al Mubtada wal khabar
8) As-sifatu wal mausoof
9) Al mudhakkar wal muannath
10) Asmaa-ul-mausool

Unit IV :-

Lessons 11 to 15

Unit V :-

Lessons 16 to 20

TEXT BOOKS

1) Duroosul Lughatil Arabiya Part – I (Reader) - Lessons 1 to 20 only by Dr.V. Abdur Rahim. Available at Islamic foundation Trust, 78 Perambur High Road , Perambur, Chennai- 600 012.

2) An-Nahwul Waadih Ibtidayee – Part I (Grammar, selected topics only) by Ali Al-jaarim and Mustafa Ameen. Available at Hilal Book House , Tirurkad, Angadipuram, Kerala.

Semester - II		
PAPER-II	***APPLIED GRAMMAR AND TRANSLATION-II***	**15UARL 21**
Hrs/ Week: 6	**Hrs/ Sem: 90**	**Hrs/ Unit: 18**	**Credits: 3**

Unit I :-

Lessons 1 to 3 (Reader)

Unit II :-

Lessons 4 to 7

Unit III :-

Grammar Portions

1) Inna wa Akhavaatuha.
2) Ismut Tafleel
3) AlMali wal Mularee
4) Al-Amr wan Nahi
5) Al Fa-il
6)Al Maf-ool
7) Al-Asmaul Mausool
8) Taqseemu Fihl ila As-saheeh wal Muhtal
9)Ismul Maf'ool
10) Ismul Faa'il.

Unit IV

Lessons 8 to 11

Unit V

Lessons 12 to 15

TEXT BOOKS

1. ***Duroosul Lughatil Arabiya*** *Part – II (Reader) Lessons 1 to 15 only by Dr.V. Abdur Rahim. Available at: Islamic foundation Trust, 78 Perambur High Road , Perambur, Chennai-600 012.*
2. ***An-Nahwul Waadih Ibtidayee*** *–Part I &II (Selected Grammar Portions only) by Ali Al-jaarim and Mustafa Ameen. Available at: Hilal Book House , Tirurkad, Angadipuram, Kerala.*

Semester III			
Paper – III	**Prose and Letter Writing**		**15UARL31**
Hrs/Week:6	**Hrs/Sem:90**	**Hrs/Unit : 18**	**Credits:3**

Unit I

Lessons 1 to 9

انحركح - انكهًح - أواع انكهًح – انًركثاخ - انفراشح وانسهرج - انسيارج - في انسوق - انًحطح - انقطار -

Unit II

Lessons 10 to 17

أسرج انعى -حفم ديُي دكاً انفواكه - جُيُح انحيواَاخ - َسهح طيثح - انهعة - انسفر تانطائرج - انعودج يٍ انحج -

Unit III

Lessons 18 to 25

سرقح انسهرج - َظاو انحجرج - انعثادج - يحادثح - انخطاب - رحهح اني دهني - يُظر انحقول - انثريذ –

Unit IV

Lessons 26 to 31

حذيث االطفال - دكاً انثقال - انصيذنيح - انسيٍ - انساعح)أنف(– انساعح)ب(

Unit V

Kinds of letters **- رسانح اني الوانذ نطهة انفهوش نهرسوو - رسانح طهة االجازج – رسانح طهة وظيفح اني شركح – رسالت االستفسار عن البضاعت – رسانح شكوي عٍ َقص انثضاعح– رسانح اني يذير انثُك –** ***Glossary of Words*** ***(page no 14)***

TEXT BOOKS

1. **Al Qira't- ul- Waaliha** Part- II By: Waheeduz Zamaan Al-Keeranavi **القراءة الواضحت – الجزء الثاني - وحيد الزمان الكيرانوي** (lessons 1 to 31only) Available at: Husainiya Bookstall, Deoband, Utterpradesh.
2. Letter Writing in Arabic (For schools and colleges) (selected letters only) by Dr. Syed Karamathullah Bahmani – Available at: Published by Alif Books & Prints, Chennai – 600 014.

Semester IV			
PAPER-IV	**QURAN AND HADEETH**		**15UARL41**
Hrs/ Week: 6	**Hrs/ Sem: 90**	**Hrs/ Unit: 18**	**Credits: 3**

Unit I

Verses from 1 to 9 from (Sura – al – Hujraat)

Unit II

Verses from 10 to 18 from (Sura – al – Hujraat)

Unit III

Codification and Compilation of Hadeeth Literature, Life History of Imam Bukhari, Muslim, Tirmidi, Abu Dawood, Nasaee and Ibn Majah & Hadeeth 1 to 10

Unit IV

Hadeeth 11 - 20

Unit V

Verses from 12 to 19 from (Sura – Luqman)

TEXT BOOKS:

1. **Tafseer Suratul Hujuraath and Suraah Luqman** (verses from 12-19) – A study material prepared by Dept. of Arabic, Sadakathullah Appa College , Rahmath Nagar, Tirunelveli-11.

2. **Hadeeth:** Ahadeeth Sahlah An Explana *Hadeeth: Sharhu Ahadeeth Sahlah An explanatory translation of Dr. V. Abdur Rahim's Ahadeeth Sahalah with grammatical notes.* Available at: Islamic foundation Trust, 78 Perambur High Road , Perambur, Chennai- 600 012.

PART – II ENGLISH
TWO – YEAR LANGUAGE COURSE
B.A. English, History, Islamic Studies, B.Sc. Mathematics, Physics, Chemistry, Zoology, Microbiology and Nutrition and Dietetics

I SEMESTER			
EN1	**PROSE, POETRY AND REMEDIAL GRAMMAR - I**		**15UENL11**
Hrs/ Week: 6	**Hrs/ Sem: 90**	**Hrs/ Unit: 18**	**Credits: 3**

Objectives:

1. To answer comprehensive questions on passages of moderate level of difficulty.
2. To analyse the prescribed prose pieces and to attempt a critical appreciation of the poems.
3. To write grammatically.

UNIT I – PROSE

1. Letter to a Teacher - Nora Rossi and Tom Cole (Trans.)
2. Spoken English and Broken English - George Bernard Shaw
3. Voluntary Poverty - M.K. Gandhi

UNIT II – PROSE

4. A Snake in the Grass - R.K. Narayan
5. The Civilization of Today - C.E.M. Joad
6. Kamala Nehru - Jawaharlal Nehru

UNIT III – POETRY

1. On His Blindness - John Milton
2. Upon Westminster Bridge - William Wordsworth
3. When I have Fears - John Keats

UNIT IV – FUNCTIONAL GRAMMAR

1. Articles and Nouns (Units 68-80 of *Intermediate English Grammar*)
2. Pronouns and Determiners (Units 81–90 of *Intermediate English Grammar*)

UNIT V – FUNCTIONAL GRAMMAR

3. Reported Speech (Units 46-47 of *Intermediate English Grammar*)
4. Questions and auxiliary verbs (Units 48-51 of *Intermediate English Grammar*)
5. 'ing' and the infinitive (Units 52-67 of *Intermediate English Grammar*)

TEXTBOOKS:

1. T. Srirama, Colin Swatridge. ed. *College Prose and Poetry*. TRINITY, New Delhi: Trichy, 1989 (rpt. 2014).
2. Raymond Murphy. ed. *Intermediate English Grammar*. New Delhi : Cambridge University Press, 1994 (rpt. 2006).

II SEMESTER			
EN2	**PROSE, POETRY AND REMEDIAL GRAMMAR - II**		**15UENL21**
Hrs/ Week: 6	**Hrs/ Sem: 90**	**Hrs/ Unit: 18**	**Credits: 3**

Objectives:

1. To answer comprehensive questions on passages of moderate level of difficulty.
2. To analyse the prescribed prose pieces and to attempt a critical appreciation of the poems.
3. To write grammatically.

UNIT I – PROSE

1. With the Photographer - Stephen Leacock
2. Professions for Women - Virginia Woolf
3. On Letter Writing - Alpha of the Plough

UNIT II – PROSE

4. The Night the Ghost Got In - James Thurber
5. The Donkey - Sir. J.Arthur Thomson
6. A Cup of Tea - Katherine Mansfield

UNIT III – POETRY

1. The Flower - Alfred Lord Tennyson
2. Homage to a Government - Philip Larkin
3. Obituary - A.K. Ramanujan

UNIT IV – FUNCTIONAL GRAMMAR

1. Present and Past (Units 1-6 of *Intermediate English Grammar*)
2. Present Perfect and Past (Units 7-18 of *Intermediate English Grammar)*
3. Future (Units 19-22 of *Intermediate English Grammar)*

UNIT V – FUNCTIONAL GRAMMAR

4. Future (Units 23-25 of *Intermediate English Grammar)*
5. Modals (Units 26-36 of *Intermediate English Grammar)*
6. Conditionals and 'Wish' (Units 37-40 of *Intermediate English Grammar)*
7. Passive (Units 41-45 of *Intermediate English Grammar)*

TEXTBOOKS:

1. T. Srirama, Colin Swatridge. ed. *College Prose and Poetry*. TRINITY, New Delhi: Trichy, 1989 (rpt. 2014).
2. Raymond Murphy. ed. *Intermediate English Grammar*. New Delhi: Cambridge University Press, 1994 (rpt. 2006).

III SEMESTER			
EN3	**ONE – ACT PLAYS AND WRITING SKILL**		**15UENL31**
Hrs/ Week: 6	**Hrs/ Sem: 90**	**Hrs/ Unit: 18**	**Credits: 3**

Objectives:

1. To expose the conversational patterns to students and enable them to make use of the patterns in a given practical situation.
2. To write sentences in English grammatically.

UNIT I – ONE – ACT PLAYS

1. Refund - Fritz Karinthy
2. Reunion - W.ST.John Tayleur
3. The Never Never Nest - Cedric Mount

UNIT II – ONE – ACT PLAYS

4. Aladdin and His Magic Lamp - Y. Sayed Mohammed
5. Tippu Sultan - Y. Sayed Mohammed
6. The Merchant of Evergreen Venice - Y. Sayed Mohammed

UNIT III – WRITING SKILL

1. **Messages** (Pages 1-9 of *Written English for You* be taught and the tasks given be accomplished in the *Record of Writing*)
   i) What is a message?
   ii) When do we write messages?
   iii) Why do we write messages?
   iv) How do we write messages?

2. **Letters – 1** (Pages 10-19 of *Written English for You* be taught and the tasks given in pages 17 and 19 should be accomplished in the *Record of Writing*)
   i) Letters for Ordering Supply of Goods
   ii) Letters of Complaint
   iii) Letters of Applications

3. **Letters – 2** (Pages 36-40 of *Written English for You* be taught and the tasks given in pages 38 and 40 should be accomplished in the *Record of Writing*)
   i) Letters to inform your plan of visits
   ii) Letters of Request
   iii) Letters of Apology

UNIT IV – WRITING SKILL

4. **Essays** (Pages 66-79 be taught and the tasks 1-3 given in pages 79 - 80 should be accomplished in the *Record of Writing*)
   i) What is an Essay?

ii) Types of Essays.
iii) The structure of an Essay.
iv) Introductory paragraph.
v) Supporting paragraph.
vi) Transitional paragraph.
vii) Concluding paragraph.
viii) What can be the length of an Essay?
ix) Why am I writing this Essay?
x) Who am I writing for?
xi) How to begin an Essay?
xii) How to organize an Essay?
xiii) What to avoid in writing an Essay?

5. **Narrating** (Pages 109-116 of *Written English for You* be taught. The tasks 1 and 2 given in pages 115 - 116 should be accomplished in the *Record of Writing*)
   i) Describing events in a chronological order
   ii) Narrating events from different points of view
   iii) Narrating events from a different viewpoint in time

UNIT V – WRITING SKILL

6. **Reporting** (Pages 127-136 be taught. The tasks given in pages 129-134 and 136-137 must be accomplished in the *Record of Writing*)
   i) News Reports.
   ii) Reporting Events or Developments
   iii) Reporting Interviews and Press Conferences
   iv) Reports of Meetings

7. **Summarizing** (Pages 164-172 of *Written English for You* be taught and the tasks 1 - 3 given in pages 172 -178 should be accomplished in the *Record of Writing*)
   i) What is a Summary?
   ii) How to write a Summary?
   iii) How long should a Summary be?
   iv) Should the Summary be in a paragraph?
   v) Analysis of the process of Summarizing.

NOTE:

Questions for Units III, IV and V should be framed from the tasks given in the text book **Written English**.

TEXTBOOKS:

1. Y. Sayed Mohammed. ed. *The Lamp of India*. Tirunelveli: Muhammed Taahaa Publications, 2011.
2. G. Radhakrishna Pillai. ed. W*ritten English for You*. Chennai: Emerald Publishers, 1990 (rpt. 2008).
3. Compiled by a Board of Editors. *A Book of Plays*. Chennai: Orient Blackswan, 2010.

IV SEMESTER			
EN4	**A PRACTICAL COURSE IN SPOKEN ENGLISH**		**15UENL41**
Hrs/ Week: 6	**Hrs/ Sem: 90**	**Hrs/ Unit: 18**	**Credits: 3**

Objectives:

1. To express students' needs orally in a fluent, simple and direct style.
2. To pronounce words intelligibly.
3. To use the right intonation pattern in speech.

UNIT I

Interactive Expressions and Pronunciation Practice :Consonants (Chapters 1- 3 of *A Course in Spoken English*)

UNIT II

Introducing oneself / others, patterns for greeting, requesting, expressing and responding to thanks, etc., & Pronunciation Practice : Vowels (Chapter 4 – 8 of *A Course in Spoken English*)

UNIT III

Developing descriptive competency, narrative competency, arguing competency, compering competency and Pronunciation Practice: Diphthongs (Chapter 9 – 13 of *A Course in Spoken English*)

UNIT IV

Practising continuous speech, group discussion and Pronunciation Practice : Word Accent and Intonation (Chapters 14 – 19 of *A Course in Spoken English*)

UNIT V – LISTENING PRACTICE

Students will listen to audio and video materials for 10 – 12 hours.

Textbook, Workbook, Record Note:

1. Nihamathullah. A. et al. *A Course in Spoken English*. Tirunelveli: MSU, 2005. (rpt. 2010).
2. A Workbook for A Course in Spoken English.
3. Spoken English Practice Record.

Evaluation Scheme:

I Internal Oral Examination	:	15 Marks	
II Internal Oral Examination	:	15 Marks	The best two of the three CIA test marks will be added up
III Internal Oral Examination	:	15 Marks	
Loud Reading	:	5 Marks	
Listening Test	:	5 Marks	
Internal Marks	**:**	**40 Marks**	
External Oral Examination	:	50 Marks	
Record Note	:	05 Marks	
Workbook	:	05 Marks	
		60 Marks	

PART III - CORE, CORE ELECTIVE & PROJECT			
I SEMESTER			
C 1	GENERAL CHEMISTRY		15UCHC11
Hrs / Week: 4	Hrs / Sem: 60	Hrs / Unit: 12	Credit: 5

UNIT I - Periodic Table

Objective: To understand the general characteristics of elements on the basis of Periodic Table.

Long form of Periodic Table - merits and demerits - variation of periodic properties (atomic radii, ionic radii, ionization potential, electro negativity and electron affinity) of elements in periods and groups. Different scales of electronegativity (Pauling, Mulliken Scale, Alfred and Rochow's Scale), Application of electro negativity. Inert pair effect. Classification of elements on the basis of their electronic configurations.

UNIT II - Atomic Structure (Wave Mechanical Approach)

Objective: To study the atomic structure from wave mechanical concept.

Dual nature of matter, de - Broglie equation - verification using Davisson and Germer experiment. Heisenberg uncertainty principle - Compton Effect - Schrodinger wave equation (derivation not required) - significance of ψ^2 - Eigen value and Eigen function. Shapes of s, p and d - orbitals. Quantum Numbers and its significances. Pauli's exclusion principle, Hund's rule and Aufbau principle.

UNIT III - Chemical Bonding

Objective: To study the modern approach of chemical bonding.

Covalent bond - Atomic Orbital theory of covalent bond - polarity of covalent bonds - Fajans rule. Molecular Orbital theory - LCAO method - Rules for linear combination of atomic orbitals. Molecular orbital treatment for homonuclear diatomic molecules (H_2, N_2, F_2, O_2 and He_2) and heteronuclear diatomic molecules CO, HF and NO - Bond order and magnetic properties. Basic concept and applications of hydrogen bonding

UNIT IV - Shape of Molecules

Objective: To understand the bonding and structure of important compounds.

VSEPR Theory - postulates, applications to simple molecules such as $BeCl_2$, BF_3, CH_4, NH_3 and H_2O. Hybridization and geometry of sp^3, sp^3d, sp^3d^2 and sp^3d^3 Bonding, shapes and structures of the following Molecules PCl_5, SF_6, IF_7, $SF_4$and XeF_4. Odd electron bond in B_2H_6(3C - 2e$^-$ bond).

UNIT V - Oxidation and reduction

Objective: To understand the Inorganic reactions on the basis of electron transfer.

Electronic concept of oxidation and reduction. Oxidation number - assigning oxidation number - Redox reaction - Half reaction. Oxidant - definition - important oxidants and their reduction half

reaction - Fe (III), hydrogen peroxide and potassium permanganate. Reductant - definition - important reductants and their oxidation half reactions - Fe (II), oxalic acid and KI. Disproportionation reactions - MnO_4^{2-} in acidic medium. Methods of balancing redox reactions: ion - electron and oxidation number method (only in acid medium).

REFERENCE BOOKS:

1. Advanced Inorganic Chemistry Volume I - Sathyaprakash and R.D.Madan, 2005; S.Chand and Company, New Delhi.
2. General and Inorganic Chemistry Volume I - R.Sarkar2005; New central Book Agency, Kolkata.
3. Text book of Inorganic Chemistry - P.L.Soni and M.Katyl, 2004; Sultan Chand & Sons, New Delhi.
4. Atomic structure and chemical bonding - Manas Chanda, 2006; Tata McGraw Hill Publishing Company, New Delhi.
5. Theoretical Principles of Inorganic Chemistry - G.S.Manku, 2004; Tata McGraw Hill publishing company, New Delhi.

I SEMESTER			
C 2	**METHODOLOGY OF PRACTICALS**		**15UCHC12**
Hrs / Week: 3	**Hrs / Sem: 45**	**Hrs / Unit: 9**	**Credit: 4**

UNIT I -Principles of Qualitative Analysis

Objective: To know the basic apparatus and their calibration used in chemistry laboratory

Flames - Oxidizing and reducing - Cleaning of Glass apparatus - Dilution of concentrated solution - Quantitative transfer of a substance to a graduated flask. - Instruments used for measuring liquids and their calibration - Pipette, Burette, graduated flask - Determination of melting point and boiling point.

Semi micro procedure - test tube, centrifuge tube, stirring rods, dropper, reagent bottles, test tube holder, centrifuge, detection of evolved gases, heating of the solution, warming, evaporation of the solution, Precipitation with H_2S - washing, dissolving, transferring of precipitates, spot test plates.

UNIT II - Qualitative Analysis

Objective: To study the principles used in qualitative analysis.

Preliminary tests for inorganic substances - physical examination, Charcoal cavity test, Flame test, Oxidizing fusion mixture test, Borax bead test, Preparation of original solution, Preparation of sodium fusion extract. Common - ion effects. Removal of interfering acid - radicals - Chromate, borate, oxalate, fluoride and phosphate.

UNIT III - Titrimetric Analysis

Objective: To study the principles and idea about the volumetric analysis.

Introduction - Normality, Molality, Molarity (with simple problems),titrant, titrate, standard solution, End point, Types of indicators - Internal, External, Self, Adsorption. Types of reactions in volumetric analysis - Principle involved in acidimetry, alkalimetry, Iodometry, Iodimetry, Complexometry titration - Volumetric calculations.

UNIT IV - Gravimetric Analysis

Objective: To study the principles and idea about the gravimetric analysis.

Principle - Precipitation from homogenous solutions - organic precipitants - Co-precipitation, post-precipitation - Apparatus generally used in gravimetric analysis - stirring of liquids - filtration - desiccators and desiccants - crucible - Gravimetric steps involved in analysis (solution, precipitation, filtration, drying, ignition and incineration , weighing).

UNIT V - Theory of organic analysis

Objective: To study the principles about the qualitative organic analysis.

Preliminary examination - (Physical state, Colour, Odour, Flame test, Solubility test) - Detection of extra elements - Lassaigne's test for nitrogen, halogens and sulphur - Classification of organic compounds

- Test for functional groups - Sodium carbonate test, Ester test, $FeCl_3$ test, Libermann's test, Schiff's reagent test, Tollen's test, 2, 4 - dinitrophenyl hydrazine test, Molisch test, Seliwanoff's test, Mulliken Barker reaction, Isocyanide test, Diazotisation reaction (Dye test).

Reference books:

1. An advanced course in Practical chemistry - Ghoshal Mahapatra & Nad, 2000; New Central Book Agency (P) Ltd., Kolkatta.
2. Vogel's Qualitative Inorganic Analysis, Revised by G.Svehla, 2009; Published by Dorling Kindersley Pvt.Ltd., New Delhi.
3. Advanced Practical Chemistry - R.Mukhopadhyay and P.Chatterje, 2007; Arunabha Sen Books & Alied(P) Ltd., Kolkata.
4. Advanced Practical Chemistry - N.K.Vishnoi, 2005; Vikas Publishing House, New Delhi.
5. A Text Book of Practical Organic Chemistry, including Qualitative Organic Analysis - A.I.Vogel (Longman), Pearson Education India.
6. University Practical Chemistry, P.C. Kamboj, 2010, Vishal Publishing Co., Punjab.

II SEMESTER			
C 3	ORGANIC CHEMISTRY - I		15UCHC21
Hrs / Week: 4	Hrs / Sem: 60	Hrs / Unit: 12	Credit: 5

UNIT I - Concepts of Organic Chemistry

Objective: To understand the important concepts of organic chemistry.

Concepts of Organic Chemistry: IUPAC nomenclature of organic compounds (Aliphatic and aromatic - Alkanes, Alkenes, Alkynes, Alcohols, Aldehydes, Ketones, Ether, Ester, Carboxylic acid, Amide, Amines, Cyano, Nitro and halo compounds) - Bicyclic compounds.

Polar effects: Inductive effect, electromeric effect, mesomeric effect, hyper - conjugation and steric effect and their influence on the acidity and basicity of organic compounds.

UNIT II - Types of reactions and Reaction Intermediates

Objective: To study the reaction intermediates.

Bond Fission: Homolytic and Heterolytic cleavage, Electrophiles and nucleophiles.

Reaction intermediates: Formation, stability and structure of carbonium ions, carbanions, carbenes, nitrenes and free radicals.

Types of Reactions: Addition, Substitution, Elimination, Condensation and Polymerization reactions.

UNIT III - Active Methylene Compounds &Tautomerism.

Objective: To study the synthetic use of active methylene group and tautomerism.

Active methylene compounds: Reactivity of methylene hydrogen - preparation and synthetic uses of diethyl malonate, ethyl acetoacetate, and ethyl cyanoacetate.

Tautomerism - definition - various types - keto - enol, amido - imido and nitro - acinitro tautomerisms - evidences in favour of each form and mechanism of inter conversion.

UNIT IV - Reagents of Synthetic Importance

Objective: To study the synthetic applications of some important organic reagents.

Preparation and synthetic applications of Diazomethane, Lithium aluminium hydride, Sodium borohydride, N-bromosuccinimide, Sodamide, Selenium dioxide, Per-iodic acid, Osmium tetroxide, Grignard reagent, Methyl lithium and Diethylzinc.

UNIT V - Cycloalkane and Aromaticity

Objective: To study the reactions and stability of cyclic compounds and the aromatic reaction mechanism.

Cycloalkane: Nomenculature - General methods of preparations, properties - Bayer's strain theory - Sachse - Mohr theory - Conformations of cyclohexane.

Aromaticity: Huckel's rule - example forbenzenoid (benzene and naphthalene) and non - benzenoid compounds (propylinium and cyclopropenyl ion). - Aromatic sextet theory based on resonance and MO theory.

REFERENCE BOOKS:

1. Modern Organic Chemistry - M. K. Jain and S. C. Sharma, 2005, VishalPublishing Company, Jalandhar.
2. Advanced Organic Reactions Mechanism - N. Tewari,2005: Books and Allied (P) LTD, Kolkata.
3. Advanced General Organic Chemistry - S. K. Gosh, 2005, New CentralBook Agency, Kolkata.
4. Organic Reaction Mechanism - R. K. Bansal, 2005, McGraw hillpublishing company New Delhi.
5. Organic Reactions and Reagent - J. N. Gurtu and R. Kapoor, 2004, S.Chand and company, New Delhi.

II SEMESTER			
C 4	INORGANIC CHEMISTRY - I		15UCHC22
Hrs / Week: 3	Hrs / Sem: 45	Hrs / Unit: 9	Credit: 4

UNIT I - Principles and Processes of Metallurgy

Objective: To study the principles and process of metallurgy.

Occurrence of elements in nature, minerals & ores, Types of ores - Various steps of metallurgy - concentration of ores, calcination, roasting. Reduction to free metals - Carbon (smelting) heating in air, carbon monoxide, hydrogen - aluminothermic process - Kroll's process. Refining - Mond's process, van Arkel - de - Boer process, electro refining, Zone refining. Metallurgy of Titanium & Nickel and their important uses.

UNIT II - Hydrogen and Oxygen compounds

Objective: To study about the hydrogen, oxygen and their compounds.

Reactive forms of hydrogen - nascent hydrogen - atomic hydrogen - active hydrogen - *ortho* and *para* hydrogen - occluded hydrogen. Hydrogen as a future fuel. Heavy water - preparation - properties - uses. Hydrogen peroxide - manufacture of hydrogen peroxide - reaction and uses - volume strength and estimation by permanganometric method - constitution of Hydrogen peroxide. Ozone - preparation - Siemens and Brodies ozoniser - properties - structure and uses.

UNIT III - s - block elements

Objective: To study the characteristics of s -block elements and their compounds.

General characteristics of IA and IIA group elements. Diagonal relationship of Lithium with Magnesium. Anomalous behavior of Lithium and Beryllium. Extraction of Lithium. Extraction of Magnesium and Beryllium. Sodium carbonate (washing soda) - manufacture by electrolytic process - properties and uses. Sodium bicarbonate (Baking soda) - properties and uses.

UNIT IV - p - Block elements

Objective: To study the characteristics of p - block elements and their compounds

Boron group elements - group discussion. Preparation, uses and structure of anhydrous aluminum chloride. Carbon group elements - comparison of carbon and silicon - preparation, properties and uses of calcium carbide. Nitrogen group elements - preparation, properties and uses of sodium nitro prusside and silicon nitride. Preparation and uses of microcosmic salt, potassium pyroantimonate, tartaremetic and sodium bismuthate

UNIT V - d and f - block elements

Objective: To study the characteristics of d and f - block elements and their compounds.

General characteristics of d - block elements - Metallurgy and uses of V - preparation and uses of V_2O_5, polyvalence of V. Comparative study of Fe, Co and Ni. Comparative study of Cu, Ag and Au. Preparation and uses of Platinized asbestos, colloidal platinum, spongy platinum, platinum black and potassium chloroplatinate.

Lanthanides - occurrence - general characteristics of Lanthanides -Lanthanide contraction and its consequences. Actinides - occurrence - general characteristics of actinides. Extraction and uses of Uranium. Preparation and uses of UF_6 and Zinc uranyl acetate.

REFERENCE BOOKS:

1. Advanced Inorganic Chemistry - Vol. I, II, - Gurdeep Raj, 1986; Goel Publishing House, New Delhi.
2. Advanced Inorganic Chemistry Vol I, II - Sathyaprakash and R. D. Madan, Revised reprint 2005; S. Chand and Company, New Delhi
3. Advanced Inorganic Chemistry - F. A. Cotton and Wilkinson, 2003; John Wiley & Sons. INC. ,
4. Inorganic Chemistry - J. E. Huhey, E. A. Keiter and R. L. Keiter, 2007; Addison Wesley Publishing Company.
5. Concise Coordination Chemistry - R. Gopalan and V. Ramalingam, 2001; Vikas Publishing House, New Delhi.

I & II SEMESTERS		
CP I	**INORGANIC QUANTITATIVE ANALYSIS & PREPARATION OF INORGANIC COMPLEXES***	**15UCHC2P**
Hrs / Week: 3	**Hrs / Sem: 45**	**Credit: 3**

*** Examination at the end of II Semester**

A. VOLUMETRIC ESTIMATION:

A double titration involving the preparation of a primary standard, standardization of the link solution, making up of the given solution and its estimation.

Use of digital balance is permitted.

The Experiments for examination

1. Estimation of Washing Soda (Na_2CO_3)
2. Estimation of Oxalic acid (Permanganometry)
3. Estimation of Ferrous iron (Permanaganmoetry)
4. Estimation of Ferrous iron by external indicator method
5. Estimation of Potassium dichromate (Iodometry)
6. Estimation of copper (Iodometry)

Complexometric titration

1. Estimation of Zinc
2. Estimation of magnesium
3. Estimation of Calcium
4. Estimation of manganese

B. PREPARATION OF INORGANIC COMPLEXES

1. Preparation of Potash alum
2. Preparation of chrome alum
3. Preparation of Prussian blue
4. Preparation of sodium ferrioxalate
5. Preparation of tetrammine copper sulphate
6. Preparation of tristhioureacopper (I) chloridedihydrate

Experiments for course work only (not to be given for examination)

1. Estimation of a mixture of Na_2CO_3 and $NaHCO_3$ using Warden double indicator method
2. Determination of acetic acid in commercial vinegar using NaOH.
3. Preparation of potassiumtrisoxalatoferrate(III)
4. Calibration of burette, pipette and thermometer.

REFERENCE BOOKS:

1. Vogel's text book of Quantitative Inorganic Analysis - A. I. Vogel, (Longman), Pearson education, India.
2. Advanced Practical Chemistry - R. Mukhopadhyay and P. Chatterje, 2007; Arunabha Sen, Books &Alied(P) Ltd. , Kolkata.
3. Advanced Practical Chemistry - N. K. Vishnoi, 2005; Vikas Publishing House, New Delhi.
4. Advanced Course in Practical Chemistry - Ghoshal, Mahapatra & Nad, 2000; New Central Book Agency (P) Ltd. , Kolkata.

III SEMESTER			
C 5	**PHYSICAL CHEMISTRY - I**		**15UCHC31**
Hrs / Week: 3	**Hrs / Sem: 45**	**Hrs / Unit: 9**	**Credit: 4**

UNIT I - Gaseous State and Liquid crystals

Objective: To study the behavior of molecules in gaseous state.

Maxwell's law of distribution of velocities (derivation) - graphical representation and its significance. Effect of temperature on distribution of molecular velocities - types of molecular velocities. Collision diameter - collision number - collision frequency - mean free path - Problems.

Degrees of freedom of a gaseous molecule - Principle of equipartition of energy - Calculation of specific heat ratio for monoatomic, diatomic molecules. Liquid crystals - Smectic, Nematic and Cholesteric types.

UNIT II - Solid State

Objective: To study the structure of solids.

Solids - types of solids - crystalline and amorphous solids. Types of crystalline solids - molecular crystal, covalent crystal, ionic crystal and metallic crystals. Types of packing - HCP,CCP - Types of voids. Structure of diamond, graphite, NaCl, CsCl and Rutile.

Crystal defects - Point defect - Schottky and Frenkel defect - Metal excess and metal deficiency defects - Crystal growth from gel method.

UNIT III - Colloids and Surface Chemistry

Objective: To understand the reactions on a surface and colloids.

Colloids - coagulation of colloids - Hardy Schulze law - protective colloids - gold number - Hoffmeister series - Gels - Classification, preparation and properties. Emulsion - types - emulsifiers - surfactants.

Adsorption - Factors influencing adsorption - Physisorption and Chemisorption - Freundlich adsorption isotherm and Langmuir adsorption isotherms - Derivation - BET isotherm (derivation not required) - Applications of adsorption.

UNIT IV - Nuclear Chemistry - I

Objectives: To study the nuclear stability and nuclear reaction.

Nuclear size - Nuclear forces - - Mass defect, binding energy and Packing fraction - Mass energy relation - Nuclear stability - n/p ratio - odd - even rule - Magic numbers - Nuclear models - liquid drop and nuclear shell model - Types of radioactive decay - Radioactive series - Soddy's group displacement law - rate of decay - half life and average life period - Geiger Nuttal rule - nuclear isomerism.

UNIT V - Nuclear Chemistry - II

Objective: To understand the concept and applications of nuclear reactions.

Nuclear reactions (elastic, inelastic and spallation) - Artificial transmutation and induced radio activity. Nuclear fission - energy released during fission - Uncontrolled fission - Principle of Atom bomb - Controlled fission - Atomic reactors - Thermal reactors and Fast Breeder reactors. Nuclear fusion - Principle of Hydrogen bomb - Stellar energy - Differences between nuclear fission and nuclear fusion. Applications of radioactive isotopes - Radio carbon dating - Radioactive hazards.

REFERENCE BOOKS:

1. Principles of Physical chemistry - B. R. Puri, L. R. Sharma, Madan S. Pathania, 2004; Vishal publishing co. - New Delhi
2. A Text book of Physical Chemistry - Samuel Glasstone ,1976; Macmillan (India) Ltd. , New Delhi
3. Solid state chemistry and its applications - Antony R. West, 1989; John Wiley & Sons, New Delhi. .
4. Nuclear chemistry - R. Gopalan, 2000; Vikas Publishing House, New Delhi.
5. Essentials of Physical Chemistry - ArunBahl, B. S. Bahl, G. D. Tuli, 2008, S. Chand & Company Ltd, New Delhi.
6. Essentials of Nuclear Chemistry - H. J. Arniker, 1995, 4th Edition, New Age International Publishers, New Delhi.

IV SEMESTER			
C 6	**INORGANIC CHEMISTRY - II**		**15UCHC41**
Hrs / Week: 3	**Hrs / Sem: 45**	**Hrs / Unit: 9**	**Credit: 4**

UNIT I - Concepts of Acids and Bases

Objective: To understand the theory of acids and bases.

Arrhenius concept of acids and bases and its limitation - Lowry - Bronsted concept - Lux Flood concept, Lewis Acid Bases theory - Usanovich concept - Dual behavior of Water, relative strength of acids and bases - Peterson's Hard and Soft acid and bases principles - Relative order of the acidity of halogen acids (HF, HCl, HBr and HI). Buffer definition - types - Henderson equation.

UNIT II: Reactions in Non Aqueous Solvents.

Objective: To understand the inorganic reaction in non - aqueous solvents.

Reaction in Non aqueous solvents: Classification of solvents - Characteristics of a solvent - Dielectric constant, dipole movement and solvation. Liquid Ammonia - Solubility of various substance (organic compounds, inorganic salts, non - metals and metals) in liquid ammonia.

Auto ionization - Ammonia acids and bases.

Precipitation, Neutralization ,Solvolysis, complex formation and redox reaction.

Advatages and disadvantages of liquid ammonia as solvent.

Liquid sulphur dioxide: Solubility of various substances - Auto ionization, precipitation, neutralization, solvolysis, complex formation and redox reactions.

UNIT III: Inorganic Polymers

Objective: To study the importance of the Inorganic Polymers

Inorganic Polymers: Definition and different methods of classification - general method of preparation and general properties of inorganic polymers. Polymers containing Boron - Preparation, reactions, uses and structure of borazine - substituted borazine - Boron nitride - preparation and structure . Polymers containing Silicon - silicones - Preparation of various types - structure and uses of high thermal silicones, silicone resins, Silicones rubber and greases.

Polymers containing P - Chain and network polymers - preparation structures and uses of polyphosphonitrilic chloride, poly *ortho* phospates, poly meta phosphates, Inorganic rubber, phosphate glasses - boro phosphates glasses - structure and uses.

UNIT IV: Applied Inorganic compounds

Objective: To have a better knowledge of Applied Inorganic Compounds.

Glass - composition, manufacture and varieties. Transparent plastic - Glass textiles - Structure and uses of Feldspar, Zeolite and Ultramarine. Ceramics - raw materials and manufacture. Cement - composition, manufacture and varieties. Paints - ingredients of paints, classifications and manufacture. Pigments - classifications and preparation. Electroplating - purpose, qualities of metal coating, apparatus, procedure and theory of electroplating. Galvanizing - methods and uses. Photography - different steps involved.

UNIT V: Computer in Chemistry

Objective: To study the application of computer programming to problems in chemistry

Introduction to computer - components - hardware, software - system and application software - Programming languages.

C^{++} - Introduction - keywords, functions - constants and variables - Data types and operators - classes and objects - branching statements and Looping statements - Oops using C^{++} . Programming in C^{++} - simple programs for problems in chemistry, such as,

1. Half - life period;
2. Normality, Molality and Molarity;
3. Root mean square velocity;
4. Average velocity and most probable velocity of gases;
5. Ionic strength of an electrolyte;
6. pH of the solution.

REFERENCE BOOKS:

1. Advanced Inorganic Chemistry Volume I - Sathyaprakash and R. D. Madan, 2005S. Chand and Company, New Delhi
2. General and Inorganic Chemistry Volume I,R. Sarkar2005; New central Book Agency , Kolkotta.
3. College Chemistry - J. L. Rosenberg and L. M. Epstein - 2004, Schaums Outlines , Tata McGraw Hill Publishing Company , New Delhi
4. Theoretical Principles of Inorganic Chemistry, G. S. Manku, 2004: Tata Mcgraw Hill Publishing Company , New Delhi
5. Text Book of Inorganic Chemistry P. L. Soni & M. Katyl - 2004 , Sultan Chand & Sons , New Delhi
6. Industrial Chemistry - B. K. Sharma , Goel Publishing House, New Delhi
7. Fundamentals Concepts of Inorganic Chemistry - E. S. Gilreath Tata McGraw Hill Publishing Company, Meerut.
8. Atomic structure and chemical bonding - Manee Chanda ,Tata McGraw Hill Publishing Company, New Delhi
9. Object oriented programming with C++, E. Balagrusamy - 1995, Padma Book Agency, Chennai
10. Computers in Chemistry - K. V. Raman - 2011, Tata McGraw Hill Education (P) Ltd. , New Delhi

III & IV SEMESTERS		
CP II	**INORGANIC QUALITATIVE ANALYSIS ***	**15UCHC4P**
Hrs / Week: 3	**Hrs / Sem: 45**	**Credit: 3**

*** Examination at the end of IV Semester**

Systematic Qualitative analysis of a mixture containing two anions and two cations. One of the anions should be an interfering radical which should be eliminated. The two cations should be of different groups.

The combination of

Mixture containing sulphates along with Lead and group V cations,
Mixture which need fusion,
Mixture containing oxalate and carbonate and
Mixture containing one oxidizing and one reducing groups should be avoided.

The micro techniques method of analysis is recommended. However the semi micro technique is also permitted

Anions:

1. Carbonate
2. Sulphate
3. Nitrate
4. Chloride
5. Bromide
6. Oxalate
7. Borate
8. Fluoride
9. Phosphate

Cations

1. Lead
2. Copper
3. Bismuth
4. Cadmium
5. Antimony
6. Nickel
7. Zinc
8. Manganese
9. Barium
10. Strontium
11. Calcium
12. Ammonium

The students are expected to analyze a minimum of 8 mixtures in their record note.

Course work only

1. Decolorisation and crystallization using charcoal:
   a. Decolorisation of brown sugar (sucrose) with animal charcoal using gravity filtration
   b. Crystallization and decolorisation of impure naphthalene (100g of naphthalene mixed with 0.3g of congo red using 1g decolorizing carbon) from ethanol
2. Sublimation (simple and vacuum)
   a. Camphor, b. Naphthalene c. Phthalic acid d. Succinic acid

REFERENCE BOOKS:

1. Vogel's Qualitative Inorganic Analysis, Revised by G. Svehla, 2009; Published by Dorling Kindersley Pvt. Ltd., New Delhi.
2. Advanced Practical Chemistry - R. Mukhopadhyay and P. Chatterje, 2007; Arunabha Sen, Books & Alied (P) Ltd., Kolkata.
3. Advanced Practical Chemistry - N.K. Vishnoi, 2005, Vikas Publishing House, New Delhi.

V SEMESTER			
C 7	**PHYSICAL CHEMISTRY - II**		**15UCHC51**
Hrs / Week: 6	**Hrs / Sem: 90**	**Hrs / Unit: 18**	**Credit: 6**

UNIT I - Thermodynamics

Objective: To study basic concepts of thermodynamics.

Reversible and irreversible process - isothermal and adiabatic process - relation among P - V, T - V and P - T during adiabatic changes - Expression for w, q, ΔE, ΔH, for 'n' moles of an ideal gas and van der Waals gas during reversible and irreversible isothermal and adiabatic processes - comparison of work done during reversible and irreversible process & isothermal and adiabatic expansion of an ideal gas - Joule - Thomson effect - Joule Thomson (JT) coefficient - Relation between JT effect and other thermodynamic quantities - Derivation of expression for Joule - Thomson coefficient for an ideal gas and a van der Waals gas - Inversion temperature - calculation and its significance.

UNIT II - Thermodynamics - II

Objective: To study the important outcome of second law of thermodynamics

Limitations of the first law of thermodynamics - Spontaneous process - Carnot cycle - different statement of second law of thermodynamics - Problems. Concept of entropy - dependence of entropy of variable of the system. Entropy changes of isothermal and adiabatic process of an ideal gas, reversible and irreversible processes - Entropy changes during phase transitions - Entropy of mixing of ideal gas - physical significance of entropy - Free energy - Helmholtz free energy (A) and Gibbs free energy (G) - variation of free energy with T and P - Gibbs - Helmholtz equation - derivation and significance. - Clapeyron equation - applications - Clausius - Clapeyron equation and applications - Problems

UNIT III - Thermodynamics III

Objective: To understand the thermodynamics of open system and Third Law.

Partial molar properties - chemical potential - Gibbs - Duhem equation - derivation and significance - variation of chemical potential with temperature and pressure - chemical potential in a system of ideal gases

Concept of fugacity - physical significance of fugacity - activity - activity coefficient - thermodynamics interpretation of law of mass action - derivation of van't Hoff isotherm and isochore. Thermodynamic derivation of relation between concentration and elevation of boiling point and depression of freezing point.

Nernst heat theorem - Third law of thermodynamics - statement - determination of absolute entropy of solids and gases - Exception to third law of thermodynamics.

UNIT IV - Phase rule

Objective: To understand the phase rule and distribution law.

Mathematical statement - definition of terms used - thermodynamic derivation - application of phase rule to one component system - Water, CO_2 and sulphur - Two component systems - condensed system and reduced phase rule - simple eutectic - Pb - Ag system - desilverisation of lead - KI - water system - Principle of freezing mixture.

Systems forming compounds with congruent and incongruent melting points - Sn - Mg and sodium sulphate - water systems.

Solid - Vapour equilibria - $CuSO_4.H_2O$ system

Nernst distribution law - thermodynamic derivation - molecular association and dissociation - application of distribution law to benzoic acid - benzene, and $KI+I_2 \rightarrow KI_3$ system.

UNIT V - Solutions and dilute solutions

Objective: To study the behaviour of different kinds of solutions.

Raoult's law - Ideal and non - ideal solutions - Activity of a component in ideal solutions - chemical potential in ideal and Non - ideal solutions - Gibbs - Duhem Margules equation - application - thermodynamics of ideal solution - ΔG_{mix}, ΔH_{mix} of ideal solution (No derivation) - vapour pressure of real solution - deviation from Raoult's law - theory of fractional distillation - benzene - toluene system, Azeotropic mixture - ethanol - water, HCl - H_2O, Immiscible liquids - theory of steam distillation - applications.

Solubility of partially miscible liquids - CST - Phenol - water, Triethylamine - water and nicotine - water systems - Crismer test. Solutions of Gases in liquids - Henry's law.

REFERENCE BOOKS:

1. Principles of Physical Chemistry - B. R. Puri, L. R. Sharma, Madan S. Pathania, 2004, Vishal publishing co. - New Delhi
2. Thermodynamics for Chemists - Samuel Glasstone, 2000; Affiliated East - West Press private Ltd. New Delhi.
3. Physical Chemistry - G. M. Barrow, 2005; Tata McGraw Hill Publishing Company, New Delhi.
4. Physical Chemistry - G. R. Metz, 2004; Schaum's outlines, Tata McGraw Hill Publishing Company, New Delhi.
5. An introduction to chemical thermodynamics - R. P. Rastogi and R. R. Misra, 2005; Vikas Publishing House, New Delhi.

V SEMESTER			
C 8	**ORGANIC CHEMISTRY – II**		**15UCHC52**
Hrs / Week: 5	**Hrs / Sem: 75**	**Hrs / Unit: 15**	**Credit: 5**

UNIT I - Organic Reactions

Objective: To understand the mechanism and applications of some important name reactions in organic synthesis.

Name reactions: Mechanism and applications of the following reactions: Aldol Condensation, Cannizzaro reaction, MPV reduction, Wolf - Kishner reduction, Clemenson reduction,Wittig reaction, Oppenaeur oxidation, Diels - Alder reaction, Gattermann reaction, Perkin's reaction, Claisen's reaction, Knovenagel reaction, Reimer - Tieman reaction and Kolbe reaction.

UNIT II - Stereochemistry and conformational analysis

Objective: To study the details of Stereochemistry and conformational analysis.

Stereochemistry: Optical isomerism - optical activity - elements of symmetry - Optical activity of lactic acid, tartaric acid. Enantiomers and diastereoisomers - racemic and meso forms - Racemisation - Resolution of racemic mixtures, Walden inversion - Asymmetric synthesis - Compounds without asymmetric carbon - diphenyl, allenes and spiranes.

Chirality - achiral molecules - meaning of (+) and (-), D and L notations. Projection formulae - Fischer, Flying wedge, Sawhorse and Newmann Projection formulae Cahn - Ingold and Prelog rule - R, S - notation (with one and two asymmetric carbon atoms).

Geometrical isomerism - maleic acid and fumaric acid, Aldoxime and ketoxime. - E - Z notation. Methods of distinguishing geometrical isomers.

Conformational Analysis: Configuration and conformation, dihedral angle - Factors affecting the conformational stability. Conformational analysis of n - butane (including energy diagrams).

UNIT - III - Reaction Mechanisms

Objective: To understand the important mechanisms of organic chemistry.

Substitution reactions - S_N1 and S_N2 mechanism - effect of substrate - structure, nucleophile, leaving group and the solvent on nucleophilic substitution reactions. Differences between S_N1 and S_N2 reaction - Neighboring group participation due to n, πand σ electrons. S_N1',S_N2', S_Ni, S_Ni' mechanisms.

Elimination reactions - α and β eliminations - E1 and E2 mechanisms - effect of substrate structure, base, solvent and the leaving group on elimination. - Hoffmann, Saytzeff and Bredt'srule.

Addition reaction - stereochemistry of addition of halogen to C=C bond

UNIT - IV - Aromatic Substitution reactions

Objective: To understand the important mechanisms of aromatic substitution reactions.

Mechanism of electrophilic aromatic mono - substitution (nitration, halogenation, sulphonation, Friedal Craft's alkylation, acylation) - Aromatic disubstitution - Korner'sabsolute method of orientation - Orientation effects of - OH, - NH_2, - X, - CH_3, - NO_2 and SO_3H on electrophilic substitution based on resonance concept - Rules of aromatic trisubstitution - Nucleophilic aromatic substitution - Unimolecular, bimolecular and benzyne mechanism with examples - Homolytic aromatic substitution (side chain halogenations of alkyl benzenes)

UNIT - V - Heterocyclic Compounds

Objective: To study the importance of heterocyclic compounds

Heterocyclic compounds: Definition, preparation and properties of furan, pyrrole and thiophene. Comparison of pyrrole with phenol - Comparison of pyrrole with aromatic amines - Comparison of aromatic characters and basic nature of furan, pyrrole and thiophene.

Preparation (Hantzsch - pyridine) and properties of pyridine - Comparison of basic characters of pyridine with pyrrole, aliphatic and aromatic amines - Synthesis of quinoline (Skraup synthesis) - properties - Synthesis of isoquinoline (Bischler - Napiralski reaction) - properties - Synthesis of indole (Fischer - indole synthesis) - properties.

REFERENCE BOOKS:

1. Stereochemistry of carbon compounds - E. L. Eliel, 2005, Tata McGraw Hill Publishing Company.
2. Organic Chemistry: Natural Products - Volume I - O. P. Agarwal, 2004, Goel Publishing House, New Delhi.
3. Organic Chemistry - R. T. Morrison and R. N. Boyd, 4th edition, 1976; New York, Allyn and Bacon Ltd.
4. Organic Chemistry Vol. I and II, I. L Finar. (Sixth ed. ,) 1996; Addison Wesley Longman Ltd. , England.
5. Heterocyclic Chemistry, Raj K Bansal, 5th Edition, New Age International Publishers, New Delhi, 2010.

V SEMESTER			
C 9	**COORDINATION CHEMISTRY**		**15UCHC53**
Hrs / Week: 5	**Hrs / Sem: 75**	**Hrs / Unit: 15**	**Credit: 5**

UNIT I - Basic concepts in Coordination Chemistry

Objective: To study the fundamental concepts of coordination chemistry.

Definition, terminology, Calculation of Oxidation number in complexes, Types of ligands (Monodentate, Bidentate, Polydentate and bridging ligands) - Nomenclature of coordination compounds (IUPAC system). Geometrical isomerism in square planar and octahedral complexes - optical isomerism in tetrahedral complexes. Werner's coordination Theory. Effective Atomic Number rule (EAN).

UNIT II - Coordination Chemistry I

Objective: To study the theories of bonding in the coordination complexes

VB theory - Prediction of hybridization - Crystal Field Theory - crystal field splitting of tetrahedral, square planar and octahedral systems - Factors affecting the value of Δ. Crystal field splitting energy (CFSE) values and its application in the stability of complexes.

Application of crystal field theory in spectral and magnetic properties - Distortion from perfect symmetry - Jahn - Tellar effect. Molecular orbital approach - MO diagrams for ML_6 type complexes - π - back bond coordination.

UNIT III - Coordination Chemistry II

Objective: To study the stability and applications of coordination complexes

Stability of Complexes in Solutions - stepwise stability constants and overall stability constant - log β value and stability. Factors affecting the stability of complexes in solution - Determination of stability constant by Bjerrum method

Chelate - chelate effect - explanation of chelate effect - Kinetic stability - labile and inert complexes - Trans effect.

UNIT IV - Coordination Chemistry III

Objective: To study the properties and structure of metal carbonyls.

Metal Carbonyls - Classification - General methods of preparation, physical and chemical properties. Bonding and structure of metal carbonyls - EAN rule.

Structures of metal carbonyls of Fe, Co, Ni, and Mn - [$Ni(CO)_4$, $Fe(CO)_5$, $Cr(CO)_6$, $Mn_2(CO)_{10}$, $Co_2(CO)_8$, $Fe_2(CO)_9$] - Distinction of bridged and terminal carbonyl using IR spectra.

UNIT V - Bio - inorganic Chemistry

Objective: To understand the role of metal ions in Biological systems.

Essential elements in biological systems - bulk, trace and ultra - trace elements in biosystems - Metallo biomolecules - classification - Structure and functions of - hemoglobin, myoglobin, Chlorophyll, Vitamin B_{12}.

Na^+ and K^+ pumps and its functions. Metals and metal complexes in medicine [Platinum complexes, Copper complexes, Gold complexes].

REFERENCE BOOKS:

1. Advanced Inorganic Chemistry Vol I, II - Sathyaprakash and R. D. Madan, Revised reprint 2005; S. Chand and Company, New Delhi
2. General and Inorganic Chemistry Vol I, II Revised reprint 2005; R. Sarkar, New Central Book Agencies , Kolkata
3. Text Book of Inorganic Chemistry - P. L. Soni and M. Katyl - 2004; Sulthan and sons, New Delhi
4. Advanced Inorganic Chemistry - F. A. Cotton and G. Wilkinson; 2003; John Wiley and sons INC. ,
5. Inorganic Chemistry - J. E. Huheey, E. A. Keither and R. L. Keither, 2007; Addison Wesley publishing company.
6. Concise Coordination Chemistry - R. Gopalan and V. Ramalingam, 2001, Vikas publishing House.

V SEMESTER			
CE1 A	**SPECTROSCOPY**		**15UCHE5A**
Hrs / Week: 5	**Hrs / Sem: 75**	**Hrs / Unit: 15**	**Credit: 6**

UNIT I - Microwave & Electronic spectroscopy

Objective: To study the principles of Microwave & Electronic spectroscopy

Electromagnetic spectrum – different regions – electromagnetic radiation –Molecular spectra – Born-Oppenheimer approximation-types of molecular spectra –Factors influencing width and intensity of spectral transition.

Microwave (rotational) spectra – condition, selection rules, theoretical principles.Applications (Calculation of bond length andinversion spectrum of NH_3).Microwave oven- principle.

Electronic spectra- principle – selection rule- Rotational structure of electronic-vibration spectra- Franck Condon principle

UNIT II - IR spectroscopy

Objective: To study the principle of IR and its applications

Vibrational (IR) Spectra – theoretical principle – Harmonic oscillator – anharmonicity – determination of force constant. Rotational – Vibrational spectra of diatomic molecules, - P, Q, R branches – Vibrational spectra of polyatomic molecules – normal modes of vibration of CO_2, H_2O.Vibrational frequencies. Factors affecting IR spectra – Finger print region – Fermi resonance-Applications (aliphatic, aromatic hydrocarbons, alcohols, aldehydes, ketones, carboxylic acid, ester and amide). Inter-molecular and intra-molecular hydrogen bonding.

UNIT III - Raman spectroscopy

Objective: To study the principle of Raman and electronic spectroscopy.

Raman spectroscopy – Rayleigh and Raman scattering, stokes and anti-stokes lines (Quantum theory) - Selection rule - Vibrational Raman spectra. Mutual exclusion principle. Raman spectra of CO_2 and H_2O molecules. Advantages and limitations of Raman Spectroscopy. Comparision of IR and Raman spectroscopy

UNIT IV- NMR spectroscopy

Objective: To study the principle and applications of NMR to some simple molecules.

NMR spectroscopy – principle – Relaxation effect, chemical shift, factors influencing chemical shift – spin-spin coupling and coupling constant. NMR spectrum of simple molecules such as 1-propanol, 1,1,2-tribromoethane, ethyl acetate, benzaldehyde, acetaldehyde, ethyl methyl ketone and isopropyl alcohol.

UNIT V - ESR and Atomic absorption spectroscopy

Objective: To understand the principle of ESR and Atomic absorption spectroscopy.

ESR spectroscopy – principle- ESR spectrometer – hyperfine splitting – ESR spectrum of hydrogen atom, CH_3, benzene anion radical and deuterium. Differences between NMR & ESR.

Atomic absorption spectroscopy – basic principle– application of Cr in steel and Ca in blood serum

REFERENCE BOOKS:

1. Spectroscopy- G.R. Chatwal, 2004; Himalaya Publishing House, New Delhi.
2. Molecular structure and spectroscopy – G. Aruldhas 2005; Prentice Hall of India.
3. Fundamentals of molecular spectroscopy – C.N. Banwell, 2000; Tata McGraw Hill Publishing Company, Mumbai.

V SEMESTER			
CE1 B	**MATERIAL SCIENCE**		**15UCHE5B**
Hrs / Week: 5	**Hrs / Sem: 75**	**Hrs / Unit: 15**	**Credit: 6**

UNIT I - Ionic Conductivity and Solid electrolytes
Objective: To study the conductance of solids.

Types of ionic crystals-Alkali halides-Silver chloride-Alkali earth fluorides- Types of ionic conductors - halide ion conductors - oxide ion conductors - Solid electrolytes - Applications of solid electrolytes.

Electrochemical cell - principle, Batteries, Sensors and Fuel cells. Crystal defects in solids- Schottky and Frenkel defects - Electronic properties and band theory: metals, semiconductors. Inorganic solids, colour, Magnetic properties, Optical properties.

UNIT II - Ferrous and Non-Ferrous Alloy
Objective: To understand the importance of alloys in materiel chemistry.

Ferrous alloys, Carbon and ferrous alloy, steels, various types of carbon steels, their properties and uses; stainless steels.Non-ferrous alloys, properties of ferrous and non-ferrous alloys and their applications.

UNIT III - Glass, Ceramics and Composites
Objective: To study the nano properties of glass and ceramics.

Glassy state, glass formers and glass modifiers, applications - Ceramic structures, mechanical properties, clay products, Refractories, characterizations, properties and applications. Microscopic composites, dispersion –strengthened and particle - reinforced, fiber-reinforced composites, macroscopic composites, Nano-crystalline phase, preparation procedures, special properties, applications.

UNIT IV - Organic Devices.
Objective: To study the important properties of polymers

Types of polymerization- Methods of polymerization. Chemical analysis of polymers- spectroscopic methods- X-ray diffraction analysis processing techniques of polymers, Biomedical applications of polymers- contact lens, dental polymers, artificial heart, kidney, skin and blood cell – water absorbing polymers.

UNIT V - Synthetic Organic Metals.
Objective: To understand the conducting properties of organics.

Conducting organics, organics superconductors, magnetism in organic materials. Electrically conducting organic solids - organic metals - Conjugated polymers- doped polyacetylene, polyaniline, and

polypyrrole - preparation and applications. Blends and composites of polymer materials - Organic charge-transfer complexes and new superconductors. Fullerenes- doped fullerenes as superconductors. Nanocarbon and its applications.

REFERENCE BOOKS:

1. Solid State Chemistry and its Applications; Anthony R. West, 1989, John Wiley &Sons.
2. Material Science; R. S. Khurmi and R. S. Sedha, 2000, S. Chand & Company Ltd.
3. Materials Science and Engineering; V. Raghavan, 2001; Prentice-Hall of India Pvt. Ltd.
4. Materials Science – Dr. Arumugam – Anuradha Publications, Kumbakonam.

VI SEMESTER			
C 10	**PHYSICAL CHEMISTRY – III**		**15UCHC61**
Hrs / Week: 6	**Hrs / Sem: 90**	**Hrs / Unit: 18**	**Credit: 6**

UNIT I - Chemical Kinetics

Objective: To understand the kinetics of reactions.

Basic concept of chemical kinetics (order, molecularity, rate equation and $t_{1/2}$) - Second order reaction (same and different concentrations) and their rate equations, methods of determining order of a reaction - Problems.

Effect of temperature on reaction rates - Arrhenius equation, Activation energy - Energy barrier - effect of catalyst.

Theory of reaction rates - collision theory of bimolecular gaseous reaction - Activated complex theory of bimolecular reaction - Lindemann theory of unimolecular reaction - Fast reaction - Flash photolysis, pulse radiolysis.

UNIT II - Photochemistry

Objectives: To understand the concept and applications of photochemical reactions.

Comparison between photochemical and thermal reaction - Beer - Lambert's law - Limitations - Laws of photochemistry - Grothus Draper law - Stark - Einstein law - Primary and secondary processes - Quantum yield - high and low quantum yield - experimental determination of quantum yield - chemical actinometer.

Consequences of light absorption - Jablonski diagram - fluorescence and phosphorescence - photochemical reaction - photochemical rate law - kinetics of H_2 - Cl_2, decomposition of HI reaction.

Energy transfer in photochemical reactions - Photosensitization and quenching - chemiluminescence - bioluminescence.

UNIT III - Electrochemistry I

Objective: To study the fundamentals of electrochemistry.

Transport number - Definition - determination by moving boundary method. Kohlrausch's law and its applications - Theory of strong electrolyte - Debye Huckel theory - significance of Debye - Huckel Onsager equation (derivation not required) - Conductometric titrations - different types - advantages. Solubility product - relationship between solubility and solubility product - Applications of solubility product and common ion effect in qualitative analysis. Salt hydrolysis - expression for hydrolysis constant and degree of hydrolysis for salts of different types. Calculation of pH of salt solutions (due to hydrolysis). Experimental determination of degree of hydrolysis of aniline hydrochloride.

UNIT IV - Electrochemistry II

Objective: To study the EMF and its applications.

EMF - Electrochemical series and significances Reversible cells - representation - reaction for metal - metal ion, gas - ion, metal - sparingly soluble salt and redox electrodes. Standard cells - Weston Cadmium cell - thermodynamics of reversible / irreversible cells. Calculation of ΔH, ΔG, ΔS and equilibrium constant of cell reaction.

Nernst equation - Concentration cells - Expression for EMF of electrolyte concentration cells with and without transference. Liquid junction potential. Application of EMF measurements - determination of solubility product - determination of pH using quinhydrone, hydrogen, Glass electrodes - potentiometric titrations: acid - base, oxidation reduction and precipitation titrations - Corrosion - Theory (electrochemical) and prevention.

UNIT V - Group Theory

Objective: To study the fundamentals of group theory.

Group theory - symmetry elements and symmetry operations - Definitions of Identity (E), proper rotation axis (n), Mirror plane (σ), Inversion center (i) and rotation - reflection axis (S_n).

Symmetry operations generated by these symmetry elements using examples like H_2O, NH_3,BF_3, $PtCl_4^{2-}$, H_2O_2 (planar, *cis* and *trans*) and CH_4.

Condition for a set of elements to form a group - Abelian and cyclic groups - Group multiplication table - Molecular point groups - assignment of point groups to simple molecule like H_2O and NH_3

REFERENCE BOOKS:

1. Principles of Physical chemistry - B. R. Puri, L. R. Sharma, Madan S. Pathania, 2004, Vishal publishing Co. - New Delhi.
2. Physical Chemistry - G. M. Barrow, 2005; Tata McGraw Hill Publishing Company, New Delhi.
3. Electrochemistry - Principle and Applications. B. Viswanathan, . S. Sundaram, R. Venkataraman, K. Rengarajan and P. S. Raghavan, S. Viswanathan, 2000, Printers &Publishers Pvt. Ltd. , Chennai, 1st Edition.
4. Group Theory and its Chemical Applications - P. K. Bhattacharya, 2005; Himalaya Publishing House, New Delhi.

VI SEMESTER			
C 11	**ORGANIC CHEMISTRY – III**		**15UCHC62**
Hrs / Week: 5	**Hrs / Sem: 75**	**Hrs / Unit: 15**	**Credit: 5**

UNIT I - Rearrangement reactions

Objective: To study the importance of rearrangement reactions:

Rearrangement reactions: Definition and classification - Mechanism and uses of the following rearrangement reactions.

Pinacol - Pinacolone, Benzilic acid, Beckmann, Benzidine, Hofmann, Curtius, Schmidt, Baker - Venkatraman and Fries (Inter, Intra and Photo) rearrangement. Sigmatropic rearrangement - Claisen rearrangement

UNIT II - Polynuclear Hydrocarbons

Objective: To know about polynuclear hydrocarbons

Isolated systems - preparation of diphenyl, triphenylmethane and stillbene - Condensed system - synthesis, reactions and structure of naphthalene, anthracene and phenanthrene - Derivatives of naphthalene and anthracene - Preparation and properties of naphthyl amine, naphthols, naphthaquinones and alizarin - synthesis and structural elucidation of alizarin.

UNIT III - Natural Products Chemistry I

Objective: To study the importance of alkaloids

Alkaloids: Definition, Classification - occurrence and General Methods of extraction - Hofmann exhaustive methylation (with coniine as example). Structural elucidation and synthesis of Coniine, Piperine and Nicotine.

UNIT IV Natural Products Chemistry II

Objective: To study the importance of terpenes, carotenoids, flavones and anthocyanins

Terpenes: Definition, Classification - Isoprene rule - Structural elucidation and synthesis of citral and Camphor.

Carotenoids - isolation and general properties - synthesis of β - carotene and its applications.

Flavones - isolation and general properties - structural elucidation and synthesis of Flavone.

Anthocyanins - isolation, structure (elucidation not required) and colour of anthocyanin.

UNIT V - Organic Spectroscopy

Objective: To understand about the spectroscopic methods applied for organic compounds

UV spectroscopy - chromophores, auxochromes, hypso, hyper and hypochromic shifts. Applications of UV in alkenes - Woodward Fischer rule - Calculation of absorption maxima (λ_{max}) of α, β - unsaturated carbonyl compounds, Conjugated and isolated dienes - Scott rule. IR spectra - Types of vibrations and IR spectra as applied to alcohol - inter and intra molecular hydrogen bonding, carbonyl compounds (aldehydes, ketones, carboxylic acids, amides and esters), tautomeric isomers and amines.

NMR spectra - presentation of NMR spectrum - position and number of signals - chemical shift - application of NMR to Ethanol, Acetaldehyde, Benzaldehyde, Ethylmethyl ketone, Nitromethane, Ethylacetate, Aniline - Roadmap problems based on UV - Visible, IR and NMR spectra.

REFERENCE BOOKS:

1. Organic Chemistry: Natural Products - Volume I - O. P. Agarwal, 2004, Goel Publishing House, New Delhi.
2. Organic Chemistry - R. T. Morrison and R. N. Boyd, 4th edition, 1976; New York Allyn and Bacon Ltd.
3. Organic Chemistry Vol. I and II, I. L Finar. 6thedision, 1996; Addison Wesley Longman Ltd. , England.

VI SEMESTER		
C 12	**PROJECT**	**15UCHP61**
Hrs / Week: 5	**Hrs / Sem: 75**	**Credit: 5**

OBJECTIVES:

At the end of the semester the students should be able to:

1. Identify the potential areas of research in his/her field;
2. Collect data from various sources including the internet, analyze them, make new connections and link them to life.
3. Read and write originally and usefully.

GUIDELINES:

1. The project may be done individually or in groups not exceeding five per group.
2. The minimum length of the project should be 30 pages in A4 size.
3. Marks for the project report will be 100 divided as 60% for the project and 40% for viva – voce.

Evaluation scheme:

The project will be evaluated by both Internal and External Examiners. Each Examiner will evaluate for 100 marks. The allocation of marks for project is as follows:

Project	Internal	External
Word of title	5	5
Objectives / Formulation including Hypothesis	5	5
Review of literature	10	10
Relevance of project to social needs	5	5
Methodology / Technique / Procedure adopted	20	20
Summary / Findings / Summation	5	5
Works cited / Annexure / Footnotes	10	10
Total	**60**	**60**

V & VI SEMESTERS		
CP III	**GRAVIMETRIC ANALYSIS AND PREPARATION OF ORGANIC COMPOUNDS ***	**15UCHC6P1**
Hrs / Week: 3	**Hrs / Sem: 45**	**Credit: 3**

*** Examination at the end of IV Semester**

A. Gravimetric analysis

1. Estimation of lead as lead chromate
2. Estimation of barium as barium chromate
3. Estimation of Calcium as Calcium oxalate monohydrate
4. Estimation of Zinc as Zinc oxinate
5. Estimation of Nickel as Nickel Dimethyl glyoximate

B. Preparation of Organic Compounds

1. Benzyolation:
   (a) Preparation of benzanilide from aniline
   (b) Preparation of beta - napthyl benzoate from beta - naphthol
2. Nitration:
   (a) Preparation of picric acid from phenol
   (b)Preparation of p -nitro acetanilide from acetanilide
3. Bromination:
   Preparation of p -bromoacetanilide from acetanilide
4. Hydrolysis:
   (a) Preparation of salicylic acid from methyl salicylate
   (b) Preparation of Benzoic acid from Benzamide
5. Oxidation:
   Preparation of Benzoic acid from Benzaldehyde
6. Condensation: Preparation of Osazone from Glucose.

REFERENCE BOOKS:

1. Vogel's text book of Quantitative Inorganic Analysis - A.I. Vogel,(Longman), Pearson education, India.
2. Advanced Practical Chemistry - R. Mukhopadhyay and P. Chatterje, 2007; Arunabha Sen, Books & Alied (P) Ltd., Kolkata.
3. Advanced Practical Chemistry - N.K. Vishnoi, 2005; Vikas Publishing House, New Delhi.
4. Advanced Course in Practical Chemistry - Ghoshal, Mahapatra & Nad, 2000; New Central Book Agency (P) Ltd., Kolkata.

V & VI SEMESTERS		
CP IV	**PHYSICAL CHEMISTRY AND COMPUTER IN CHEMISTRY ***	**15UCHC6P2**
Hrs / Week: 3	**Hrs / Sem: 45**	**Credit: 3**

*** Examination at the end of VI Semester**

1. Determination of molecular weight of non -volatile solute by Rast macro method.
2. Determination of molecular weight of a solute by transition temperature method.
3. Construction of the phase diagram of a simple eutectic system and interpretation of the diagram (Example; Naphthalene – Biphenyl)
4. Determination of CST of phenol – water system. Determination of the unknown concentration of NaCl, by CST using phenol water system.
5. Comparison of the strengths of HCl by ester hydrolysis.
6. Conductometric titration:
   a) Determination of the strength of HCl using standard NaOH solution.
   b) Determination of the strength of $BaCl_2$ using Std.$MgSO_4$.
7. Conductometric titration:
   a) Determination of the strength of CH_3COOH using Std. NaOH.
   b) Determination of the strength of $Ba(OH)_2$ using std.$MgSO_4$.
8. Potentiometric titration
   a) Estimation of Fe^{2+} Vs $KMnO_4$ using standard FAS solution (standard solution of FAS has to be prepared).
   b) Estimation of $KMnO_4$ Vs FAS and $K_2Cr_2O_7$ Vs FAS solution (standard solution of FAS has to be prepared).
9. Determination of the solubility of Ammonium Oxalate at different temperature.
10. Computer practical's: Solving problems by writing and running programs in C++ and executing with output (**Course work only**)
    a) Determination of pH of a solution and find that it is basic, acidic or neutral
    b) Compute the rate constant of a first order reaction
    c) Determination of half -life and average -life of a radioactive nuclei
    d) Compute the average velocity & MPV using RMS velocity
    e) Depression of freezing point

f) Most probable velocity, average velocity and RMS velocity

g) Inversion temperature and critical constant.

h) Elevation of boiling point.

REFERENCE BOOKS:

1. Vogel's text book of Quantitative Inorganic Analysis - A.I. Vogel, (Longman), Pearson education, India.
2. Advanced Practical Chemistry - R. Mukhopadhyay and P. Chatterje, 2007; Arunabha Sen, Books &Alied (P) Ltd., Kolkata.
3. Advanced Practical Chemistry - N.K. Vishnoi, 2005, Vikas Publishing House, New Delhi.
4. Advanced Course in Practical Chemistry - Ghoshal, Mahapatra & Nad, 2000; New Central Book Agency (P) Ltd., Kolkata.

VI SEMESTER			
CE2 A	**APPLIED AND ANALYTICAL CHEMISTRY**		**15UCHE6A**
Hrs / Week: 5	**Hrs / Sem: 75**	**Hrs / Unit: 15**	**Credit: 6**

UNIT I- Petroleum and Petrochemicals

Objective: To study the importance of petroleum and petrochemicals.

Refining of petroleum - Composition and uses of main petroleum fractions - Cracking - Thermal and catalytic cracking - Types of catalytic cracking

Advantages of catalytic cracking - Octane number - Antiknock agents - Unleaded petrol - Cetane number - Anti diesel knock agents - Flash point - synthetic petrol - Fischer - Tropsch process.

Petrochemicals - manufacture and industrial uses of methanol - ethanol - rectified sprit, methylated sprit, absolute alcohol - Industrial uses of isopropanol, ethylene glycol, glycerin, acetone and phenol.

UNIT II - Plant nutrients and Fertilizers

Objective: To understand the idea about the plant nutrients/fertilizers and their importance.

Plant nutrients - Macro and micro nutrients - Their role in plant growth - Sources, forms of nutrients absorbed by plants. Deficiency symptoms in plants - Corrective measures - Chemicals used for correcting nutritional deficiencies.

Fertilizers - Manures - Characteristics and its importance - Synthetic fertilizers - Manufacture and uses of urea and Triplesuperphosphate, superphosphate of lime, CAN, Potassium nitrate - Mixed fertilizers - Biofertilizers.

UNIT III - Industrial Chemistry

Objective: To know the idea about paper, textile, match Industries and explosives.

Chemistry of Paper industry: Raw materials - manufacturing process - bleaching and colouring.

Textile Chemistry: Fibers - definition - natural and synthetic fibers - distinction - manufacture and uses of rayon, nylon 66, dacron, orlon and Teflon.

Match industry: pyrotechnic and Explosives - safety matches - composition of the match head, composition of fireworks - colored matches.

Explosives: classifications - primary explosives - preparation of lead azide, DDNP, Tetryl and EDNA. High explosives - Preparation of TNT, picric acid, Ammonium picrate, GTN, PETN, Cyclonite.

UNIT IV - Pharmaceutical Chemistry

Objective: To study the structure and uses of the following important drugs.

Structure and uses:

1. Sulpha drugs - sulphadiazine and prontosil
2. Antimalarial - quinine, quinacrine, chloroguanide, amodiaquin.
3. Arsenical drugs - Salvarasan 606, Neosalvarasan
4. Antibiotics - Penicillin, Tetracycline, streptomycin and chloromycetin (structure and uses)
5. Anesthetics - General anesthetics - vinyl ether, cyclopropane, chloroform, halo ethane, Trichloro ethylene - Intravenous anesthetics - Thiopentone - sodium - Local anesthetics - cocaine , benzocaine and procaine .

Preparation and uses of the following compounds:

Antacids - Magnesium trisilicate, Milk of magnesia
Antifungals - Clotrimazole, Naftifine, Tolnaftate
Emetic - Tartaremetic
Haematonics - Ferrous gluconate
Analgesic and Antipyretic - Aspirin.
Cancer - causes and treatment.

UNIT V - Thermo analytical and Electro analytical Methods

Objective: To study the analytical uses of thermal and electro analytical methods

Thermo Gravimetric Analysis (TGA) - principle, application in the determination of optimum drying temperature range of the precipitates - Factors affecting TGA - Differential Thermal Analysis (DTA) - principle and instrumentation, DTA of Calcium oxalate monohydrate - Simultaneous DTA - TGA curves.

Electro Gravimetric Analysis (EGA) - theory, types of EGA, instrumentation and applications in the estimation of metal ions in solution. Polarography - principle - dropping mercury electrode (DME).

REFERENCE BOOKS:

1. Industrial Chemistry - B. K. Sharma, 2003, Goel Publishing House, Meerut.
2. Industrial Chemicals - Faith etal, Wiley Interscience, New York.
3. Chemical Process Industries - R. N. Shreve, 2000; Tata McGraw Hill Publishing Company, Mumbai.
4. Text Book of Pharmaceutical Chemistry - JayasreeGhosh, 2003; S. Chand and Company, New Delhi.
5. Fundamentals of Analytical Chemistry - D. A. Skoog, D. M. West, F. J. Holler and S. R. Crouch - 2004; Thompson Asia Private Ltd. , Bangalore.

VI SEMESTER			
CE2 B	**MEDICINAL CHEMISTRY**		**15UCHE6B**
Hrs / Week: 5	**Hrs / Sem: 75**	**Hrs / Unit: 15**	**Credit: 6**

UNIT I - Concepts and metabolism of drugs

Objective: To understand the concepts of drugs and their action.

Concepts: Classifications of drugs - biological and chemical classification nomenclature of drugs - International Non - proprietary names (INNs).

Metabolism of drugs: Factors affecting metabolism - chemical pathway of drug metabolism - bio transformation - oxidative, reductive and hydrolytic bio transformations - conjugate reactions - glucouranides, amino acids, ethereal sulphate, methylated, acetylated and glucothione conjugations. Absorption of drugs - routes of administration - factors affecting absorption. Assay of drugs: Chemical, biological and immunological assay.

UNIT II - Diagnostic Medical Instruments

Objective: To study the different techniques used for diagnosis.

Design of medical instruments - general components - transducers - types - biopotential recorders - Electrocardiograph (ECG) - principles, block diagram, measurement and analysis of the ECG.

X - ray - Principle, block diagram, measurement and analysis. Ultrasonic Scanning - principle, block diagram, measurement and analysis of the scans. C. T. Scan - principle, block diagram, measurement and analysis.

UNIT III - Clinical Chemistry

Objective: To know the various clinical analyses.

Clinical chemistry: Composition of blood - blood grouping - determination of blood groups and matching - blood pressure - hyper tension - determination.

Determination of glucose in serum - Folin method, Wu's method - determination of serum cholesterol - Sackett's method - tests for cholesterol.

Estimation of glucose in urine - Benedict's test - tests for salts in serum - tests for chlorides in serum - tests for salts in urine - tests for cholesterol in urine.

Detection of diabetes and anaemia. Estimation of hemoglobin(Hb concentration) - estimation of red blood cells(count).

Analysis of blood - determination of blood urea - urease method.

Estimation of bile pigment in serum - estimation of total protein in serum - estimation of total proteins and albumin based on Biuret and BCG methods.

UNIT IV - Diseases and treatment I

Objective: To study the important disorders of human body and the drugs for them.

Causes and treatment of some common diseases:

Insect borne diseases - malaria and filariasis.
Air borne diseases - diphtheria, woophing cough, influenza, cold, fever and tuberculosis.
Water borne - cholera, typhoid and dysentery.
Digestive disorders - jaundice - respiratory disorder - asthma - nervous disorder - epilepsy - other diseases - piles and leprosy.

Functions, uses and effects of the following drugs:

Cardiovascular drugs - antiarrythmic drugs - quinidine.
Anti hypertensive drugs - reserpine.
Anti anginal drugs - glyceryltrinitrate and isosorbidedinitrate.
Sulpha drugs - sulphanilide and sulphadiazine.

UNIT V - Diseases and treatment II

Objective: To understand the important diseases and their treatment.

Cancer - causes, spread and treatment - structure and effects of chloram - Bucil (Leukeran), methotrexate (Anti - metabolite), plant products and hormones.

Diabetes - control - structure and uses of insulin - Oral hypoglycemic drugs - tolbutamide and chloropropanamide.

Anti - convulsant agents - structure and uses of barbiturates and succinimides.

Uses and effects of the following drugs:

Analgesics - narcotic analgesics - action, uses and structural activity of morphine.
Non narcotic analgesics - asprin and paraacetamol.
Anaesthetic - generalanaesthetic - uses and disadvantages of vinlyl ether and halothane.
Intravenous anaesthetics - thiopental sodium - local anesthetics - cocaine and cincocaine.
Anti psychotic drugs - piperazine and benzamides.
Anti anxiety drugs - benzodiazepine.

REFERENCE BOOKS:

1. Practical Biochemistry - David Plummer - 2005, Tata McGraw - Hills PublishingCompany.
2. Text Book of Pharmaceutical Chemistry - Jeyashree Gosh - 2003, S.Chand and Company, New Delhi.
3. Medicinal Chemistry - G.R.Chatwal, 2002, Himalaya Publishing House, New Delhi.
4. Drugs - G.L.D.Krupadanam, D.V.Prasad, K.V.Rao, K.L.N.Reddy and C.Sudhakar, 2005; Orient LongmannPvtLimited, Hyderabad.
5. Handbook of Biomedical Instrumentation II Edition. - R.S.Khandpur, TataMcGraw - Hill Publishing, Company, New Delhi.

V & VI SEMESTERS		
CE P	**ORGANIC ANALYSIS, ESTIMATION AND PHYSICAL CONSTANTS***	**15UCHE6P**
Hrs / Week: 3	**Hrs / Sem: 45**	**Credit: 3**

*** Examination at the end of VI semester**

A. Systematic analysis of the organic compound with the view to find out the following:

a. Detection of extra element (N, S and halogens)
b. Aliphatic or aromatic
c. Saturated or unsaturated
d. Nature of the functional group (Phenolic, carbonyl, monocorboxylic acid, dicarboxylic acid, esters, carbohydrate (glucose), aromatic primary amine, amide, nitro compound, anilide)
e. Preparation of rational solid derivatives to confirm the functional group.

B. Organic estimation

1) Estimation of Phenol
2) Estimation of Aniline.

C) Physical constants:

1. Determination of melting point

Naphthalene [80 - 82^0 C]; Benzoic acid [121 - 122^0 C]; Urea [132. 5 - 133^0 C];

Salicylic acid [157. 5 - 158^0 C]; m - dinitrobenzene [90^0 C]; p - dichlorobenzene [52^0 C]

Acetanilide 113. 5 - 114^0 C; Asprin 135^0 C

2. Determination of boiling point

Ethanol [78. 5^0 C]; Benzene [80^0 C]; Cyclohexane [81. 4^0 C]; Toluene [110^0 C]

3. Crystallization (Course work only):

a. Acetanilide from boiling water
b. Benzoic acid from water
c. Naphthalene from ethanol

REFERENCE BOOKS:

1. A Text Book of Practical Organic Chemistry, including Qualitative Organic Analysis - A. I. Vogel (Longman), Pearson Education India.
2. Advanced Practical Chemistry - R. Mukhopadhyay and P. Chatterje, 2007; Arunabha Sen, Books & Alied (P) Ltd. , Kolkata.
3. Advanced Practical Chemistry - N. K. Vishnoi, 2005; Vikas Publishing House, New Delhi.
4. Advanced Course in Practical Chemistry - Ghoshal, Mahapatra & Nad, 2000; New Central Book Agency (P) Ltd. , Kolkata.

PART III - ALLIED - I - BIOCHEMISTRY			
I SEMESTER			
AI 1	CARBOHYDRATES, NUCLEIC ACIDS AND METABOLISM		15UCHA11
Hrs / Week: 3	Hrs / Sem: 45	Hrs / Unit: 9	Credit: 4

UNIT I - CARBOHYDRATES I

Objective: To understand the chemistry of carbohydrates of monosaccharide types.

Definition and classification of carbohydrates - Structure and reactions of monosacharides (pyranose structure) Glucose, fructose, Galactose - Mutarotation - Epimerisation - Interconversion of monosaccharide - D - Arabinose to D - Glucose and vice - versa. D - Glucose to D - fructose and vice - versa. Qualitative test for glucose, fructose, galactose and mannose.

UNIT II - CARBOHYDRATES II

Objective: To understand the chemistry of carbohydrates of di - and poly - saccharide types.

Disaccharides - Occurrence, Structure and reactions of maltose, lactose, isomaltose (structural elucidation not required) - Qualitative test for lactose, maltose and sucrose. - Glycosides - Physiological significance - Amino sugars - Importance

Polysaccharides - Definition of homo and hetero polysaccharide. Occurrence and structure of starch and cellulose - Difference between starch and cellulose. Applications of starch, cellulose and their derivatives.

Heteropolysaccharides - occurrence, structure and uses of Hyaluronic acid & chondroitin sulphate.

Blood group polysaccharides.

UNIT III – Nucleic Acids

Objective: To study. The structure and functions of Nucleic acids

Bases – Structure of Purine, Pyrimidine bases which commonly occur in nucleic acids, structure and biochemical function of nucleosides, nucleotides and deoxynucleotides. Genetic code – Watson and crick DNA structure. RNA – Different types (MRNA, tRNA & rRNA) and structure and tRNA only. Triplet code for 20 amino acids.

UNIT IV - Concepts of Metabolism

Objective: To study the basic concepts of metabolism.

Basic concept of metabolism - Catabolism and anabolism. Study of metabolism - different approaches - Use of laboratory animals, isotopes, tissue slices and microorganisms.

UNIT V - Carbohydrate Metabolism

Objective: To understand the complete carbohydrate metabolism.

Embden _meyerhof pathway (or) glycolysis - Significance and reactions - TCA cycle - Significance and reactions - HMP shunt, glycogenesis and glucogenesis .

REFERENCE BOOKS:

1. Biochemistry - U. Satyanarayana & U. Chakrapani, 2008; Books and Allied (P) Ltd., Kolkata.
2. Biochemistry - L. Stryer, W.H. Freeman and Company, New York.
3. Biochemistry _ P.W. Kuchel and G.B. Ralstol, 2005; Schaum's Outlines, Tata McGraw Hill Publishing Company Ltd., New Delhi.

II SEMESTER			
AI 2	**AMINO ACIDS, LIPIDS AND ENZYMES**		**15UCHA21**
Hrs / Week: 3	**Hrs / Sem: 45**	**Hrs / Unit: 9**	**Credit: 4**

UNIT I - AMINO ACIDS AND PROTEINS

Objective: To study about amino acids and proteins.

Amino acids - Different classifications and properties. Optical activity, isoelectric point & zwitter ion - Reaction due to amino group, carboxylic acid group - Action of heat on alpha, beta and gama amino acids.

Proteins - Classification of proteins based on shape, solubility, composition and biological function - Biological actions of proteins. Primary structure, (one method each for C - Terminal, N - Terminal amino acid analysis), Secondary, tertiary and quarternary structure of proteins.

UNIT II - LIPIDS

Objective: To study fatty acids and their biological importance.

Lipids - Definition, classification - Fatty acids - - Definition, classification - . Saturated, unsaturated and unusual fatty acids. - Essential Fatty acids - Functions and Physiological role - Triacylglycerol. - Physical and chemical properties - Acid number, Iodine number, Saponification number and R.M. value.

Phospholipids - lecithin, cephalin - Functions - Spingophospholipid - Glycolipid.

Cholesterol - structure, colour reaction, biochemical function and biological importance.

UNIT III - METABOLISM OF AMINO ACID

Objective: To understand the metabolism of aminoacids

General breakdown of proteins - deamination, transamination, decarboxylation - . Urea cycle - Metabolism of tryptophan - Kynurenine pathway - Serotonin pathway - Melatonin - Serotonin - functions.

UNIT IV - METABOLISM OF LIPIDS

Objective: To understand the metabolism of lipids

Source of body fat - fatty acid oxidation - β oxidation - Source of CoA - Ketone bodies - Ketogenesis - Utilization - overproduction. Biosynthesis of fattyacids - Palmitate - Structure of fatty acid synthase complex.

UNIT V - ENZYMES

Objective: To understand the basic concepts of enzymes

Enzymes - Nomenclature - Classification - Factors affecting the velocity of enzyme reaction - Michaelis - Menten equation - Derivation - Enzyme specificity - Enzyme inhibition - Reversible, Irreversible and Allosteric - Coenzymes - Mechanism of NAD' - Industrial and Medical applications of enzyme.

REFERENCE BOOKS:

1. Biochemistry - U. Satyanarayana & U. Chakrapani, 2008; Books and Allied (P) Ltd., Kolkata.
2. Biochemistry - Lubert Stryer, W.H. Freeman and Company, New York.
3. Biochemistry _ P.W. Kuchel and G.B. Ralstol, 2005; Schaum's Outlines, Tata McGraw Hill Publishing Company Ltd., New Delhi.

I & II SEMESTER		
AI P	**ALLIED BIO-CHEMISTRY PRACTICAL** **(Examination at the end of II Semester)**	**15UCHA2P**
Hrs / Week: 3	**Hrs / Sem: 45**	**Credit: 2**

ANALYSIS OF BIOMOLECULES

I Qualitative analysis of carbohydrates and amino acids

1. Analysis of monosaccharides – glucose and fructose.
2. Analysis of disaccharides - Maltose, lactose and sucrose.
3. Analysis of polysaccharides – Starch, dextrin
4. Analysis of Glycine, tyrosine, tryptophan, arginine and cysteine.

COURSE WORK

1. Qualitative analysis of arginine using paper chromatographic method.
2. Qualitative analysis of monosaccharides (glucose, fructose, galactose, mannose, ribose) using paper chromatographic method.

II Quantitative analysis

1. Estimation of Glycine by formal titration method
2. Estimation of protein by colorimetric method
3. Estimation of ascorbic acid (volumetric method)

COURSE WORK

1. Estimation of Acid number of Oil
2. Estimation of Iodine number of Oil
3. Estimation of saponification number of Oil
4. Estimation of protein in milk by Kjheldal method.

REFERENCE BOOKS:

1. Laboratory manual for Analytical Biochemistry & Separation Techniques- D.R. Palanivelu, 2000; School of Biotechnology, Madurai Kamaraj University, Madurai.
2. B.Sc., Biochemistry Practical Guide (EDOC) - Dept. of Chemistry, Sadakathullah Appa College, Tirunelveli.
3. Practical Clinical Biochemistry Manual- T. Mary Vijaya, M.L. Mani, K. Sunitha Kumari & K.R.T. Asha, 2003; Rishi Publications, Kalikavilai.

DEPARTMENT OF MATHEMATICS Allied Mathematics offered to B.Sc. Physics and B.Sc. Chemistry Students			
I SEMESTER			
AI 1	STATISTICS AND CALCULUS		15UMAA11
Hrs/Week: 6	Hrs/Sem: 90	Hrs./ Unit : 18	Credit: 5

Objectives:

1. To enable the students to understand physical science by a knowledge of elementary calculus.
2. To introduce various statistical tools to satisfy the need of concept personals.

Unit I

Measures of Central Tendency - simple average - Mean, Median & Mode - Geometrical mean and Harmonic mean.

Unit II

Measures of dispersion range - quartile deviation - standard deviation and mean deviation - coefficient of variation.

Unit III

Correlation and regression: Scatter diagram - Karl Pearson's Coefficient of Correlation - properties - Rank Correlation - lines of regression - regression coefficient and properties.

Unit IV

Pedal equations - Curvature - Radius of Curvature in Cartesian, parametric & polar co - ordinates - Evolute - Circle and centre of curvature

Unit V

Beta and Gamma functions

TEXT BOOKS:

1. Statistics by S. Arumugam and Isaac , New Gamma Publications
2. Calculus by S.Arumugam and Isaac, New Gamma Publications

Unit 1 : Chapter II Section 2.1 - 2.4
Unit II : Chapter III Section 3.1
Unit III : Chapter VI Section 6.1 0 - 6.3
Unit IV : Text Book 2 Part I Chapter III Section 3.3, 3.4
Unit V : Text Book 2 Part II Chapter IV

REFERENCE BOOK:

1. Probability and Statistics by Joseph A. Mangaladoss Presi—Persi Publication
2. Calculus Volume I&II by S. Narayanan & T.K.Manicavachagam Pillay, S.Viswanathan

DEPARTMENT OF MATHEMATICS
Allied Mathematics offered to
B.Sc. Physics and B.Sc. Chemistry Students

II SEMESTER			
AI 2	**ALGEBRA & DIFFERENTIAL EQUATIONS**		**15UMAA21**
Hrs/Week: 6	**Hrs/Sem: 90**	**Hrs./ Unit : 18**	**Credit: 5**

Objective:

To enable the students to understand physical science by a knowledge of elementary calculus.

Unit I

Every equation f(x)=0 of degree n has n roots - Relation between roots and coefficients - Symmetric functions of roots in terms of coefficients.

Unit II

Symmetric functions of roots in terms of coefficients**,** Reciprocal equations - Transformation of equations.

Unit III

Approximate solutions of numerical equations using Newton's method and Horner's method.

Unit IV

First order higher degree Differential equations - Solvable for p, x and y - Clairaut's form

Unit V

Vector differentiation - gradient - curl - divergents - solenoidal - irritational - formulae involving gradient, curl and divergent.

TEXT BOOK:

1. Algebra and Sequences and Series by Joseph A. Mangaladoss, Presi - Persi Publications - Edition 2004
2. Differential equation & Applications by S. Arumugam, New Gamma Publications—Edition 2008
3. Analytical Geometry 3D, Vector Calculus & Trigonometry by S. Arumugam & Issac Edition 2004.

Unit I : Chapter I : Section 1.1, 1.2, 1.3.
Unit II : Chapter I : Section 1.4,
Chapter III : Section 3.1 - 3.
Unit III : Chapter IV : Section 4.1, 4.2
Unit IV : TB2 Chapter I : Section 1.7
Unit V : TB3 Chapter VII

REFERENCE BOOK:

Differential Equation & Application By Sankaranarayanan & Others.

DEPARTMENT OF PHYSICS			
Part III – Allied Physics offered by Physics Department to B.Sc. Mathematics and B.Sc. Chemistry Students			
III SEMESTER			
AII 1	**ALLIED PHYSICS - I**		**15UPHA31**
Hrs/Week: 3	**Hrs/Sem: 45**	**Hrs./ Unit : 9**	**Credit: 4**

UNIT I Elasticity

Elastic modulii - Poisson's ratio - relation between elastic constants - Expression for bending moment – cantilever - expression for depression - experiment to find young's modulus (uniform bending) - expression for elevation - experiment to find young's modulus using microscope (non uniform bending) - expression for depression - experiment to find Young's modulus using scale and telescope

UNIT II Interference and Diffraction

Young's experiment - Condition for interference - Additional phase difference due to dissimilar reflections - Colours of thin film-Air wedge - Thickness of wire - Fresnel and Fraunhofer diffraction-Plane transmission grating - Theory and experiment to find wave length by normal incidence method. Distinction between interference and diffraction bands.

UNIT III Polarisation

Double refraction - Nicol prism - Brewster's law -Production and analysis of plane, circulary and elliptically polarised light, half wave and quarter wave plate - Optical activity – specific rotation (definition)

UNIT IV Transport Phenomena

Mean free path – expression for mean free path (Zeroth order approximation) Transport phenomena – Viscosity, thermal conductivity, diffusion

UNIT V Transfer of Heat

Conduction – Coefficient of thermal conductivity – definition – Thermal conductivity of a bad conductor – Lee's Disc experiment – Convection - Newton's law of cooling – determination of specific heat capacity of liquid – Radiation – Stefan's law – Planck law.

REFERENCE BOOKS:

1. Properties of matter - Brijlal & Subrahmanyam – S.Chand & Co. – New Delhi.
2. College Physics -Volume 1 - A.B.Gupta – Books and Allied (P) Ltd. – Kolkatta-700010.
3. Heat and Thermodynamics Brijlal & Subramaniyam S.Chand &Co. – New Delhi.
4. A Text book of Optics Brijlal , Subrahmanyam & M.N.Avathanu – S.Chand & Co. – New Delhi.

DEPARTMENT OF PHYSICS			
Part III – Allied Physics offered by Physics Department to B.Sc. Mathematics and B.Sc. Chemistry Students			
IV SEMESTER			
AII 2	**ALLIED PHYSICS - II**		**15UPHA41**
Hrs/Week: 3	**Hrs/Sem: 45**	**Hrs./ Unit : 9**	**Credit: 4**

UNIT I Relativity and Wave Mechanics

Frame of reference - Galilean transformation - Postulates - Lorentz transformation - de Broglie's theory of matter waves - Expression for de Broglie wavelength – Davison and Germer experiment

UNIT II Nuclear Physics

Nuclear structure - Properties of nucleus - Packing fraction - Binding energy - BE/A curve - Nuclear forces - Nuclear stability - Liquid drop model.

UNIT III Electricity & Electromagnetism

Charge-Current-Potential difference- Resistance & Resistivity - Ohm's law- Kirchoff's law- Potentiometer – Principles - Calibration of Voltmeter – Capacitance – Self induction – self inductance of toroidal solenoid – determination of Rayleigh method – mutual inductance between coils – determination of mutual induction using B.G

UNIT IV Basic Electronics

Semi-conductor diode – Diode Characteristics – Zener diode characteristics -Regulation with Zener diode – Bridge rectifier – Biasing of transistor – RC amplifier .

UNIT V Digital Electronics

Basic logic gates – NOR , NAND gates – EX-OR gate – Boolean equations and logic circuit from table – NOR and NAND gates as universal building blocks – Binary adder – Half adder – Full adder

REFERENCE BOOKS:

1. Modern Physics – R.Murugesan and Kiruthiga Sivaprasath - (15th edition) – S.Chand & Co., New Delhi.
2. Electricity & Magnetism - R.Murugesan. 8th edition – S.Chand & Co., New Delhi.
3. Introduction to Integrated Electronics, Digital and Analog – V.Vijayendran – S.Viswanathan Pvt. Ltd., Chennai.

III & IV SEMESTERS		
AP	**ALLIED PHYSICS PRACTICAL**	**15UPHA4P**
Hrs/Week: 3	**Hrs/Sem: 45**	**Credit: 2**

1. Young's modulus - Uniform bending (Pin and Microscope)
2. Young's modulus - Non Uniform bending (scale and Telescope)
3. Young's modulus – Cantilever – depression
4. Lee's disc – K of card board
5. Verification of Newton's law of cooling
6. Spectrometer Grating - Oblique incidence
7. Newton's rings – Radius of curvature - μ
8. Air wedge – thickness of wire
9. Calibration of Voltmeter ……?
10. Characteristics of Zener diode
11. Basic logic gates OR, NOT & AND
12. Transistor Characteristics (CE mode)

PART III - ALLIED II – CHEMISTRY (Offered by Chemistry Department to Physics and Mathematics Students)			
III SEMESTER			
AII 1	ALLIED CHEMISTRY - I		15UCHA31
Hrs / Week: 3	Hrs / Sem: 45	Hrs / Unit: 9	Credit: 4

Unit I - Inorganic chemistry - Zero group elements

Objective: To study the nature of inert gases and their compounds

Isolation of inert gases by physical and chemical methods - preparation and properties of xenon tetra fluoride, xenon hexafluoride xenon oxytetrafluoride - uses of noble gases

Unit II - Organic chemistry - Principles of reactions

Objective: To learn the chemistry of basic heterocyclic compounds.

Heterolytic and homolytic cleavage - nucleophiles and electrophiles - reaction intermediates - preparation and properties of carbonium ions and carbanions - type of reactions - substitution, addition, elimination and polymerization reactions

Unit III - Physical chemistry - Photochemistry

Objective: To study about photochemical reactions

Definition - comparison between thermal and photochemical reactions - Laws of photochemistry - Beer Lambert's law - Grothus Draper law - Einstein's law - Quantum yield - low and high quantum yield - determination of quantum yield - fluorescence, phosphorescence, thermo - luminescence, chemi - luminescence and bioluminescence - definition with examples

Unit IV - Polymer Chemistry

Objective: To learn about the importance of polymers and polymer science.

Definition - Monomers, Oligomers, Polymers - Classification of polymers - : Natural synthetic, linear, cross linked and network - plastics, elastomers, fibres, Homopolymers and Co - polymers Thermoplastics - Polyethylene, Polypropylene, polystyrene, Poly Vinyl Chloride and nylon - Thermosetting Plastics - : Phenol formaldehyde and expoxide resin

Unit V - Applied Chemistry

Objective: To study about lubricants and some cosmetics in the modern world.

Lubricants - classification - criteria of good lubricating oils - synthetic lubricating oils - poly glycols and poly alkene oxides - greases or semi solid lubricants - examples -

Prepration and uses of shampoo, nail polish, tooth paste, boot polish, moth ball, chalk piece.

REFERENCE BOOKS

1. B. R. Puri, L. R. Sharma and K. C. Kalia, Principles of Inorganic Chemistry
2. P. L. Soni, Text Book of Inorganic Chemistry
3. K. S. Tewari and N. K. Vishnoi,A Text Book of Organic Chemistry.
4. Arun Bahl and B.S. Bahl, Advanced Organic Chemistry, S. Chand and Sons.
5. M.K. Jain and S. C. Sharma, Modern Organic Chemistry
6. K.K.Rohatgi Mukherjee, Fundamentals of photochemistry, Wiley Eastern Ltd.
7. B.R. Puri and L.R. Sharma, Principles of Physical Chemistry, S.Chand & Co.
8. Malcom P. stevens, Polymer Chemistry - An Introduction
9. V.R. Gowariker, Polymer Science, Wiley Eastern, 1995.
10. Sawyer.W, Experimental cosmetics, Dover publishers, New York, 2000.

PART III - ALLIED II – CHEMISTRY (Offered by Chemistry Department to Physics and Mathematics Students)			
IV SEMESTER			
AII 2	ALLIED CHEMISTRY - II		15UCHA41
Hrs / Week: 3	Hrs / Sem: 45	Hrs / Unit: 9	Credit: 4

UNIT I: INORGANIC CHEMISTRY

Objective: To study about the Transition and inner transition elements

Transition metals - general characteristics - metallic character - oxidation states - size - density - melting and boiling points - ionization energy - colour - magnetic properties - reducing properties - catalytic properties.

Inner Transition elements - Lanthanides - Electronic configuration and general characteristics - occurrence of lanthanides - separation by ion exchange method - lanthanide contraction - Actinides - Electronic configuration and general characteristics - comparison with lanthanides.

UNIT II: ORGANIC CHEMISTRY

Objective: To know about the Aromatic compounds

General characteristics of aromatic compounds - aromaticity - Huckel's rule with examples - non - benzenoid aromatic compounds (definition and examples only) - preparation, properties and structure of benzene and naphthalene.

UNIT III: PHYSICAL CHEMISTRY

Objective: To understand about Nuclear Chemistry

Nuclear stability - n/p ratio - packing fraction - mass defect - binding energy - isotopes, isobars, isotones with examples. Separation of isotopes by diffusion method - group displacement law - radioactive series - Nuclear fission, Nuclear fusion - Application of radio isotopes (radio diagnosis and therapy, C^{14} dating)

UNIT IV: BIOCHEMISTRY

Objective: To know about the Bio - chemistry

Carbohydrates - definition and classification - Amino acids - classification - amphoteric nature - isoelectric point - Proteins - classification according to composition, solubility and shape - colour reactions - biological action - Nucleic acids - purines, pyrimidines, nucleosides, nucleotides - structure of DNA and RNA.

UNIT V: PHARMACEUTICAL CHEMISTRY

Objective: To study about the Pharmaceutical Chemistry

Common diseases - infective diseases - insect borne - air borne - water borne - hereditary diseases. Definition and examples of analgesics, antipyretics, sulpha drugs, antimalarials and antibiotics. Indian medicinal plants - tulsi, neem, keezhanelli - their importance.

REFERENCE BOOKS

1. Puri, Sharma and Kalia, Principles of Inorganic Chemistry, Milestone Publishers and Distributors, 2008.
2. P.L.Soni, Text book of Inorganic Chemistry, Sultan Chand and Sons, 2007.
3. Bahl and Arun Bahl, Organic Chemistry, S. Chand and Sons, New Delhi, 2005.
4. Morrison and Boyd, Organic Chemistry, VI th edition, Prentice Hall of India Pvt. Ltd., New Delhi, 1998.
5. J.L. Jain, Sunjay Jain and Nitin Jain, Fundamentals of Biochemistry, S. Chand and Company Ltd., New Delhi, 2005.
6. S. Lakshmi, Pharmaceutical Chemistry, S. Chand and Sons, New Delhi, 1995.

III & IV SEMESTER		
AII P	ALLIED CHEMISTRY PRACTICAL (Examination at the end of IV Semester)	15UCHA4P
Hrs / Week: 3	Hrs / Sem: 45	Credit: 2

QUALITATIVE ANALYSIS

Analysis of a sample salt containing one anion and one cation

Anions:

1. Carbonate
2. Sulphate
3. Nitrate
4. Chloride
5. Oxalate
6. Borate
7. Fluoride
8. Phosphate

Cations:

1. Lead
2. Copper
3. Cadmium
4. Nickel
5. Manganese
6. Strontium
7. Ammonium

Note:

a. Elimination should be avoided.
b. Interfering radicals with cations of group III, IV and V may be avoided

VOLUMETRIC ANALYSIS

Acidimetry - alkalimetry:

1. Estimation of Sodium Hydroxide - Sodium Carbonate standard and HCl link.
2. Estimation of Sulphuric Acid - Oxalic acid standard and Sodium Hydroxide link.
3. Estimation of Sodium carbonate - Sodium carbonate standard and HCl link.

Permanganometry:

4. Estimation of Ferrous ion - Ferrous ammonium sulphate standard and $KMnO_4$ link.
5. Estimation of Sodium Oxalate - Oxalic acid standard and $KMno_4$ link.
6. Estimation of Oxalic acid - FAS standard and $KMnO_4$ link.

Complexometry:

7. Estimation of Zinc by EDTA method - Standard Zinc sulphate and EDTA link.
8. Estimation of Magnesium by EDTA method - Standard Magnesium sulphate and EDTA link

Note: **In the external practical examination, question should be asked only either from qualitative analysis or volumetric analysis**.

III SEMESTER			
SBE 1	**CHROMATOGRAPHY**		**15UCHS31**
Hrs / Week: 3	**Hrs / Sem: 45**	**Hrs / Unit: 9**	**Credit: 2**

UNIT I - Basic Concepts of chromatography:

Objective: To know about the types of Chromatography and to study principle, method and applications of Column Chromatography

Introduction, Classification Chromatography methods. Column Chromatography - Principles, experimental procedures, stationary and mobile phases, Choice of Solvent Systems, Separation techniques. Applications

UNIT II - Paper Chromatography

Objective: To study the principle, method and applications of Paper Chromatography

Principles R_f values, Factors effecting R_f values, Experimental procedures, Choice of paper and solvent systems, developments of chromatogram. Detection of the spots. Ascending, Descending and Radial Paper Chromatography, Two Dimensional Chromatography - Applications.

UNIT III - Thin - Layer Chromatography

Objective: To study the principle and analytical uses of thin - layer chromatography

Principles, factors affecting R_f values. Experimental Procedures. Choice of adsorbents and Solvents.Preparation of plates. Development of the Chromatogram. Detection of the spots. Advantages of thin Layer Chromatography over paper chromatography. Applications

UNIT IV - Ion Exchange Chromatography

Objective: To study the principle and analytical uses of Ion Exchange Chromatography

Principle, ion exchange resins and their types - cation exchange resins, anion exchange resins, ion exchange equilibria, properties of ion exchange resins, ion exchange capacity, techniques - applications

UNIT V - High Performance Liquid Chromatography

Objective: To understand the idea about the High Performance Liquid Chromatography.

Introduction, Instrumentation, Stationary and Mobile Phases.Mobile Phase - Composition. Column - Preparation, Cleaning - regeneration and Storage Conditions. Retention time - Types of HPLC.

REFERENCE BOOKS:

1. Fundamentals of Analytical Chemistry - D.A. Skoog, D.M. West, F.J. Holler and S.R. Crouch 2004; Thompson Asia Private Ltd., Bangalore.
2. Instrumental Methods of Analysis - B.K.Sharma, 2003; Goel publishing House, Meerut, India.
3. Contemporary Chemical Analysis - Judith F. Rubinson, Prentice Hall (India).
4. An introduction to Chromatography - H. Kaur, 2001: Pragati Prakashan, Meerut, India.
5. Laboratory Manual for Analytical Biochemistry &Separation Techniques - P. Palanivelu, 2000: School of Biochemistry, MK University, Madurai

IV SEMESTER			
SBE 2	**POLYMER CHEMISTRY**		**15UCHS41**
Hrs / Week: 3	**Hrs / Sem: 45**	**Hrs / Unit: 9**	**Credit: 2**

UNIT I - Polymer and its types

Objective: To study the characteristics of polymer and its different types.

General characteristics of a polymer in comparison with common organic compounds - Distinction among plastics, elastomers and fibres. Copolymer - tacticity, isotactic, atactic and syndiotactic polymers - Homo and heteropolymers - Plastics, Thermosetting and thermoplastics - Functionality - cross linking - Linear, branched and cross linked polymers - Types of polymerization - addition, condensation and copolymerization

UNIT II - Methods of polymerization and synthesis of some important polymer

Objective: To study the methods of polymerization and synthesis of some polymers

Methods of polymerization - bulk, suspension, emulsion and solution polymerization

Synthesis, properties and applications of the following:

1. Phenol - formaldehyde resin
2. Melamine - formaldehyde resin
3. Polyurethanes
4. Polycarbonates
5. Natural rubber, Vulcanization of rubber, synthetic rubber - styrene rubber, nitrile rubber and neoprene rubber
6. Water soluble polymers (acrylic acid acrylamide copolymer)

UNIT III - Synthetic polymers

Objective: To study about the synthesis and applications of some synthetic polymers.

Detailed study of the following polymers with respect to synthesis, properties and application: - Synthetic polymers - polyolefins - polyethylene - HDPE, LDPE, LLDPE - Polypropylene - polyvinyl chloride - grades of PVC - Teflon, polymethylmethacrylate (plexiglass) - Polyamide - nylon 66 - natural polymers - cellulose acetate and cellulose nitrate.

UNIT IV - Physical states and biomedical applications of polymers

Objective: To study the characteristics and biomedical application of some polymers.

Synthesis of intermediates - Terephthalic acid, Caprolactum and Hexamethylenediamine - Molecular mass - number average, weight average, viscosity average molecular mass - Determination of

molecular mass by viscosity and light scattering method - practical significance of molecular mass distribution - size of polymers. Kinetics of free radical polymerization - Carother's equation - Polymers in medicine and surgery - Bio - medical applications of polymers.

UNIT V - Processing of polymer

Objective: To understand the idea about polymer processing.

Glassy state - glass transition temperature , factors affecting glassy state - crystallinity in polymers, viscosity, solubility , optical, electrical, thermal and mechanical properties of polymers. Degradation of polymers by thermal, oxidative, mechanical and chemical methods - Polymer processing - Compression moulding, injection moulding, transfer moulding.

REFERENCE BOOKS:

1. Polymer science - V.R Gowarikar, N.V Viswanathan and J. Sreedhar 2000; New Age International (P) Ltd., New Delhi.
2. Text Book of polymer science - F.W. Billmeyer.1984; A wiley - InterscPuplication, John Wiley & Sons Newyork.
3. Text Book of polymer science - P.L. Nayak& S. Lenka, 2000; Kalyani publishers, New Delhi.

Part IV - Non Major Elective			
III SEMESTER			
NME 1	WATER MANAGEMENT		15UCHN31
Hrs / Week: 3	Hrs / Sem: 45	Hrs / Unit: 9	Credit: 2

UNIT I: WATER POLLUTION

Objective: To know about water pollution

Definition - sources of water pollution - types of water pollutants: sewage and domestic wastes, industrial effluents, agricultural discharges, detergents, disease causing agents and radioactive materials. Eutrophication and its effects.

UNIT II: WATER QUALITY PARAMETERS

Objective: To understand about the water quality parameters

Physical, Chemical and biological water quality parameters - water quality standards for drinking water - BIS, ICMR and WHO. Determination of pH, Total hardness, TDS, DO, BOD and COD.

UNIT III: WATER PURIFICATION

Objective: To study about the water purification techniques

Purification of water: Sedimentation, Filtration, disinfection, water softening permutit process, ion - exchange process, reverse osmosis.

UNIT IV: WASTE WATER TREATMENT

Objective: To study about the water waste treatment

Elementary ideas of waste water treatment: pre - treatment - primary treatment - secondary treatment, Trickling and activated sludge process - tertiary treatment: evaporation, adsorption - chemical precipitation

UNIT V: RESTORATION AND MANAGEMENT

Objective: To understand the restoration and management of water

Importance of lakes and rivers - stresses on the Indian rivers and their effects - A restoration case study: Ganga Action plan: objectives implementation and drawbacks. Rain water harvesting - water recycling - The water prevention and control Pollution Act 1974.

REFERENCE BOOKS:

1. Environmental Chemistry, A.K. De, Wiley Eastern Ltd. New Delhi
2. Environmental Chemistry, B.K. Sharma, Geol Publishing House, Meerut.
3. Chemical and Biological methods for water pollution Studies, R.K. Trivedy and P.K. Geol Environmental Publications, Karad, India.
4. BIS 1991, Specification for drinking water, Bureau of Indian Standards, New Delhi
5. WHO 1992, International standards for Drinking water, World Health Organisation, Geeneva.
6. Environmental Science and Biotechnology - Theory and Techniques - A.G. Murugesan, C. Rajakumari, MJP Publishers, 2005.

Part IV - Non Major Elective			
IV SEMESTER			
NME 2	APPLIED CHEMISTRY		15UCHN41
Hrs / Week: 3	Hrs / Sem: 45	Hrs / Unit: 9	Credit: 2

UNIT: I Soaps and Detergents

Objective: To understand the idea about soaps and detergents

Soaps - Definition - classification - raw materials used in the manufacture of soap - manufacture of toilet soap.

Detergents - Definition - various types with examples - advantages of detergents over soaps - cleaning action of soap.

UNIT: II Fertilizers

Objective: To understand the idea about the fertilizers and their importance

Definition - characteristics of a good fertilizer - role of nitrogen, potassium and phosphorous in plant growth - natural fertilizers - chemical fertilizers - urea, muriate of potash and triple superphosphate - mixed fertilizers - biofertilizers - advantages of biofertilizers.

UNIT: III Fibres, Plastics and Rubber

Objective: To create knowledge about Fibres, resins, plastics and rubber

Fibres - Classification - uses of terylene, nylon and orlon

Resins - Natural resins - synthetic resins - type - uses of fevicol, quickfix, araldite, glyptal and Bakelite.

Plastics - Classification - differences between thermoplastics and thermosets - Advantages of plastics - uses of polythene, PVC, polystyrene, Teflon and thermocole.

Rubber - Types - Defects in natural rubber - vulcanization - synthetic rubbers - uses of neoprene, thiocol, butyl rubber, silicone rubber and foam rubber.

UNIT: IV Pharmaceutical Chemistry

Objective: To study the Definition and uses of some important drugs

Definition and therapeutic uses of the following important drugs(an elementary study only)

Antiseptics: alum, boric acid, Hydrogen peroxide
Antacids: Aluminium hydroxide
Analgesics: Aspirin, Paracetamol
Haematinics: Ferrous fumerate, ferrous gluconate
Laxatives: Epsom salt, milk of magnesia
Sedatives: Diazepam

UNIT: V

Objective: To study about the preparation and importance of some important chemicals used in our day today life.

An outline of the preparation and uses of the following articles.

Tooth powder, tooth paste, writing inks, gum paste, boot polish, talcum powder, chalk crayons, agar battis, moth balls and phenoyle.

REFERENCE BOOKS:

1. Industrial Chemistry - B.K. Sharma, 2003, Goel Publishing House, Meerut.
2. Industrial Chemicals - Faith etal, Wiley Interscience, New York.
3. Chemical Process Industries - R.N. Shreve, 2000; Tata McGraw Hill Publishing Company, Mumbai.
4. Text Book of Pharmaceutical Chemistry - Jayashree Ghosh, 2003; S. Chand and Company, New Delhi.

PART IV – NON-MAJOR ELECTIVE (AIDED COURSES) (2015 – 2018)							
SEM	TITLE OF THE PAPER	S.CODE	H/W	C	MARKS		
					I	E	T
DEPT. OF ENGLISH							
III	Computer Assisted Language Learning: Reading & Writing	15UENN31	3	2	25	75	100
IV	Computer Assisted Language Learning: Listening & Speaking	15UENN41	3	2	25	75	100
DEPT. OF HISTORY							
III	Modern Constitution – I	15UHSN31	3	2	25	75	100
IV	Modern Constitution – II	15UHSN41	3	2	25	75	100
DEPT. OF MATHEMATICS							
III	Mathematics for Competitive Examinations – I	15UMAN31	3	2	25	75	100
IV	Mathematics for Competitive Examinations – II	15UMAN41	3	2	25	75	100
DEPT. OF PHYSICS							
III	Basic Physics – I	15UPHN31	3	2	25	75	100
IV	Basic Physics - II	15UPHN41	3	2	25	75	100
DEPT. OF CHEMISTRY							
III	Water Management	15UCHN31	3	2	25	75	100
IV	Applied Chemistry	15UCHN41	3	2	25	75	100
DEPT. OF ZOOLOGY							
III	Ornamental Fish culture	15UZON31	3	2	25	75	100
IV	Apiculture	15UZON41	3	2	25	75	100
DEPT. OF COMPUTER SCIENCE							
III	Office Automation	15UCSN31	3	2	25	75	100
IV	Desktop Publishing	15UCSN41	3	2	25	75	100
DEPT. OF COMMERCE							
III	Principles of Commerce	15UCON31	3	2	25	75	100
IV	Basics in Accounting*	15UCON41	3	2	25	75	100

* Common to Department of Commerce and Department of Commerce (CA)

I SEMESTER			
EVS	**ENVIRONMENTAL STUDIES**		**15UEVS11**
Hrs/ Week: 2	**Hrs/ Sem: 30**	**Hrs/ UNIT: 6**	**Credits: 1**

UNIT - I: Nature of Environmental Studies

Goals, Objectives and guiding principles of environmental studies. Towards sustainable development - Environmental segments– Atmosphere, Hydrosphere, Lithosphere, Biosphere – definition. Pollution episodes -– Hiroshima – Nagasaki, - Bhopal gas Tragedy, Fukishma – Stone leprosy in Taj Mahal

UNIT - II: Natural Resources

Renewable and Non Renewable resources - classification.

- Forest resources: Use and over - exploitation, Aforrestation and deforestation.
- Water resources: Use and over - utilization and conservation of surface and ground water - Rain harvesting.
- Marine Resources: Fisheries and Coral reefs.
- Mineral resources: Use and exploitation - environmental impacts of extracting and using mineral resources.
- Food resources: Effects of modern agriculture fertilizers - pesticide problem.
- Energy resources: Growing energy needs - use of alternate energy source - Solar cells & wind mills.
- Land resources: Land degradation

UNIT - III: Ecosystem

- Concept of Eco-systems - Tropic level, food chains, food web and Ecological pyramids. Types, structure & Functions of the following:
  a) Aquatic ecosystem
  b) Grassland ecosystem
  c) Forest ecosystem
  d) Desert ecosystem
  e) Living conditions on other planets (Briefly)

UNIT - IV: Biodiversity & Its Conservation

Introduction - Definition: eco system diversity, species and Genetic Hot spots of biodiversity - Western Ghats, Eastern Himalayas

and Gulf of Mannar. Threats to biodiversity - Habitual Loss, Poaching of wild life and Man - wild life conflicts.

Conversation of biodiversity: Insitu and ex-insitu.

UNIT - V: Environmental Pollution

Sources, effects, prevention and control measures of the following.

a) Air pollution: Composition of clean air, Global warming, Ozone layer depletion.
b) Water Pollution: Fresh and Marine water pollution
c) Noise Pollution
d) Soil pollution
e) Bio degradable and Non Bio degradable wastes
   - Air (prevention & Control of Pollution) Act.
   - Environmental Protection Act
   - Water (Prevention & Control of pollution) Act
   - Environmental movements - Green peace and Chipco,
   - Role of State & Central pollution Control Boards.

REFERENCE BOOKS:

1. Basic of Environmental Science. Viyajalakhmi, Murugesan and Sukumaran - Manonmaniam Sundaranar University publications.
2. Environmental Studies. John de Brito, Victor, Narayanan and Patric Raja - published by St. Xavier's College, Palayamkottai.
3. Environmental Science and Biotechnology. A.G. Murugesan and C. Raja Kumar - MJP Publishers.
4. Fundamental of Environmental pollution - Krishnan Kannan - Chand & Company Ltd., New Delhi 1997.
5. Environmental Studies. S. Muthiah, Ramalakshmi publications, Tirunelveli.
6. Environmental Studies. V.M. Selvaraj, Bavani Publications, Tirunelveli.

II SEMESTER			
VE1	**VALUE EDUCATION – I**		**15USVE2A**
Hrs/ Week: 2	**Hrs/ Sem: 30**	**Hrs/ Unit: 6**	**Credits: 1**

Objectives:

1. To inculcate moral values in the minds of students.
2. To teach ethical practices to be adopted by students in their life.
3. To make students honest and upright in their life.

UNIT I

Islam – Meaning – Importance – A complete Religion – The religion accepted by God – Five Pillars of Islam – Kalima – Prayers – Fasting – Zakat – Haj.

Iman – Monotheism – Angels – Books – Prophets – Dooms Day – Life after death – Heaven and Hell.

UNIT II

Quran – The Book of Allah – Wahi – Revelation to Prophet Muhammad(sal) – Compilation – Preservance – Structure – Content – Purpose – Source of Islamic Law– Sura Fathiha , Kafirun, Iqlas, Falakh and Nas.

UNIT III

Hadith – Siha Sitha – Buhari – Muslim – Tirmithi – Abu Dawood – Nasai – Ibn Maja – Collection of Hadith – Meaning of 40 Hadith.

UNIT IV

Life History of Prophet Muhammad (sal) – Aiamul Jahiliya – Prophet's Childhood and Marriage – Prophethood – Life at Mecca – Life at Medinah – Farewell Address – Seal of Prophethood.

UNIT V

Good character – Etiquettes – Halal and Haram – Duties towards Allah – Duties towards fellow beings – Masnoon Duas.

REFERENCE BOOKS:

1. V.A. Moahmed Ashrof – Islamic Dimensions – Reflection and Review on Quranic Themes.
2. The Presidency of Islamic Researchers – Revised & Edited – The Holy Quran.
3. M. Manzoor Nomani – Islamic Faith & Practice.
4. Abdul Hasan Ali Nadvi – Muhammad Rasulullah.
5. K. Ali – A Study of Islamic History.
6. Abdul Rahuman Abdullah – Islamic Dress code for Women.
7. Dr. Munir Ahamed Mughal – Code For Believers.
8. Abdul Malik Mujahid – Gems and Jewels.

II SEMESTER			
VE2	**VALUE EDUCATION – II**		**15USVE2B**
Hrs/ Week: 2	**Hrs/ Sem: 30**	**Hrs/ Unit: 6**	**Credits: 1**

UNIT I

Individual Morality – Objective of Moral life – Living in accordance with the code of Morality – the goodness of Morality – Morality and *Thirukural*- The need for faith.

UNIT II

Adherence to higher code of Morality – Fear of God – Good Moral Values – Duty to Parents – Teacher, respecting elders – Moral Etiquettes – Right-minded Principle – High Principles for Proper conduct.

UNIT III

Inculcating good attitudes – Open mindedness – Morale – analysing the pros and cons of good and bad – Service to others – Mind Power, tolerance, respecting others, showing love to others, patience – tranquility – Modesty, kindness and forgiveness.

UNIT IV

Quotations and moral Stories expressing Good characters of Great personalities – Life History of Great people: Mahatma Gandhi, Abraham Lincoln, Dr. A.P.J. Abdul Kalam.

UNIT V

Truth, the importance of uprightness, integrity, friendship – Health awareness on Alcohol and drug abuse – inculcating reading habit – reading good books – Hygiene – Dowry – Corruption.

TEXTBOOK:

Publication of Sadakathullah Appa College.

SCHEME OF EXAMINATIONS UNDER CBCS (2015 - 2018)

The medium of instruction in all UG and PG courses is English and students shall write the CIA Tests and Semester Examinations in English. However, if the examinations were written in Tamil, the answer papers will be valued.

DISTRIBUTION OF MARKS FOR CIA AND SEMESTER EXAMINATIONS

UNDERGRADUATE, CERTIFICATE & DIPLOMA COURSES

SUBJECT	TOTAL MARKS	CIA TEST	SEMESTER EXAMINATION	PASSING MINIMUM		
				CIA TEST	SEM. EXAM.	OVER ALL
Theory	100	25	75	Nil	30	40
Practical	100	40	60	Nil	24	40
Project	100	Nil	Report - 60 marks Viva Voce - 40 marks	Nil	40	40

POSTGRADUATE COURSES

SUBJECT	TOTAL MARKS	CIA TEST	SEMESTER EXAMINATION	PASSING MINIMUM		
				CIA EXAM.	SEM. EXAM.	OVER ALL
Theory	100	25	75	nil	38	50
Practical	100	40	60	nil	30	50
Project	100	nil	Report - 60 marks Viva Voce - 40 marks	nil	50	50

DIVISION OF MARKS FOR CIA TEST

SUBJECT	MARKS	ASSIGNMENT FOR UG / ASSIGNMENT OR SEMINAR FOR PG	REGULARITY	RECORD NOTE	TOTAL MARKS
Theory	20	5	--	--	**25**
Practical	30	--	5	5	**40**

1. The duration of each CIA Test is ONE hour and the Semester Examination is THREE hours.
2. Three CIA tests of 20 marks each will be conducted and the average marks of the best two tests out of the three tests will be taken.
3. The I test will be based on the first 1.5 units of the syllabus, the II test will be based on the next 1.5 units of the syllabus and the III test will be based on the next 1.5 units of the syllabus.
4. Two assignments for Undergraduate, Certificate, Diploma and Advanced Diploma Courses and two assignments OR two seminars for Postgraduate Courses.
5. The duration and the pattern of question paper for practical examination may be decided by the respective Boards of Studies. However, out of 60 marks in the semester practical examination, 10 marks may be allotted for record and 50 marks for practical.
6. Three internal practical tests of 25 marks each will be conducted for science students in the even semester and the best two out of the three will be taken. The total 50 marks of the best two tests will be converted to 30 by using the following formula:

$$\left(\begin{array}{c}\text{Marks secured in the first best Practical Test (Out of 25)}\\ + \\ \text{Marks secured in the next best Practical Test (out of 25)}\end{array}\right) \text{ X } 0.6$$

7. The Heads of Science Departments are requested to keep a record of attendance of practicals for students to assign marks for regularity.

QUESTION PAPER PATTERN FOR CIA TEST (THEORY)

Duration: 1 Hr **Maximum Marks: 20**

Section	Question Type	No. of Questions & Marks	Marks
A	No Choice Answer should not exceed 75 words	2 Questions 2 marks each	2 x 2 = 4
B	Internal choice (Either or type) Answer should not exceed 200 words	2 Questions 4 marks each	2 x 4 = 8
C	Open Choice (Answer ANY ONE out of Two) Answer should not exceed 400 words	1 Question 8 marks	1 x 8 = 8
		TOTAL	**20 MARKS**

QUESTION PAPER PATTERN FOR SEMESTER EXAMINATION (THEORY)

Duration: 3 Hrs **Maximum Marks: 75**

Section	Question Type	No. of Questions & Marks	Marks
A	No Choice Answer should not exceed 75 words	10 Questions - 2 marks each (2 Questions from each unit)	10 x 2 = 20
B	Internal choice (Either or type) Answer should not exceed 200 words	5 Questions with internal choice. Each carries 5 marks (Two questions from each unit)	5 x 5 = 25
C	Open Choice (Answer ANY THREE out of FIVE) Answer should not exceed 400 words	3 Questions out of 5 - 10 marks each (1 Question from each unit)	3 x 10 = 30
		TOTAL	**75 MARKS**