

SADAKATHULLAH APPA COLLEGE
(AUTONOMOUS)

(Reaccredited by NAAC with 'A' GRADE and ISO 9001: 2008 certified)

Rahmath Nagar, Tirunelveli – 627 011

DEPT. OF CHEMISTRY



B.SC. (CHEMISTRY)
UNITIZED SYLLABUS (CBCS)
FOR
(2011 - 2014)

(Applicable for students admitted in June 2011 and onwards)

**(Updated as per the resolutions passed in the
Academic Council Meeting held on 14-03-2013)**

B.Sc. - CHEMISTRY (2011 - 2014)

COURSE STRUCTURE (CBCS)

ALLIED I - BIOCHEMISTRY

ALLIED II - PHYSICS

I SEMESTER				II SEMESTER			
P		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	3	5	III	Core - 2	3	5
	Core Practical - I	3	--		Core Practical - I	3	3
	Allied I - 1	4	4		Allied I - 2	4	4
	Allied I Practical	2	--		Allied I Practical	2	2
IV	Skill Based Elective - 1	3	2	IV	Skill Based Elective - 2	3	2
	Social Value Education	3	2		Environmental Studies	3	2
TOTAL		30	19	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 - 3	4	5	III	Core - 4	4	5
	Core Practical - II	2	--		Core Practical - II	2	3
	Allied II - 1	4	4		Allied II - 2	4	4
	Allied II Practical	2	--		Allied II Practical	2	2
IV	Skill Based Elective - 3	3	2	IV	Skill Based Elective - 4	3	2
	Non Major Elective - 1	3	2		Non Major Elective - 2	3	2
TOTAL		30	19	TOTAL		30	24
V SEMESTER				VI SEMESTER			
III	Core - 5	5	5	III	Core - 8	5	5
	Core - 6	5	5		Core - 9	5	5
	Core - 7	5	5		Core Practical - III	3	4
	Core Practical - III	3	--		Core Practical - IV	3	4
	Core Practical - IV	3	--		Project	5	5
	Core Elective - 1	4	4		Core Elective - 2	4	4
	Core Elective Practical	2	--		Core Elective Practical	2	3
IV	Skill Based Elective - 5	3	2	IV	Skill Based Elective - 6	3	2
TOTAL		30	21	TOTAL		30	32

B.Sc. - CHEMISTRY MAJOR WITH BIOCHEMISTRY & PHYSICS ALLIEDS (2011 - 2014)										
DISTRIBUTION OF CREDITS, NO. OF PAPERS & MARKS										
PART	COURSE			SEMESTER	CREDITS	NO.OF PAPERS	MARKS			
I	Tamil / Arabic			I to IV	12	4	400			
II	English			I to IV	12	4	400			
III	Core + Core Practical			I to VI	60	9 + 4	1300			
	Core Elective + CE Pract + Project			V & VI	15	2 + 1 + 1	400			
	Allied + Practical			I to IV	20	4 + 2	600			
IV	Social Value Education			I	2	1	100			
	Environmental Studies			II	2	1	100			
	Skilled Based Elective			I to VI	12	6	600			
	Non Major Elective			III & IV	4	2	200			
V	Extension Activities			I to IV	1	--	100			
TOTAL					140	41	4200			
SEMESTER WISE DISTRIBUTION OF HOURS										
PART	I	II	III				IV			TOT.
SEM	T/A	ENG	CORE	CE	PRO	AL	SBE	NME	SVE/ES	
I	6	6	3+ 3	-	-	4+ 2	3	-	3	30
II	6	6	3+ 3	-	-	4+ 2	3	-	3	30
III	6	6	4+ 2	-	-	4+ 2	3	3	-	30
IV	6	6	4+ 2	-	-	4+ 2	3	3	-	30
V	-	-	15+ 6	4+ 2	-	-	3	-	-	30
VI	-	-	10+ 6	4+ 2	5	-	3	-	-	30
TOT	24	24	61	12	5	24	18	6	6	180

B.Sc. - CHEMISTRY (2011 - 2014)
COURSE STRUCTURE (CBCS)

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

I SEMESTER				II SEMESTER			
P		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	3	5	III	Core - 2	3	5
	Core Practical - I	3	--		Core Practical - I	3	3
	Allied I - 1	6	5		Allied I - 2	6	5
IV	Skill Based Elective - 1	3	2	IV	Skill Based Elective - 2	3	2
	Social Value Education	3	2		Environmental Studies	3	2
TOTAL		30	20	TOTAL		30	23
III SEMESTER				IV SEMESTER			
I	Tamil / Arabic	6	3	I	Tamil / Arabic	6	3
II	English	6	3	II	English	6	3
III	Core - 3	4	5	III	Core - 4	4	5
	Core Practical - II	2	--		Core Practical - II	2	3
	Allied II - 1	4	4		Allied II - 2	4	4
	Allied II Practical	2	--		Allied II Practical	2	2
IV	Skill Based Elective - 3	3	2	IV	Skill Based Elective - 4	3	2
	Non Major Elective - 1	3	2		Non Major Elective - 2	3	2
TOTAL		30	19	TOTAL		30	24
V SEMESTER				VI SEMESTER			
III	Core - 5	5	5	III	Core - 8	5	5
	Core - 6	5	5		Core - 9	5	5
	Core - 7	5	5		Core Practical - III	3	4
	Core Practical - III	3	--		Core Practical - IV	3	4
	Core Practical - IV	3	--		Project	5	5
	Core Elective - 1	4	4		Core Elective - 2	4	4
	Core Elective Practical	2	--		Core Elective Practical	2	3
IV	Skill Based Elective - 5	3	2	IV	Skill Based Elective - 6	3	2
TOTAL		30	21	TOTAL		30	32

B.Sc. - CHEMISTRY MAJOR WITH MATHEMATICS & PHYSICS ALLIEDS (2011 - 2014)										
DISTRIBUTION OF CREDITS, NO. OF PAPERS & MARKS										
PART	COURSE		SEMESTER	CREDITS	NO.OF PAPERS		MARKS			
I	Tamil / Arabic		I to IV	12	4		400			
II	English		I to IV	12	4		400			
III	Core + Core Practical		I to VI	60	9 + 4		1300			
	Core Elective + CE Pract + Project		V & VI	15	2 + 1 + 1		400			
	Allied + Practical		I to IV	20	4 + 1		500			
IV	Social Value Education		I	2	1		100			
	Environmental Studies		II	2	1		100			
	Skilled Based Elective		I to VI	12	6		600			
	Non Major Elective		III & IV	4	2		200			
V	Extension Activities		I to IV	1	--		100			
TOTAL				140	40		4100			
SEMESTER WISE DISTRIBUTION OF HOURS										
PART	I	II	III				IV			TOT.
SEM	T/A	ENG	CORE	CE	PRO	AL	SBE	NME	SVE/ES	
I	6	6	3+ 3	-	-	6	3	-	3	30
II	6	6	3+ 3	-	-	6	3	-	3	30
III	6	6	4+ 2	-	-	4+ 2	3	3	-	30
IV	6	6	4+ 2	-	-	4+ 2	3	3	-	30
V	-	-	15+ 6	4+ 2	-	-	3	-	-	30
VI	-	-	10+ 6	4+ 2	5	-	3	-	-	30
TOT	24	24	61	12	5	24	18	6	6	180

B.Sc. - CHEMISTRY MAJOR WITH BIOCHEMISTRY & PHYSICS ALLIEDS

I SEMESTER								
P	SUB	TITLE OF THE PAPER	S.CODE	H/ W	C	MARKS		
						I	E	T
I	TA 1	இக்காலத் தமிழ் OR	11ULTA11	6	3	25	75	100
	AR 1	Applied Grammar and Translation	11ULAR11					
II	EN 1	Prose,Poetry &functional Grammar-I	11ULEN11	6	3	25	75	100
III	C 1	General Chemistry	11UCCH11	3	5	25	75	100
	CP I	Inorganic Qualitative Analysis	11UCCH2P	3	--	EXAM II SEM		
	AI - 1	Biomolecules	11UABC11	4	4	25	75	100
	AI P	Allied I Practical (Analysis of Biomolecules)	11UABC2P	2	--	EXAM II SEM		
IV	SBE 1	Practical Chemistry	11SECH11	3	2	25	75	100
	SVE	Social Value Education	11USVE11	3	2	25	75	100
TOTAL				30	19	150	450	600
II SEMESTER								
I	TA 2	சமயத் தமிழ்	11ULTA21	6	3	25	75	100
	AR 2	Functional Arabic & Translation	11ULAR21					
II	EN 2	Prose, Poetry and functional Grammar - II	11ULEN21	6	3	25	75	100
III	C 2	Organic Chemistry - I	11UCCH21	3	5	25	75	100
	CP I	Inorganic Qualitative Analysis	11UCCH2P	3	3	40	60	100
	AI - 2	Metabolism	11UABC21	4	4	25	75	100
	AI P	Allied I Practical (Analysis of Biomolecules)	11UABC2P	2	2	40	60	100
IV	SBE 2	Polymer Chemistry	11SECH21	3	2	25	75	100
	ES	Environmental Studies	11UENS21	3	2	25	75	100
TOTAL				30	24	230	570	800
III SEMESTER								
I	TA 3	பயன்பாட்டுத் தமிழ்	11ULTA31	6	3	25	75	100
	AR 3	Conversational Arabic	11ULAR31					
II	EN 3	One Act Plays and Word Power	11ULEN31	6	3	25	75	100
III	C 3	Physical Chemistry - I	11UCCH31	4	5	25	75	100
	CP II	Inorganic Quantitative Analysis & Chromatographic Tech.	11UCCH4P	2	3	EXAM IV SEM		
	A II - 1	Properties of Matter, Thermal Physics & Optics	11UAPH31	4	4	25	75	100
	A II - P	Allied II Practical (Qualitative & Volumetric Analysis)	11UAPH4P	2	-	Exam. IV SEM.		
IV	SBE 3	Chromatographic techniques and Analytical Chemistry	11SECH31	3	2	25	75	100
	NME 1	Choose any one from the list	--	3	2	25	75	100
TOTAL				30	19	150	450	600

TITLE OF THE PAPERS, CREDITS & MARKS (2011 - 2014)
B.Sc. - CHEMISTRY MAJOR WITH BIOCHEMISTRY & PHYSICS ALLIEDS
TITLE OF THE PAPERS, CREDITS & MARKS (2011 - 2014)

IV SEMESTER									
P	SUB	TITLE OF THE PAPER	S.CODE	H/ W	C	MARKS			
						I	E	T	
I	TA 4	அறிவியல் தமிழ்	11ULTA41	6	3	25	75	100	
	AR 4	Quran , Hadeeth and Grammar	11ULAR41						
II	EN 4	A Course in Spoken English	11ULEN41	6	3	40	60	100	
III	C 4	Organic Chemistry - II	11UCCH41	4	5	25	75	100	
	CP II	Inorganic Quantitative Analysis & Chromatographic Tech.	11UCCH4P	2	3	40	60	100	
	A II 2	Modern Physics , Electro Magnetism & Electronics	11UAPH41	4	4	25	75	100	
	A II P	Allied II Practical (Qualitative & Volumetric Analysis)	11UAPH4P	2	2	40	60	100	
IV	SBE 4	Computers in Chemistry with C++	11SECH41	3	2	25	75	100	
	NME 2	Choose any one from the list	--	3	2	25	75	100	
TOTAL				30	24	245	555	800	
V SEMESTER									
III	C 5	Organic Chemistry - III	11UCCH51	5	5	25	75	100	
	C 6	Inorganic Chemistry - I	11UCCH52	5	5	25	75	100	
	C 7	Physical Chemistry - II	11UCCH53	5	5	25	75	100	
	CE 1	Spectroscopy OR		11UECH54A	4	4	25	75	100
		Material Science		11UECH54B					
	CP III	Gravimetric Analysis & Prepn. of Inorganic Complexes		11UCCH6P1	3	--	EXAM VI SEM		
	CP IV	Physical Chemistry & Computers in Chemistry		11UCCH6P2	3	--	EXAM VI SEM		
CE P	Organic Analysis, Organic Estimation & Preparation of Organic Compounds		11UECH6P	2	--	EXAM VI SEM			
IV	SBE 5	Instrumental Methods of Analysis	11SECH51	3	2	25	75	100	
TOTAL				30	21	125	375	500	
VI SEMESTER									
III	C 8	Inorganic Chemistry - II	11UCCH61	5	5	25	75	100	
	C 9	Physical Chemistry - III	11UCCH62	5	5	25	75	100	
	CE 2	Applied Chemistry OR		11UCCH63A	4	4	25	75	100
		Medicinal Chemistry		11UCCH63B					
	P	Project		11UCPCH6	5	5	--	100	100
	CP III	Gravimetric Analysis & Prepn. of Inorganic Complexes		11UCCH6P1	3	4	40	60	100
	CP IV	Physical Chemistry & Computers in Chemistry		11UCCH6P2	3	5	40	60	100
CE P	Organic Analysis, Organic Estimation & Preparation of Organic Compounds		11UECH6P	2	2	40	60	100	
IV	SBE 6	Nanoscience and Nanotechnology	11SECH61	3	2	25	75	100	
TOTAL				30	32	220	580	800	

B.Sc. - CHEMISTRY MAJOR WITH MATHEMATICS & PHYSICS ALLIEDS
TITLE OF THE PAPERS, CREDITS & MARKS (2011 - 2014)

I SEMESTER								
P	SUB	TITLE OF THE PAPER	S.CODE	H/ W	C	MARKS		
						I	E	T
I	TA 1	இக்காலத் தமிழ் OR	11ULTA11	6	3	25	75	100
	AR 1	Applied Grammar and Translation	11ULAR11					
II	EN 1	Prose, Poetry and functional Grammar - I	11ULEN11	6	3	25	75	100
III	C 1	General Chemistry	11UCCH11	3	5	25	75	100
	CP I	Inorganic Qualitative Analysis	11UCCH2P	3	--	EXAM II SEM		
	AI - 1	Statistics, Differential Equations and Vector Calculus	11UAMA11	6	5	25	75	100
IV	SBE 1	Practical Chemistry	11SECH11	3	2	25	75	100
	SVE	Social Value Education	11USVE11	3	2	25	75	100
TOTAL				30	20	150	450	600
II SEMESTER								
I	TA 2	சமயத் தமிழ்	11ULTA21	6	3	25	75	100
	AR 2	Functional Arabic & Translation	11ULAR21					
II	EN 2	Prose, Poetry and functional Grammar - II	11ULEN21	6	3	25	75	100
III	C 2	Organic Chemistry - I	11UCCH21	3	5	25	75	100
	CP I	Inorganic Qualitative Analysis	11UCCH2P	3	3	40	60	100
	AI - 2	Algebra & Calculus	11UAMA21	6	5	25	75	100
IV	SBE 2	Polymer Chemistry	11SECH21	3	2	25	75	100
	ES	Environmental Studies	11UENS21	3	2	25	75	100
TOTAL				30	23	190	510	700
III SEMESTER								
I	TA 3	பயன்பாட்டுத் தமிழ்	11ULTA31	6	3	25	75	100
	AR 3	Conversational Arabic	11ULAR31					
II	EN 3	One Act Plays and Word Power	11ULEN31	6	3	25	75	100
III	C 3	Physical Chemistry - I	11UCCH31	4	5	25	75	100
	CP II	Inorganic Quantitative Analysis & Chromatographic Tech.	11UCCH4P	2	--	EXAM IV SEM		
	A II - 1	Properties of Matter, Thermal Physics & Optics	11UAPH31	4	4	25	75	100
	A II P	Allied II Practical (Qualitative & Volumetric Analysis)	11UACH4P	2	--	EXAM IV SEM		
IV	SBE 3	Chromatographic Techniques and Analytical Chemistry	11SECH31	3	2	25	75	100
	NME 1	Choose any one from the list	--	3	2	25	75	100
TOTAL				30	19	150	450	600

B.Sc. - CHEMISTRY MAJOR WITH MATHEMATICS & PHYSICS ALLIEDS
TITLE OF THE PAPERS, CREDITS & MARKS (2011 - 2014)

IV SEMESTER									
P	SUB	TITLE OF THE PAPER	S.CODE	H/ W	C	MARKS			
						I	E	T	
I	TA 4	அறிவியல் தமிழ்	11ULTA41	6	3	25	75	100	
	AR 4	Quran , Hadeeth and Grammar	11ULAR41						
II	EN 4	A Course in Spoken English	11ULEN41	6	3	40	60	100	
III	C 4	Organic Chemistry - II	11UCCH41	4	5	25	75	100	
	CP II	Inorganic Quantitative Analysis & Chromatographic Tech.	11UCCH4P	2	3	40	60	100	
	A II - 2	Modern Physics , Electro Magnetism & Electronics	11UAPH41	4	4	25	75	100	
	A II P	Allied II Practical (Qualitative & Volumetric Analysis)	11UAPH4P	2	2	40	60	100	
IV	SBE 4	Computers in Chemistry with C++	11SECH41	3	2	25	75	100	
	NME 2	Choose any one from the list	--	3	2	25	75	100	
TOTAL				30	24	245	555	800	
V SEMESTER									
III	C 5	Organic Chemistry - III	11UCCH51	5	5	25	75	100	
	C 6	Inorganic Chemistry - II	11UCCH52	5	5	25	75	100	
	C 7	Physical Chemistry - II	11UCCH53	5	5	25	75	100	
	CE 1	Polymer Chemistry	OR	11UCCH54A	4	4	25	75	100
		Material Science		11UCCH54B					
	CP III	Gravimetric Analysis & Prepn. of Inorganic Complexes		11UCCH6P1	3	--	EXAM VI SEM		
	CP IV	Physical Chemistry & Computers in Chemistry		11UCCH6P2	3	--	EXAM VI SEM		
CE P	Organic Analysis, Organic Estimation & Preparation of Organic Compounds		11UCCH6P	2	--	EXAM VI SEM			
IV	SBE 5	Instrumental Methods of Analysis	11SECH51	3	2	25	75	100	
TOTAL				30	21	125	375	500	
VI SEMESTER									
III	C 8	Inorganic Chemistry - III	11UCCH61	5	5	25	75	100	
	C 9	Physical Chemistry - III	11UCCH62	5	5	25	75	100	
	CE 2	Applied Chemistry	OR	11UCCH63A	4	4	25	75	100
		Medicinal Chemistry		11UCCH63B					
	P	Project		11UCPCH6	5	5	--	100	100
	CP III	Gravimetric Analysis & Prepn. of Inorganic Complexes		11UCCH6P1	3	4	40	60	100
	CP IV	Physical Chemistry & Computers in Chemistry		11UCCH6P2	3	5	40	60	100
CE P	Organic Analysis, Organic Estimation & Preparation of Organic Compounds		11UECH6P	2	2	40	60	100	
IV	SBE 6	Nanoscience & Nanotechnology	11SECH61	3	2	25	75	100	
TOTAL				30	32	220	580	800	

TITLE OF THE PAPERS, CREDITS & MARKS

PART I & II (2011 - 2014 ONWARDS)

TWO YEARS LANGUAGE COURSES (B.A. - HIS., ENG.LIT., B.Sc. - MATHEMATICS, PHYSICS, CHEMISTRY, ADVANCED ZOOLOGY AND BIOTECHNOLOGY & MICROBIOLOGY)							
PART I - TAMIL							
I	இக்காலத் தமிழ்	11ULTA11	6	3	25	75	100
II	சமயத் தமிழ்	11ULTA21	6	3	25	75	100
III	பயன்பாட்டுத் தமிழ்	11ULTA31	6	3	25	75	100
IV	அறிவியல் தமிழ்	11ULTA41	6	3	25	75	100
TOTAL			24	12	100	300	400
PART I - ARABIC							
I	Applied Grammar and Translation	11ULAR11	6	3	25	75	100
II	Functional Arabic and Translation	11ULAR21	6	3	25	75	100
III	Conversational Arabic	11ULAR31	6	3	25	75	100
IV	Quran , Hadeeth and Grammar	11ULAR41	6	3	25	75	100
TOTAL			24	12	100	300	400
PART II - ENGLISH							
I	Prose, Poetry and Functional Grammar I	11ULEN11	6	3	25	75	100
II	Prose, Poetry and Functional Grammar II	11ULEN21	6	3	25	75	100
III	One act plays and word power	11ULEN31	6	3	25	75	100
IV	A Course in Spoken English	11ULEN41	6	3	40	60	100
TOTAL			24	12	115	285	400

DEPT. OF CHEMISTRY								
CBCS SYLLABUS (2011 - 2014)								
PART III CORE , CORE ELECTIVE & PROJECT (FOR B.Sc. - CHEMISTRY MAJOR)								
SEM	P	TITLE OF THE PAPER	S.CODE	H/ W	C	MARKS		
						I	E	T
I	C1	General Chemistry	11UCCH11	3	5	25	75	100
	CP1	Inorganic Qualitative Analysis	11UCCH2P	3	--	EXAM II SEM		
II	C2	Organic Chemistry - I	11UCCH21	3	5	25	75	100
	CP1	Inorganic Qualitative Analysis	11UCCH2P	3	3	40	60	100
III	C3	Physical Chemistry - I	11UCCH31	4	5	25	75	100
	CP2	Inorganic Quantitative Analysis & Chromatographic Tech.	11UCCH4P	2	--	EXAM IV SEM		
IV	C4	Organic Chemistry - II	11UCCH41	4	5	25	75	100
	CP2	Inorganic Quantitative Analysis & Chromatographic Tech.	11UCCH4P	2	3	40	60	100
V	C5	Organic Chemistry - III	11UCCH51	5	5	25	75	100
	C6	Inorganic Chemistry - I	11UCCH52	5	5	25	75	100
	C7	Physical Chemistry - II	11UCCH53	5	5	25	75	100
	CE1	Spectroscopy OR	11UECH54A	4	4	25	75	100
		Material Science	11UECH54B					
	CP3	Gravimetric Analysis & Prepn. of Inorganic Complexes	11UCCH6P1	3	--	EXAM VI SEM		
	CP4	Physical Chemistry & Computers in Chemistry	11UCCH6P2	3	--	EXAM VI SEM		
CEP	Organic Analysis, Organic Estimation & Preparation of Organic Compounds	11UCCH6P	2	--	EXAM VI SEM			
VI	C8	Inorganic Chemistry – III	11UCCH61	5	5	25	75	100
	C9	Physical Chemistry - III	11UCCH62	5	5	25	75	100
	CE2	Applied Chemistry OR	11UECH63A	4	4	25	75	100
		Medicinal Chemistry	11UECH63B					
	P	Project	11UCPCH6	5	5	--	100	100
	CP3	Gravimetric Analysis & Prepn. of Inorganic Complexes	11UCCH6P1	3	4	40	60	100
	CP4	Physical Chemistry & Computers in Chemistry	11UCCH6P2	3	5	40	60	100
CEP	Organic Analysis, Organic Estimation & Preparation of Organic Compounds	11UECH6P	2	2	40	60	100	
TOTAL				78	75	475	1225	1700

DEPT. OF CHEMISTRY CBCS SYLLABUS (2011 - 2014)								
PART III - ALLIED I - BIOCHEMISTRY (FOR CHEMISTRY & MICROBIOLOGY MAJORS)								
SEM	P	TITLE OF THE PAPER	S.CODE	H/ W	C	MARKS		
						I	E	T
I	1	Biomolecules	11UABC11	4	4	25	75	100
		Allied I Practical	--	2	--	EXAM II SEM		
II	2	Metabolism	11UABC21	4	4	25	75	100
		Allied I Practical	11UABC2P	2	2	40	60	100
TOTAL				12	10	90	210	300
PART III - ALLIED II - CHEMISTRY (FOR PHYSICS MAJOR)								
III	1	Allied Chemistry - I	11UACH31	4	4	25	75	100
		Allied II Practical	--	2	--	EXAM IV SEM		
IV	2	Allied Chemistry - II	11UACH41	4	4	25	75	100
		Allied II Practical	11UACH4P	2	2	40	60	100
TOTAL				12	10	90	210	300
PART IV - SKILL BASED ELECTIVE (FOR B.Sc. - CHEMISTRY MAJOR)								
I	1	Practical Chemistry	11SECH11	3	2	25	75	100
II	2	Polymer Chemistry	11SECH21	3	2	25	75	100
III	3	Chromatographic Techniques and Analytical Chemistry	11SECH31	3	2	25	75	100
IV	4	Computers in Chemistry (With C++)	11SECH41	3	2	25	75	100
V	5	Instrumental Methods of Analysis	11SECH51	3	2	25	75	100
VI	6	Nanoscience & Nanotechnology	11SECH61	3	2	25	75	100
TOTAL				18	12	150	450	600
PART IV - NON MAJOR ELECTIVE (FOR OTHER MAJORS)								
III	1	Water Analysis	11NECH31	3	2	25	75	100
IV	2	Applied Chemistry	11NECH41	3	2	25	75	100
TOTAL				6	4	50	150	200
PART IV - SVE & ES (FOR ALL MAJORS)								
I	1	Social Value Education	11USVE11	3	2	25	75	100
II	2	Environmental Studies	11UENS21	3	2	25	75	100
TOTAL				6	4	50	150	200
PART - V								
I to IV	Extension activities			-	1	100	-	100

PART III – CORE, CORE ELECTIVE & PROJECT			
I SEMESTER			
C 1	GENERAL CHEMISTRY 11UCCH11		
Hrs / Week : 3	Hrs / Sem : 45	Hrs / Unit : 9	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 electro negativity (Pauling, Mulliken Scale, Allred 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 $BeCl_2$, 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

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 2005; R. Sarkar; New central Book Agency, Kolkotta.
3. Text book of Inorganic Chemistry –P.L. Soni and M. Katyl, 2004; Sultanchand & Sons, New Delhi.
4. Atomic structure and chemical bonding – Manas Chanda, 2006; Tata McGraw Hill Publishing Company, New Delhi.
5. Theoretical principle of Inorganic Chemistry –G.S. Manku, 2004; Tata McGraw Hill publishing company, New Delhi..

II SEMESTER			
C 2	ORGANIC CHEMISTRY - I		11UCCH21
Hrs / Week : 3	Hrs / Sem :45	Hrs / Unit : 9	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 - Inductive effect, electromeric effect, mesomeric effect and steric effect and their influence on the reactivity of organic compounds. Bond Fission: homolytic and heterolytic fission, Reaction intermediates, formation stability and structure of carbonium ions, carbanions, carbenes, nitrenes and free radicals.

UNIT II - Active Methylene Compounds

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

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 tautomerism – amido-imido tautomerism.- evidences in favour of each form and mechanism of inter conversion.

UNIT III - Reagents of Synthetic Importance

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

Types of organic reagents: Electrophiles and nucleophiles -Reagents of synthetic importance: Preparation and synthetic applications of diazomethane, lithium aluminium hydride, N-bromosuccinimide, sodamide, selenium dioxide, per-iodic acid, Sodium borohydride and osmium tetroxide

UNIT IV- Name Reactions

Objective:To understand the mechanism and uses of some important name reactions.

Name reactions: Mechanism and applications of the following reactions – Aldol Condensation, Cannizzaro reaction, cross cannizzaro reaction, Clemmenson reduction, Diels - Alder reaction, Friedel–Crafts reactions, Gattermann reaction, Wolf-Kishner reduction, MPV and Oppenauer oxidation.

UNIT V- Cycloalkane and Aromaticity

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

Cycloalkane: General methods of preparations .Preparation of Large ring systems (Civetone and Muscone)– Bayer's strain theory – Sachse – Mohr theory - Aromaticity: Huckel's rule – example for benzenoid (benzene and naphthalene) and non-benzenoid compounds (propylium and cyclopropenyl ion). Mechanism of aromatic substitution reaction – electrophilic, nucleophilic and benzyne mechanism – effect of substitutions on acidity of phenol and basicity of aniline.

REFERENCE BOOKS:

1. Modern Organic Chemistry – M.K. Jain and S.C. Sharma, 2005: Vishal Publishing Company, Jalandar.
2. Advanced Organic Reactions Mechanism - N. Tewari, 2005: Books and Allied (P) LTD, Kolkotta.
3. Advanced General Organic Chemistry – S.K. Gosh, 2005, New Central Book Agency, Kolkatta.
4. Organic Reaction Mechanism – R.K. Bansal, 2005, McGraw hill publishing company New Delhi.
5. Organic Reactions and Reagent – J.N. Gurtu and R. Kapoor, 2004, S.Chand and company, New Delhi.

I & II SEMESTERS		
CP 1	NORGANIC QUALITATIVE ANALYSIS(Exam at the end of II Sem)	11UCCH2P
Hrs / Week : 3	Hrs / Sem : 45	Credit : 3

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. Nickel |
| 6. Zinc | 7. Manganese | 8. Barium | 9. Strontium | 10. Calcium |
| 11. 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; ArunabhaSen Books & Allied(P) Ltd., Kolkata.
3. Advanced Practical Chemistry- N.K. Vishnoi, 2005; Vikas Publishing House, New Delhi.

III SEMESTER			
C 3	PHYSICAL CHEMISTRY - I		11UCCH31
Hrs / Week : 4	Hrs / Sem : 60	Hrs / Unit : 12	Credit : 5

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, CO₂ and O₃. Liquid crystals – Smectic – Nematic – Cholesteric — Applications

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, Sphalerite, Wurtzite, rutile and fluorite.

Crystal defects – Point defect – Schottky defect – Frenkel defect – Metal excess and metal deficiency defects – Crystal growth from Melt (Czochralski method) - from solution (Hydro-thermal method) and gel method.

UNIT III- Colloids and Surface Chemistry

Objective: To understand the reactions on a surface, Types of Colloids.

Colloids – coagulation of colloids – Hardy Schulze law – protective colloids – gold number – Hoffmeister series – Gels – Classification, preparation, properties. Emulsion – types – emulsifiers – surfactants – Donnan Membrane equilibrium.

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

UNIT IV - 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 Droper 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 H₂- Cl₂, decomposition of HI reaction.

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

UNIT V - Nuclear Chemistry

Objective: 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.

Nuclear reactions – Artificial transmutation and induced radio activity. Nuclear fission– energy released during fission – Uncontrolled fission – Atomic bomb

Controlled fission - Atomic reactors – Thermal reactors and fast breeder reactors. Nuclear fusion- Hydrogen bomb – Stellar energy – Differences between nuclear fission and nuclear fusion. Radio carbon dating. Radioactive hazards – disposal of radioactive wastes from nuclear reactors.

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.Solid state – Asaraf

IV SEMESTER			
C 4	ORGANIC CHEMISTRY – II		11UCCH41
Hrs / Week : 4	Hrs / Sem : 60	Hrs / Unit : 12	Credit : 5

UNIT I - Stereochemistry and conformational analysis

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

Stereochemistry: Geometrical isomerism – maleic acid and fumaric acid, Aldoxime and ketoxime. Methods of distinguishing geometrical isomers. Optical isomerism, elements of symmetry – Optical activity of compounds without asymmetric carbon – diphenyl, allenes and spiranes. – Ingold and prelog rule R-S notation (with one and two asymmetric carbon atoms) – E-Z notation.

Conformational Analysis: Factors affecting the conformational stability. Conformational analysis of 1, 2-dichloroethane, butane and cyclohexane.

UNIT II - 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, Baker - Venkataraman and Fries rearrangement reactions. – Introduction to sigmatropic rearrangement – Claisen rearrangement.

UNIT III - Heterocyclic Compounds - I

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.

UNIT IV - Alkaloids and Terpenes

Objective: To study the importance of alkaloids and terpenes.

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

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

Unit – V Reaction Mechanism:

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, π and 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 Bredtrule.

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

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; Abdison Wesley Longman Ltd., England.

III & IV SEMESTERS		
CP II	INORGANIC QUANTITATIVE ANALYSIS & CHROMATOGRAPHIC TECHNIQUES (Exam at the end of IV Sem.)	11UCCH4P
Hrs / Week : 2	Hrs / Sem : 30	Credit : 3

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
2. Estimation of Oxalic acid (permanganometry)
3. Estimation of Ferrous ion by external indicator method
4. Estimation of Potassium dichromate (Iodometry)
5. Estimation of copper using thiosulphate
6. Estimation of ferric iron by internal indicator method.

Complexometric titration

7. Estimation of Zinc
8. Estimation of magnesium
9. Estimation of Calcium
10. Estimation of manganese
11. Estimation of total hardness of water

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

1. Estimation of a mixture of Na_2CO_3 using Warden double indicator method
2. Determination of acetic acid in commercial vinegar using NaOH
3. Estimation of calcium by permanganometric method
4. Estimation of ferrous ion in AyagaSenthuram (Siddha drug)

B. Chromatographic techniques

Thin layer chromatography: Separation of organic mixture containing o,m and p - nitrophenol using dioxane: Toluene (6:1) solvent system and the determination of R_f values of the separated components in a mixture.

Paper chromatography: Ascending type: Determination of R_f values of carbohydrates (Glucose, Galactose, Fructose) and amino acids (Phenylalanine, valine, Glycine) using solvent systems. n-butanol:acetic acid:water (4:1:5 v/v) – spray reagent – 50% sulphuric acid for carbohydrates, 2% ninhydrin for amino acids.

REFERENCE BOOKS:

1. Vogel's text book of Quantitative Inorganic Analysis- A.I. Vogel,(Longman), Pearson education, India.
2. Advanced Practical Chemistry- N.K. Vishnoi, 2005;Vikas Publishing House, New Delhi.
3. Laboratory manual for Analytical Biochemistry & Separation Techniques-D.R. Palanivelu, 2000; School of Biotechnology, Madurai kamaraj University, Madurai.

V SEMESTER			
C 5	ORGANIC CHEMISTRY – III		11UCCH51
Hrs / Week : 5	Hrs / Sem : 75	Hrs / Unit : 15	Credit : 5

UNIT – I Organic photochemistry

Objective: To understand the important application of photochemistry in organic compounds.

Organic photochemistry: Electronic excitations – allowed and forbidden transitions – singlet and triplet states – internal conversion – intersystem crossing (fluorescence, phosphorescence and photosensitisation)

Photochemical reactions – photolysis of ketones – Norrish type – I and type - II reactions, photoinduced reactions of α,β -unsaturated ketones – cyclopentenone and cyclohexenone – photochemical rearrangement of α,β -unsaturated ketones and cyclic dienones and mechanism. Barton reaction -Photocyclic addition reactions – Paterno–Buchi reaction and mechanism.

UNIT II – Drug Design

Objective: To study the design, synthesis and formulation of drugs.

Drug design – development of drugs – procedures followed in drug design – lead components and modification – concept of pro drugs and soft drugs. Physical and chemical factors of drug design. Chemical structure and pharmacological activities of drugs. General principles of drug action – absorption, distribution, metabolism and excretion – Receptors, metabolites and anti metabolites.

Synthesis of the following drugs: paracetamol (Analgesics) – Chloroamphenicol and Penicillin (Antibiotic) – Benadryl (antihistamines) – Carbovir (anti AIDS) – Chloroquin (anti malarial) – diazepam (psychoactive and tranquilizer)

UNIT – III – Biosynthesis

Objective: To study the biosynthesis of some essential biomolecules.

Biosynthesis - Biosynthesis of carbohydrates – mechanism of photosynthesis - Biosynthesis of fructose and disaccharides (sucrose). Biosynthesis of lipids – palmitate and oleate. Biosynthesis of fats (triglycerides). Biosynthesis of amino acids – L-glutamine, L-tyrosine and L-proline. Biosynthesis of terpenes – citral and menthone.

UNIT – IV – Supramolecular Chemistry and Green Chemistry

Objective: To study the non- benzenoid aromatic and supramolecular compounds.

Supramolecular chemistry – important concepts – crown ethers and cryptands – molecular recognition – principle of molecular receptor design – spherical recognition (cryptates of metal cations) and examples – tetrahedral recognition with examples – supramolecular characteristics Principles of Green Chemistry – Green solvents (H_2O and Solid CO_2) – Green oxidation of alcohols.

UNIT – V – Dyes and Vitamins

Objective: To study the preparation of some important dyes and the importance of vitamins.

Theory of color and constitution – classification according to structure and application. Preparation of Azo dyes – Methyl orange and Bismarck brown – Triphenylmethane dyes – Malachite green. Phthalein dyes – phenolphthalein and fluorescein – Vat dye – indigo. Anthraquinone dye – alizarin.

Vitamins – Thiamine, riboflavin, pyridoxine and ascorbic acid – occurrence and biological importance. Structural elucidations of pyridoxine and ascorbic acid.

Reference Books:

1. An Introduction to Drug design – S.S.Pandeyya and J.R. Dimmock, 2004; New Age International.
2. Medicinal Chemistry – G.R. Chatwal, 2002, Himalaya Publishing House, New Delhi.
3. Drugs – G.L.D. Krupadanam, D. V. Prasad, K.V. Rao, K.L.N Reddy and C. Sudhakar, 2005; Orient Longmann Pvt Limited, Hyderabad.
4. Molecular Modelling and Drug Design- K. Anand Solomon, 2008; MJP Publishers, Chennai.
5. Biochemistry – U. Sathyanarayana, 2005, Books and Allied (P)Ltd., Kolkatha.
6. Modern Organic Chemistry – M.K. Jain and S.C.Gosh, 2005, Vishal Publishing Company, Jalandar.
7. Bio organic, Bioinorganic and supramolecular Chemistry – P.S.Kalsi and J.P.Kalsi, New Age International (P) Ltd, Publishers New Delhi. (First edition, 2007).
8. Bio inorganic and supramolecular chemistry – A.K.Bhagi and G.R.Chatwal, 2003, Himalaya Publishing House, New Delhi.
9. Green Chemistry – A.K. Ahluwalia, 2008; Ane books India, New Delhi,

V SEMESTER			
C 6	INORGANIC CHEMISTRY - I		11UCCH52
Hrs / Week : 5	Hrs / Sem : 75	Hrs / Unit : 15	Credit : 5

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 process.

Refining – Mond's process, van Arkel– de-Boer process, electro refining, Zone refining. Metallurgy of Titanium & Nickel and their important uses.

UNIT II - d - block elements - I

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

General characteristics of d-block elements - Comparative study of Ti, Zr, Hf. Preparation and uses of TiO_2 and $TiCl_4$. Comparative study of V, Nb, Ta. Metallurgy and uses of V- preparation and uses of V_2O_5 and NH_4VO_3 – polyvalency of V – comparative study of Cr, Mo, W polyvalency of Cr – preparation & uses of ammonium molybdate, and Tungsten Bronzes.

Comparative study of Fe, Co and Ni – Metallurgy and uses of Co – Preparation and uses of sodium cobaltinitrite.

UNIT III- d-block elements – II and f – block elements

Objective: To study the characteristics of d-block elements, lanthanides and actinides.

Comparative study of Cu, Ag and Au - Comparative study of Zn, Cd and Hg - Polycations- Toxicity of cadmium and mercury.

Metallurgy and uses of platinum – 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.

Comparison of Lanthanides and Actinides. Extraction and uses of Thorium –role of thorium in nuclear reaction - Extraction and uses of U. Preparation and uses of UF_6 and Zinc uranyl acetate.

UNIT IV - Magnetic properties of inorganic compounds

Objective: To study the magnetic properties of inorganic compounds

Dipole moment and molecular structure – Application of dipole moment studies in the structural determination of H_2O , CO_2 , NH_3 , N_2O , SF_6 , C_6H_6 , CH_4 , Cis and trans isomers of 1,2 –dichloro-ethylene, o,m,p – dichlorobenzene.

Magnetic flux – Magnetic permeability – magnetic susceptibility – Diamagnetism, para, ferro and anti – Ferro magnetism – Curie temperature – Neil point -Determination of magnetic susceptibility by Guoy's method – Number of unpaired electrons and spin only magnetic

moment value of $K_3[Fe(CN)_6]$, $K_4[Fe(CN)_6]$, $[Ni(CN)_4]^{2-}$, $[CoCl_4]^{2-}$, $[Ti(H_2O)_6]^{3+}$, $[Cr(NH_3)_6]^{3+}$, $Ni(CO)_4$.

UNIT V – 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 – nomenclature of coordination compounds (IUPAC system). Geometrical and optical isomerism in 4 and 6 coordination compounds. Werner's coordination Theory. Effective Atomic Number rule (EAN).- prediction of hybridization on the basis of VB theory.

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. Huges, 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.

V SEMESTER			
C 7	PHYSICAL CHEMISTRY- II		11UCCH53
Hrs / Week : 5	Hrs / Sem : 75	Hrs / Unit : 15	Credit : 5

UNIT I - Thermodynamics

Objective: To study the important outcome of first law of thermodynamics.

Reversible and irreversible process – isothermal and adiabatic process – relation among P-V, T-V and P-T during adiabatic changes – Expression for $w, q, \Delta E, \Delta H$, for 'n' moles of an ideal gas and van der Waals gas during reversible and irreversible isothermal and adiabatic processes – comparison of isothermal and adiabatic expansion of an ideal gas – Joule – Thomson effect – Joule Thomson 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 – 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.

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 – Clapeyron equation – applications – Clausius - Clapeyron equation and applications.

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, CO₂ 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, sodium sulphate - water.

Solid – Vapour equilibria – $\text{CuSO}_4 \cdot \text{H}_2\text{O}$ system –Nernst distribution law – thermodynamic derivation – molecular association and dissociation – application of distribution law to benzoic acid – benzene, $\text{KI} + \text{I}_2 \rightarrow \text{KI}_3$ system and solvent extraction.

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 – DuhemMargules 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, nicotine – water and aniline- n- hexane system – Crismer test

Thermodynamics derivation of relation between concentration and elevation of boiling point and depression of freezing point.

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; Schanm's outlines, Tata McGraw Hill Publishing Company, New Delhi.
5. An introduction to chemical thermodynamics – R.P. Rastogi and R.R. Misra, 2005; Vigas Publishing House, New Delhi.

V SEMESTER			
CE 1 A	SPECTROSCOPY		11UECH54A
Hrs / Week : 4	Hrs / Sem : 60	Hrs / Unit : 12	Credit : 4

UNIT I – Basic principles of spectroscopy & Microwave spectroscopy

Objective: To study the principles of spectroscopy and microwave 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, Inversion spectrum of NH₃)- Microwave oven.

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 CO₂, H₂O. Vibrational frequencies – Factors affecting IR spectra – Finger print region – Fermi resonance-Applications (aliphatic and aromatic hydrocarbons, alcohols, aldehydes, ketones, carboxylic acid,ester,amide) – Intermolecular and intramolecular hydrogen bonding.

UNIT III - Raman and Electronic spectroscopy

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

Raman spectroscopy – Rayleigh and Raman scattering, stokes and antistokes lines (Quantum theory)- Selection rule- Vibrational Raman spectra- Mutual exclusion principle- instrumentation Raman spectra of CO₂ and H₂O – Advantages and limitations of Raman Spectroscopy.Electronic spectra- principle – selection rule- Rotational structure of electronic-vibration spectra- Franck Condon principle.

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 - instrumentation – spin-spin coupling and coupling constant- NMR spectrum of simple molecules (1-propanol, 1,1,2-tribromoethane, ethyl acetate, benzaldehyde, acetaldehyde, ethyl methyl ketone, isopropyl alcohol).

UNIT V - ESR and Mossbauer spectroscopy

Objective: To understand the principles of ESR and Mossbauer spectroscopy.

ESR spectroscopy – principle- ESR spectrometer – hyperfine splitting – ESR spectrum of hydrogen atom,CH₃, deuterium, benzene anion radical - g-factor- Applications of ESR- Differences between NMR & ESR.

Mossbauer spectroscopy- basic principle-Mossbauer experiment- Theory of Mossbauer spectroscopy- Applications (Electronic structure, Molecular structure, Crystal symmetry and Magnetic structure).

REFERENCE BOOKS:

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

V SEMESTER			
CE 1 B	MATERIAL SCIENCE		11UECH54B
Hrs / Week : 4	Hrs / Sem : 60	Hrs / Unit : 12	Credit : 4

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 material 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, fibre-reinforced composites, macroscopic composites, Nanocrystalline 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- Xray 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 8	INORGANIC CHEMISTRY - II		11UCCH61
Hrs / Week : 5	Hrs / Sem : 75	Hrs / Unit : 15	Credit : 5

UNIT I - Coordination Chemistry I

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

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 – JahnTellereffect. Molecular orbital approach – MO diagrams for ML_6 type complexes - π - back bond coordination.

UNIT II - Coordination Chemistry II

Objective : To study the stability and applications of coordination complexes

Thermodynamic stability – stepwise stability constants and overall stability constant – $\log \beta$ value and stability. Factors affecting the stability of complexes in solution – Determination of stability constant by Kjerrum method

Chelate – chelate effect – explanation of chelate effect – Kinetic stability – labile and inert complexes – comparison of thermodynamic and kinetic stability.

Reactions of complexes – Substitution reactions in S_N1 and S_N2 – trans effect.

UNIT III - Coordination Chemistry III

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

Metal Carbonyls – low oxidation state of metal ions in carbonyls. Classification – general methods of preparation, physical and chemical properties. Bonding and structure of metal carbonyls – Valence Bond Theories – $M \rightarrow CO$ (bonding).

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.

Metal nitrosyls – nitroso ferrous sulphate and sodium nitroprusside – preparation, properties and structure.

UNIT IV - Spectral Properties of Complexes

Objective : To understand the electronic spectral properties of complexes

Electronic spectra of complexes – LS coupling - micro state – Hund's rule – Term symbols – selection rules for electronic transition.

General energy diagrams of d^1 and d^9, d^4, d^6, d^2 and d^8, d^3, d^7 (Orgel diagram) - Charge transfer 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 haemoglobin, myoglobin, chlorophyll, Carboxy peptidase. Vitamin B_{12} , super oxide dismutase

Transport through channels – function of $Na^+ K^+$ pump. Metals and metal complexes in medicine.

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 , Kolkatta
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. Huhee, 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.

VI SEMESTER			
C 9	PHYSICAL CHEMISTRY - III		11UCCH62
Hrs / Week : 5	Hrs / Sem : 75	Hrs / Unit : 15	Credit : 5

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 - 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 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 III - 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 quin-hydrone, hydrogen, Glass electrodes – potentiometric titrations: acid-base, oxidation reduction and precipitation titrations – Corrosion – Theory (electrochemical) and prevention.

UNIT IV - Applied Electrochemistry

Objective: To study the common application of electrochemistry.

Organic Electrochemistry – electrochemical oxidation – Kolbe's synthesis. Electro reduction of carbonyl compounds – adiponitrile synthesis. Electroplating – Principle, process – electroplating of Cu, Ni, and Cd. Types of coating – protection of structure and pipelines – protection of ships in sea .

Power sources – primary cells – principles – selection of anode and cathode- alkaline – MnO_2 cells – secondary cells – characteristics – Lithium battery and Ni-Cd battery. Fuel cells – principle – hydrogen – oxygen fuel cells – alkaline fuel cells.

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 Applicatiopns Prof. B. Viswanathan, Dr.S.Sundaram, Prof R.Venkataraman , Dr. K. Rengarajan and Dr. P.S. Raghavan , S. Viswanathan 2000; (Printers &Publishers) Pvt . Ltd. Chennai. I Edition.
4. Group Theory and its Chemical Applications- P.K. Bhattacharya, 2005; Himalaya Publishing House, New Delhi.

VI SEMESTER			
Elective - CE 2 A	APPLIED CHEMISTRY		11UECH63A
Hrs / Week : 4	Hrs / Sem : 60	Hrs / Unit : 12	Credit : 5

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 – 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 spirit, methylated spirit, proof spirit, absolute alcohol – Industrial uses of isopropanol, ethylene glycol, glycerin, acetone and phenol – catalysts used in petroleum industry. Petrochemical industries in India.

UNIT II - Plant nutrients / 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 nitrite, – Mixed fertilizers – Biofertilizers.

UNIT III - Silicate Industry and Chemicals in Day-to-day life

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

Silicate industry: Cement, Glass and ceramics. Raw materials and manufacture of cement, glass and ceramics

Chemicals in Day-to-day life: Preparation and uses of i) tooth powder ii) tooth paste iii) boot polish iv) gum paste v) sealing wax vi) writing ink vii) chalk crayons viii) ager battis ix) talcum powder x) liquid blues xi) candles xii) phenoyle xiii) moth balls xiv) camphor tablets (xv) liquid blue.

UNIT IV- 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 6-6, dacron, orlon and Teflon.

Match industry: pyrotechnic and Explosives- safety matches – composition of the match head, composition of fire works – coloured 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 V- Pharmaceutical chemistry

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

Structure and uses:

1. Sulpha drugs-sulphadiazine, protosil and prontosil
2. Antimalarials –quinine, plasmoquine
3. Arsenical drugs – Salvarasan 606, Neosalvarasan
4. Antibiotics - Penicilline, Tetracycline, streptomycin and chloromycin(structure and uses)
5. Anaesthetics – General anaesthetics- vinyl ether-cyclopropane-Halohydrocarbon-chloroform-Haloethane-Trichloro ethylene – Intravenous anaesthetics-Thiopentone-sodium isoprenoid- Localanaesthetics – Cocaine and its derivatives.

Preparation and uses of the following compounds:

- Antacids – Magnesium trisilicate, Milk of magnesia
- Antifungals - Griseofulvin
- Emetic - Tartaremetic
- Haematonics – Ferrous gluconate
- Analgesic and Anripyretic – Aspirin.
- Cancer – causes.

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 – JaysgreeGhosh, 2003; S. Chand and Company, New Delhi.

VI SEMESTER			
CE 2 B	MEDICINAL CHEMISTRY		11UECH63B
Hrs / Week : 4	Hrs / Sem : 60	Hrs / Unit : 12	Credit : 5

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 glutathione 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 analysis.

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, whooping 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 – antiarrhythmic 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 – aspirin and paracetamol.

Anaesthetic - general anaesthetic – uses and disadvantages of vinyl ether and halothane.

Intravenous anesthetics – triptental sodium – local anesthetics – cocaine and cincoaine.

Anti psychotic drugs – piperazine and benzamides.

Anti anxiety drugs – benzodiazepine.

REFERENCE BOOKS :

1. Practical Biochemistry – David Plummer – 2005, Tata McGraw-Hills Publishing Company.
2. Text Book of Pharmaceutical Chemistry – Jeyashree Gosh – 2003, S.Chand and Company, New Dehi.
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 Longmann Pvt Limited , Hyderabad.
5. Handbook of Biomedical Instrumentation II Edition. – R.S.Khandpur, TataMcgraw - Hill Publishing, Company, New Delhi.

V & VI SEMESTERS		
CP III	GRAVIMETRIC ANALYSIS AND PREPARATION OF INORGANIC COMPLEXES (Exam at the end of VI Sem)	11UCCH6P1
Hrs / Week : 3	Hrs / Sem : 45	Credit : 4

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 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 trithiourea copper(I)chloridedihydrate
7. Preparation of potassiumtrioxalato ferrate(III)
8. Preparation of potassiumdioxalato diaquochromate(III)

C) Physical constants :

1. Determination of melting point

Naphthalene 80 – 82⁰ C ; Benzoic acid 121 – 122⁰ C ; Urea 132.5 – 133⁰ C :
 Salicylic acid 157.5 – 18⁰ C ; m - dinitrobenzene -90⁰ C ; p - dichlorobenzene
 52⁰ C
 Acetanilide 113.5 – 114⁰ C ; Aspirin 135⁰ C

2. Determination of boiling point

Ethanol 78.5⁰ C ; Benzene 80⁰ C ; Cyclohexane 81.4⁰ C ; Toluene 110⁰ C

3. Crystallization

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

V & VI SEMESTERS		
CP IV	PHYSICAL CHEMISTRY AND COMPUTER IN CHEMISTRY (Exam at the end of VI Sem)	11UCCH6P2
Hrs / Week : 3	Hrs / Sem : 45	Credit : 5

- Determination of molecular weight of non-volatile solute by Rast macro method.
- Determination of molecular weight of a solute by transition temperature method.
- Construction of the phase diagram of a simple eutectic system and interpretation of the diagram
(eg. Naphthalene – diphenyl)
- Determination of CST of phenol – water system. Determination of the unknown concentration of NaCl, by CST using phenol water system.
- Comparison of the strengths of HCl by ester hydrolysis.
- Conductometric titration:
 - Determination of the strength of HCl using standard NaOH solution.
 - Determination of the strength of BaCl₂ using Std.MgSO₄.
- Conductometric titration:
 - Determination of the strength of CH₃COOH using Std.NaOH.
 - Determination of the strength of Ba(OH)₂ using std.MgSO₄.
- Determination of the solubility of a sparingly soluble salt using conductometric titrations.
- Potentiometric titration-Estimation of Fe²⁺ Vs KMnO₄ Vs FAS solution (standard solution of FAS has to be prepared) .
- Estimation of KMnO₄ VsFAS Vs K₂Cr₂O₇ solution (standard solution of FAS has to be prepared).
- Determination of the solubility of Ammonium Oxalate at different temperature.

12. Computer practicals:

Solving problems by writing and running programs in C++ and exciting the output

- Determination of pressure from van der Waal's equation
- Determination of van der Waal's constant 'a' & 'b' of a gas
- Determination of pH of a solution and find that it is basic, acidic or neutral
- Compute lattice energy of ionic crystal.
- Compute the rate constant of a first order reaction
- Determination of half-life and average-life of a radioactive nuclei
- Compute the rate constant of a second order reaction
- Compute the energy of activation
- Compute the average velocity & MPV using RMS velocity
- Depression of freezing point
- Most probable velocity, average velocity and RMS velocity
- Inversion temperature and critical constant.
- Elevation of boiling point.

REFERENCE BOOKS :

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

V & VI SEMESTERS		
CEP	ORGANIC ANALYSIS, ESTIMATION AND PREPARATION OF ORG. COMPOUNDS (Exam. at the end of VI Sem)	11UECH6P
Hrs / Week : 2	Hrs / Sem : 30	Credit : 2

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, monocarboxylic acid, dicarboxylic acid, esters, carbohydrate (glucose), aromatic primary amine, amide, nitrocompound, anilide)
- (e) Preparation of a rational solid derivatives to confirm the functional group.

B .Preparation of Organic Compounds

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

C. Organic estimation

- 1) Estimation of Phenol
- 2) Estimation of Aniline

REFERENCE BOOKS :

1. A Text Book of Practical Organic Chemistry, including Qualitative Organic Analysis- A.I. Vogel (Lpngman), Pearson Education India.
2. Advanced Practical Chemistry- I. Mukhopadyay and P. Chatterjee, 2004; Books & Allied Pvt. Ltd., Kolkatta.

VI Semester		
P	PROJECT	11UCPCH6
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, analyse 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 80% for the presentation of project and 20% for viva-voce.

PART III - ALLIED - I - BIOCHEMISTRY			
I SEMESTER			
AI 1	BIOMOLECULES		11UABC11
Hrs / Week : 4	Hrs / Sem : 60	Hrs / Unit : 12	Credit : 4

UNIT I - CARBOHYDRATES I

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

Definition and classification of carbohydrates – Configuration of monosaccharide (Glucose, fructose, Galactose) - Ring structure of Glucose, fructose, Galactose and mannose - Mutarotation – Epimerisation - Chemical properties of glucose. Reactions of fructose (oxidation, reduction, osazone formation) - 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 polysaccharide types.

Disaccharides – Lactose, maltose, sucrose - Occurrence and structure (elucidation not required) . Qualitative test for lactose, maltose and sucrose.

Polysaccharides - Definition of homo and hetero polysaccharide. Occurrence and structure of starch and cellulose - Difference between starch and cellulose. Application of starch, cellulose and their derivatives. Heteropolysaccharides – occurrence, structure and uses of Hyaluronic acid & chondroitin sulphate. Blood group polysacchrides

UNIT III - Amino Acids

Objective: To study about aminoacids and proteins.

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

Objective: To study fatty acids and their biological importance.

Definition and classification of fatty acids. Saturated, unsaturated and cyclic fatty acids. Triacylglycerol. Acid number, iodine number and saponification number. Saponification and rancidity. Occurrence and functions of phospholipids - lecithin, Cholesterol - structure, colour reaction, biochemical function and biological importance.

UNIT V - 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 of tRNA only. Triplet code for 20 amino acids.

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	METABOLISM		11UABC21
Hrs / Week : 4	Hrs / Sem : 60	Hrs / Unit : 12	Credit : 4

UNIT I - 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 II - Carbohydrate Metabolism

Objective: To understand the complete carbohydrate metabolism.

Reaction sequence and name of each enzyme of glycolysis, TCA cycle, HMP shunt, glycogenesis and glucogenesis .

UNIT III - Bioenergetics

Objective: To understand the ETC operation

Electron transport chain (ETC). Components and reactions of ETC. Oxidative phosphorylation - (outline study) Role of ATP in energy cycle- calculation of number of ATP by the complete oxidation of glucose (both aerobic and anaerobic oxidation)

UNIT IV - Lipid metabolism

Objective: To understand the metabolism of lipids.

Source of body fat – fatty acid oxidation- β oxidation- Source of Co A- formation of ketone bodies - Structure of fatty acid synthase complex – Biosynthesis of palmitate & oleate – cholesterol formation and degradation

UNIT V - Metabolism of proteins and Amino acids

Objective: To understand the metabolism of proteins and amino acids.

General breakdown of proteins, deamination, transamination, decarboxylation and urea cycle. Metabolism of glycine, tryptophan, tyrosine and Glutamin and phenylalanine (break down and biosynthesis. Synthesis of Oxytocin and Vasopressin.

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 SEMESTERS		
A1 P	ALLIED I PRACTICAL (Exam end of II Sem)	11UABC2P
Hrs / Week : 2	Hrs / Sem : 2 / 30	Credit : 2

ANALYSIS OF BIOMOLECULES

I Qualitative analysis of carbohydrates and amino acids

1. Analysis of monosaccharides – glucose, fructose and galactose using colour reactions.
2. Analysis of disaccharides - Maltose, lactose and sucrose.
3. Analysis of polysaccharides – Starch, dextrin
4. Analysis of tyrosine, tryptophan, arginine, methionine, cysteine and Histidine using colour reactions.

COURSE WORK

5. Qualitative analysis of arginine using paper chromatographic method.
6. Qualitative analysis of monosaccharides (Glucose , fructose, galactose, mannose ,ribose) using paper chromatographic method .

II Quantitative analysis

1. Estimation of Amino Acid by formal titration method
2. Estimation of protein by colorimetric method
3. Estimation of Acid number of Oil
4. Estimation of Iodine number of Oil
5. Estimation of saponification number of Oil
6. Estimation of ascorbic acid (volumetric method)

COURSE WORK

7. Estimation of protein in milk by Kjaldhal method.
8. Separation of blood proteins using electrophoretic 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. Parctical Clinical Biochemistry Manual- T. Mary Vijaya, M.L. Mani, K. Sunitha Kumari & K.R.T. Asha, 2003; Rishi Publications, Kalikavilai.

PART III - ALLIED MATHEMATICS			
(FOR B.Sc. PHYSICS & CHEMISTR MAJORS) (2011 - 2014)			
I SEMESTER			
A I-P	I STATISTICS, DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS	11UAMA11	
Hrs /Week : 6	Hrs/ Sem : 6 x 15 = 90	Hrs./ Unit : 18	Credits : 5

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

First order higher degree Differential equations - Solvable for p, x and y - Clairaut's form – linear differential equations with Constant coefficients - particular integrals of the form, $f(x) e^{ax}$, x^n , $e^{ax} x^n$

UNIT IV

Linear differential equations with variable coefficients - homogenous equations - equations reducible to homogenous equations - method of variation of parameters.

UNIT V

Vector differentiation – gradient - curl – divergence - solenoidal and irrotational vectors - formulae involving gradient, curl and divergent.

TEXT BOOKS:

1. Statistics by Dr S. Arumugam and Issac, New Gamma Publications
2. Differential Equations and Applications by Dr. S. Arumugam, New Gamma Publications, Edition 2008
3. Differential Equations and Vector Calculus by Joseph A Mangaladoss – Presi - Persi Publications – Edition 2004
 - UNIT 1 : Text Book 1 - Chapter 2
 - UNIT II : Text Book 1 - Chapter 3
 - UNIT III : Text Book 2 - Chapter 1 - SEC 1.7 and Chapter 2 - SEC 2.3
 - UNIT IV : Text Book 2 - Chapter 2 - SEC 2.4, 2.5
 - UNIT V : Text Book 3 - Chapter 1

REFERENCE BOOK:

Differential Equations & Applications by Sankaranarayanan & others

II SEMESTER			
A I – P I	ALGEBRA & CALCULUS		11UAMA21
Hrs/Week: 6	Hrs/Sem: 6 x 15 = 90	Hrs./ Unit : 18	Credits : 5

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

Sum of the r^{th} powers of the roots – Newton’s theorem - Reciprocal equations.

UNIT III

Transformation of equations – Descarte’s rules of signs – Rolle’s Theorem
Approximate solutions of numerical equations using Newton’s method and Horner’s method.

UNIT IV

Pedal equatuions - 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. Set Theory & Theory Of Equations, Dr.S.Arumugam & Issac New Gamma Publishing House, 2006 Edition
2. Calculus , Dr.S.Arumugam & Issac, New Gamma Publishing House, 2006 Edition
 UNIT I : TEXT BOOK 1 - CHAPTER 5 - SECTION 5.1, 5.2
 UNIT II : TEXT BOOK 1 - CHAPTER 5 - SECTION 5.3, 5.4
 UNIT III : TEXT BOOK 1 - CHAPTER 5 - SECTION 5.5, 5.7,5.10
 UNIT IV : TEXT BOOK 2 - PART I - CHAPTER 3 - SECTION 3.3, 3.4
 UNIT V : TEXT BOOK 2 - PART II - CHAPTER 4

REFERENCE BOOKS:

1. Classical Algebra by Joseph A. Mangaladoss.
2. Algebra Volume I & II by T.K.Manicavachagom pillay, T.Natarajan & K.S.Ganapathy

III SEMESTER			
A 1	PROPERTIES OF MATTER, THERMAL PHYSICS & OPTICS	11UAPH31	
Hrs / Week : 4	Hrs / Sem : 60	Hrs / Unit : 12	Credits : 4

PART III - ALLIED PHYSICS (FOR MATHS AND CHEMISTRY MAJORS)

UNIT I – Elasticity - Bending of Beams

Elastic moduli - 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 - Optics - Interference and Diffraction

Young's Double slit experiment - Condition for interference - 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, circularly and elliptically polarised light, half wave and quarter wave plate - Optical activity – specific rotation (definition)

UNIT IV - Thermal Physics - Transport Phenomena

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

UNIT V - Transfer of Heat & Low Temperature

Conduction – Coefficient of thermal conductivity – definition – Thermal conductivity of a bad conductor – Lee's Disc experiment – Newton's law of cooling – determination of specific heat capacity of liquid – Joule Kelvin effect – Theory of porous plug experiment – adiabatic demagnetization – superconductivity – its properties

TEXT BOOKS:

1. College Physics Volume 1 - A.B. Gupta
2. Optics - Brijlal & Subramaniam

REFERENCE BOOKS:

1. Properties of matter - Brijlal & Subramaniam
2. Properties of matter - D.S. Mathur
3. Heat and Thermodynamics - Brijlal & Subramaniam - S.Chand &Co..

IV SEMESTER			
A2 MODERN PHYSICS , ELECTRO MAGNETISM & ELECTRONICS 11UAPH41			
Hrs / Week : 4	Hrs / Sem : 60	Hrs / Unit : 12	Credits : 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 - Postulates of quantum mechanics

UNIT II - Nuclear Physics

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

UNIT III - Electromagnetism

Moving coil Ballistic galvanometer – theory –damping correction – experiment to find charge sensitivity and absolute capacity of a capacitor – Classification of magnetic materials – magnetic hysteresis – B.H curve – self induction of toroidal solenoid – determination of Rayleigh method – mutual induction between coils and co-efficient of coupling – determination of mutual induction using B.G.

UNIT IV - Basic Electronics

Superposition theorem – Thevenin's theorem – Norton's theorem – Zener diode characteristics Regulation with Zener diode – Bridge rectifier - Clipping and clamping circuits using diodes – 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.

TEXT BOOKS:

1. Modern Physics - R. Murugesan
2. Electricity & Magnetism - R. Murugesan
3. Principles of Electronics - V.K. Mehta

REFERENCE BOOKS:

1. Fundamentals of Electronics - B. Ghosh
2. Electricity & Magnetism - R. Murugesan

III & IV SEMESTERS		
ALLIED PRACTICAL (EXAM. END OF IV SEM.)		11UAPH4P
Hrs / Week : 2	Hrs / Sem : 30	Credits : 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 - Normal incidence
7. Newton's rings – Radius of curvature - μ
8. Air wedge – thickness of wire
9. Figure of merit – B.G
10. Characteristics of Zener diode
11. Basic logic gates OR, NOT & AND
12. Transistor Characteristics (CE mode)

I SEMESTER			
SBE 1	PRACTICAL CHEMISTRY		11SECH11
Hrs / Week : 3	Hrs / Sem : 45	Hrs / Unit : 9	Credit : 2

Unit I – Basic techniques

Objective: To know the basic techniques used in practical chemistry.

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.

Unit II – General Principles of Qualitative Analysis

Objective: To study the principles used in qualitative analysis.

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 H₂S– washing, dissolving, transferring of precipitates, spot test plates

Preliminary tests for inorganic substances – physical examination, Charcoal cavity test, Flame test, Oxidising fusion mixture test, Borax bead test, Preparation of original solution, Preparation of sodium fusion extract. Interfering radicals – Common ion effect, Removal of interfering acids – Oxalate, borate, fluoride and phosphate.

Unit III – Titrimetric Analysis

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

Introduction – Normality, Molarity, 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 methods – 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) .Estimation of Nickel.

Unit V – Theory of organic analysis

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

Preliminary examination – (Physical state, Colour, Odour, Flame test, Solubility test) - Detection of extra elements - Lassaingé's test for nitrogen, Sodium nitroprusside test for sulphur, Beilstein test for halogen - Detection of functional groups (substance acidic in nature, substance basic in nature, substance phenolic in nature, substance neutral in nature) - Classification of organic compounds – Test for functional groups - Sodium carbonate test, Ester test, FeCl₃ test, Libermann's test, Schiff's reagent test, Tollen's test, 2,4-dinitrophenylNitroprusside test, Hydroxamic test (Feigl test) ,Molisch test, Seliwanoff's test, Mulliken Barker reaction, Isocyanide test, Diazotisation reaction.

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; ArunabhaSen 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 (Lpngman), Pearson Education India.

II SEMESTER			
SBE 2	POLYMER CHEMISTRY		11SECH21
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 varieties.

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 – Vulcanisation, 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 Hexamethylene diamine - 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 polymerization and Carother's equation - Polymers in medicine and surgery – Biomedical 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 Gowariker, 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- Interscience Publication, John Wiley & Sons Newyork.
3. Text Book of polymer science- P.L. Nayak & S. Lenka, 2000; Kalyani publishers, New Delhi.

III SEMESTER			
SBE 3	CHROMATOGRAPHIC TECHNIQUES AND ANALYTICAL CHEMISTRY	11SECH31	
Hrs / Week : 3	Hrs / Sem : 45	Hrs / Unit : 9	Credit : 2

UNIT I - Chromatography - I

Objective: To study the principle, method and applications of TLC, PC and CC.

Chromatography: - Classifications - Thin layer chromatography (TLC) – principle, experimental method, R_f values and applications. Paper chromatography (PC) – principle, experimental method and application in the separation of amino acid mixtures. Column chromatography (CC) - principle, experimental method and applications.

UNIT II - Chromatography - II

Objective: To study the principle, method and applications of IEC and GC.

Ion exchange chromatography (IEC) – principle – types of ion exchange resin and action of resin – Instrumentation and application in the separation of Zn, Mg, Cl and Br. Gas chromatography – basic principle – instrumentation – block diagram – application in quantitative analysis.

UNIT III - Thermo-analytical Methods

Objective: To study the analytical uses of thermal methods

Thermo Gravimetric Analysis (TGA) – principle, instrumentation and 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.

UNIT IV – Electro-analytical Methods

Objective: To study the analytical uses of electrolytic methods

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) – experimental assembly – polarograms – applications to qualitative analysis.

UNIT V - Evaluation of analytical treatment

Objective: To understand the idea about the interpretation of experimental results.

Definition and explanation of the terms – Mean, mode and median, deviation and relative mean deviation, standard deviation, variances, coefficient of variances (student T-test). Accuracy and precision – classification. Error and types of error – minimization of errors.

Analysis of experimental results – graphical method – curve fitting – method of least squares calculations – problems involving straight line graph. Computation rules and significant figures.

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. Industrial Chemistry - B.K Sharma, 2003; Goel Publishing House, Meerut.
3. Instrumental Methods of Analysis – B.K.Sharma,2003; Goel publishing House, Meerut.
4. Contemporary Chemical Analysis - Judith F. Rubinson, Prentice Hall (India).

IV SEMESTER			
SBE 4	COMPUTERS IN CHEMISTRY (WITH C++)	11SECH41	
Hrs / Week : 3	Hrs / Sem : 45	Hrs / Unit : 9	Credit : 2

UNIT I – Basic concepts of C++

Objective: To study the basic concept of C++

Basic concepts of object oriented programming in C++ - Benefits of oops – Object oriented programming languages. Applications of oops. What is C++ - Applications of C++ - A simple program in C++ - More C++ statements. Structure of C++ program.

UNIT II – Tokens and Basic data types of C++

Objective: To know about tokens and data types of C++

Tokens – keywords – identifiers and constants – Basic data types – User Defined data types – Derived data types – symbolic constants – Type compatibility – Variables – Declaration of variables – Reference variables – Operators in C++ - Type cast operators – Manipulators – Expression and their types– operator overloading – operator precedence .

UNIT III – Class and function of C++

Objective: To understand about the class and the function of C++

Specifying a class – Defining member function – A C++ program with a class – Making an outside function inline – Nesting of member functions – Private member functions – Arrays with in a class – Memory allocation for objects – Static data members – static member function – Arrays of object – Object as function Arguments.

UNIT IV – Operator Overloading

Objective: To study about the operator overloading of C++

Defining operator overloading – overloading unary and binary operators – overloading binary operators using friends – Manipulation of strings using operators – Rules for Overloading – Type conversions. Single inheritance – Making a private member an inheritable – Multilevel inheritance – Multiple hybrid inheritance – Virtual Base, virtual function.

UNIT V – C++ programming

Objective: To solve the various problems in chemistry based on C++ program

Programming examples from chemistry – Determination of RMS, average and most probable velocities of gases – Calculation of ΔE , ΔW and ΔH for adiabatic expansion of a monoatomic ideal gas – Determination of normality, molarity, molality of solution – Calculation of pH and ionic strength of solution, half life period & average life period of radioactive nuclei, first order rate constant elevation of boiling point and depression of freezing point.

REFERENCE BOOKS:

1. Computers and their Application to Chemistry- Ramesh Kumari,2007; Narosa Publishing House, New Delhi.
2. Object oriented programming with C++ - E.Balaguruswamy,2008; The McGraw Hill Publishing Company Ltd., New Delhi.
3. Programming with C++ - D. Ravichandran, 2008; Tata McGraw Hill Publishing Company Ltd., New Delhi.
4. Trouble Free C++- H.M. Pandey, 2010; Ane Books Pvt. Ltd., New Delhi.
5. Computer in Chemistry- K.V. Raman, 2003; Tata McGraw Hill Publishing Company Ltd., New Delhi.

V SEMESTER			
SBE 5	INSTRUMENTAL METHODS OF ANALYSIS		11SECH51
Hrs / Week : 3	Hrs / Sem : 45	Hrs / Unit : 9	Credit : 2

UNIT I - Colorimetric and Spectrophotometric Analysis

Objective: To study the principle and instrumentation of colorimetry and flame photometry

Visible colorimetry – instrumentation – spectrophotometer. Fluorometry – principle – instrumentation and applications. Flame photometry – principle – instrumentation and applications. Nephelometry and turbidimetry - theory - instrumentation and applications.

UNIT II - UV Spectroscopy

Objective: To understand the idea about the principle and instrumentation of UV

UV spectroscopy – fundamental theoretical principles – chromophores – solvent effect – instrumentation. Woodward Fieser rule for calculating λ_{\max} for Conjugated dienes, α,β unsaturated ketones, Scott rules for calculating absorption maximum for Benzene and its simple derivatives (alcohol, aldehyde, ketone).

UNIT III - IR and NMR spectroscopy

Objective: To understand the idea about the principle and instrumentation of IR & NMR

IR spectroscopy – Principle and instrumentation – application in the determination of hydrogen bonding. NMR spectroscopy – principle – instrumentation – applications in the determination of hydrogen bonding – MRI - C^{13} NMR (principle only).

UNIT IV - Mass Spectrometry

Objective: To study the principle, instrumentation and application of mass spectra

Mass spectrometry - principle – components of a mass spectrometer – recording of a mass spectrum. Types of ions produced in a mass spectrometer. General rules for interpretation of mass spectra – examples of mass spectra (1-Heptene, alkane, alcohols, and ketones).

UNIT V - Atomic absorption and Photo electron spectroscopy

Objective: To study the principle and instrumentation of AAS. To study the theory of photoelectron spectroscopy

Atomic absorption spectroscopy – basic principles – instrumentation – interference - application in Cr in steel and Ca in blood serum – Photo electron spectroscopy – Theory only.

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.
3. Contemporary Chemical Analysis - Judith F. Rubinson, Prentice Hall(India).
4. Spectroscopy- G.R. Chatwal, 2004; Himalaya Publishing House, New Delhi.

VI SEMESTER			
SBE - 6	NANOSCIENCE AND NANOTECHNOLOGY		11SECH61
Hrs / Week : 3	Hrs / Sem : 45	Hrs / Unit : 9	Credit : 2

Unit I - Basic principles of Nanoscience

Objective: To study the principles of Nanoscience

Nano – Definition, classification of Nanostructures – Quantum structure, size and dimension factors – Fermi Electrons – Artificial Atoms – Effects - Processing – Top-down and Bottom-up process

Unit II - Fabrication of Nanomaterials

Objective: To study the synthesis of some Nanomaterials

Physical methods: Inert gas condensation, Arc discharge, RFplasma, Ion sputtering, Laser pyrolysis, Ball Milling, Chemical vapour deposition method and Electro deposition

Chemical methods: Chemical precipitation and co-precipitation; Metal nanocrystals by reduction, Sol-gel synthesis; Microemulsions or reverse micelles, Solvothermal synthesis; Thermolysis routes, Microwave heating synthesis; Sonochemical synthesis.

Unit III - Characterization and properties of Nanomaterial

Objective: To study the properties of Nanomaterials

Characterization – structure of Nano materials – X-ray diffraction studies- SEM, TEM and AFM(Principle only). Properties of Nanomaterials – Optical, electrical, mechanical, magnetic properties – Redox properties – Surface plasma

Unit IV - Nanocomposites and Nanoclusters

Objective: To understand the idea about Nanocomposites and Nanoclusters

Nanocomposites: An Introduction: Types of Nanocomposite (i.e. metal oxide, ceramic, glass and polymer based); Core-Shell structured nanocomposites. Synthesis and applications of Superhard Nanocomposite: Nanocluster – Free cluster, semiconductor cluster and molecular cluster.

Unit V - Carbon Nano tubes and Application of Nanotechnology

Objective: To study CNT and various Nanotechnological applications

Carbon Nano tubes-Types– Single and multiple wall CNT- applications. Fullerenes-Synthesis, properties and applications of C₆₀. Application of Nanotechnology in various field – Nanobiology – Nanocatalyst – Nanoelctronics – Nanomachines – Nano medicines.

REFERENCE BOOKS:

1. Solid State Chemistry and its Applications; Anthony R. West, 1989; John Wiley & Sons New Delhi.
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. Nanochemistry- A Chemical Approach to Nanomaterials, 2005; Royal Society of Chemistry, Cambridge UK.
5. Nanocomposite science and technology – P.M. Ajayan, L.S. Schadler, P.V. Braun, Wiley, New York.
6. Chemistry of nanomaterials: Synthesis, properties and applications by CNR Rao et.al.
7. Nanoscience and technology – V.S. Muralidharan & A. Subramania – Ane Books pvt Ltd, New Delhi

PART IV – NON MAJOR ELECTIVE			
III SEMESTER			
NME-1	WATER ANALYSIS		11NECH31
Hrs/ Week : 3	Hrs/ Sem: 45	Hrs/ Unit: 9	Credit: 2

UNIT I- Water pollution

Objective: To study the different types of water and pollution

Hydrosphere- sources of water- Hydrological cycle- Water pollution- Sources of water pollution- Types of water pollutants- Organic pollutants. Inorganic pollutants, Suspended solids and sediments, Radioactive materials and Heat-Eutrophication and its effects.

UNIT II- Water Analysis-I

Objective: To study the water quality standards and organic constituents of water

Sample collection- Water quality- potable water- characteristics – water quality standards for drinking water by WHO and ICMR- Water quality standard for effluents (WHO)- Determination of DO, BOD & COD and its significance.

UNIT III- Water Analysis- II

Objective: To study the physic- chemical characteristics of water.

Determination of pH, EC, turbidity, total solids, total dissolved (TDS), Total settleable solids, alkalinity, acidity, total hardness and calcium and magnesium hardness, estimation of iron.

UNIT IV- Waste Water treatment

Objective: To study the waste water treatment techniques

Waste water treatment – preliminary and primary treatment (screening, skimming, sedimentation, coagulation)- Secondary treatment (oxidation ponds, anaerobic digestion)- Tertiary treatment (adsorption, ion-exchange, reverse osmosis, electro dialysis)- Treatment of water for municipal purposes- Domestic sewage and industrial effluents treatment.

UNIT V- Industrial effluents

Objective: To study the sources, characteristic, effects and treatments of effluents from some typical industries.

Waste water from typical industries- tannery, pulp and paper mill, Petrochemicals, Dairy, sugar mill, textile, fertilizer and electroplating- sources, characteristics, effect and treatment option.

Reference Books:

1. Environmental Science and Biotechnology- A.G. Murugesan et al
2. Environmental Chemistry- B.K.Sharma
3. Environmental Chemistry- A.K.De
4. Environmental Chemistry and pollution control- S.S. Dara
5. Environmental technology- J.A. Nathanson et al
6. ICMR Drinking water guidelines, serial no 44:22 (1975)
7. WHO guideline for drinking water quality- Geneva (1985)
8. Environmental Chemistry laboratory manual- R. Gopalan and amrita anand
9. NEERI lab. Manual on water analysis National environmental engineering research institute, Nagpur

PART IV – NON MAJOR ELECTIVE			
IV SEMESTER			
NME-2	APPLIED CHEMISTRY		11NECH41
Hrs/ Week : 3	Hrs/ Sem: 45	Hrs/ Unit: 9	Credit: 2

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- Advantage of catalytic cracking – Octane number- Antiknock agents- Unleaded petrol- Cetane number- Anti diesel knock agents- petrochemicals (Direct & indirect) – Catalysts used in petroleum industry - Indian petroleum industry- Resources- Quality- distribution- future

UNIT II – Plant nutrients/ 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 - mixed fertilizer- Biofertilizer.

UNIT III – Chemicals in Day –to-day life

Objective: To study about the important chemicals used in our life

Preparation and uses of i) Tooth powder ii) Tooth paste iii) boot polish iv) gum paste v) sealing wax vi) Writing ink vii) chalk crayons viii) agar battis ix) talcum powder x) liquid blues xi) candles xii) phenole xiii) moth balls xiv) camphor tablets.

UNIT IV – Soaps, detergents and disinfectants

Objective: To study the preparation of soap, detergents and disinfectants

Soaps- Different types- raw materials- manufacture of soaps (Toilet, transparent and liquid soaps)- detergents- different types with examples. Antiseptic and disinfectants- Distinction- various types of disinfectants- structure and application of phenol, dettol, Lysol, gentian violet, benzalkonium chloride, cetyl pyridinium chloride, formalin and chloramine-T.

UNIT V- Pharmaceutical Chemistry

Objective: To study the preparation of some important drugs we use

Structure and uses of the following compounds:

Antacids – Magnesium trisilicates, milk of magnesia

Antifungal- Griseofulvin

Emetic- Tartaremetic

Haematonics- Ferrous gluconate

Analgesic and antipyretic- Aspirin and paracetamol

Drug- Diazepam

Antianaemic drugs- example- cardiovascular drugs- Antianginal drugs-

Vasodilators-Cancer- causes – Antineoplastic drugs.

Reference Books:

1. Industrial Chemistry- B.K. Sharma,2003, Goel Publishing House, Meerut.
2. Industrial Chemistry- Faith et al, Wiley interscience, Newyork.
3. Applied Chemistry- Four authors
4. Pharmaceutical Chemistry- Jayasree Ghosh