

**Sacred Heart College (Autonomous)**

**Department of Chemistry**

**MSc Chemistry**

**Course Plan**

**Academic Year 2014 – 15**

**Semester 3**

**COURSE PLAN****ACADEMIC YEAR 2014-15**

<b>PROGRAMME</b>	:	MSc Chemistry	<b>LECTURE HOURS</b>	:	72
<b>SEMESTER</b>	:	III	<b>CREDITS</b>	:	4
<b>SUBJECT TITLE</b>	:	<b>Structural Inorganic Chemistry</b>	<b>SUBJECT CODE</b>	:	<b>CH3C09</b>
<b>COURSE TEACHERS</b>	:	Dr. Joseph John, Mr. Midhun Dominic C D, Mr. Senju Devassykutty, Dr.Ramakrishnan			
<b>Instructional Hours</b>	:	4			

Sessions	Topic/Module	Method of teaching *
1-3	<b>Unit 1: Solid State Chemistry (18 hours) (JJ)</b> Structure of solids: Imperfections in solids-point defects, line defects and plane defects.	Conventional Teaching
4-6	Structure of compounds of AX (Zinc blende, Wurtzite), AX <sub>2</sub> (Rutile, fluorite, antiferite), A <sub>m</sub> X <sub>2</sub> (Nickel Arsenide), ABX <sub>3</sub> (Perovskite, Ilmenite). Spinel structures. Inverse spinel structures.	Conventional Teaching ICT
7-8	Solid state reactions-diffusion coefficient, mechanisms, vacancy diffusion,	Conventional Teaching
9-10	thermal decomposition of solid-Type I reactions, Type II reactions.	Conventional Teaching
11-13	Phase transition in solids: classification of phase transitions-first and second order phase transitions,	Conventional Teaching
14-16	Martensitic transformations, order-disorder transitions and spinodal decomposition. Kinetics of phase transitions, sintering.	Conventional Teaching Assignment

17-18	Growing single crystals-crystal growth from solution, growth from melt and vapor deposition technique.	Conventional Teaching
1-2	<b>Unit 2: Electrical, Magnetic and Optical Properties (18 Hrs) (MD)</b> Kronig-Penney model, Free electron theory	Conventional Teaching
2-6	Zone theory and MO theory of solids. Energy bands-conductors and non-conductors, intrinsic and extrinsic semiconductors	Conventional Teaching
7	Electrons and holes. Mobility of charge carriers. Hall Effect.	Conventional Teaching
8-9	Pyroelectricity, piezo electricity and ferro electricity. Conductivity of pure metals.	Conventional Teaching ASSIGNMENT
10-11	Magnetic properties of transition metal oxides, garnets, spinels, ilmenites and perovskites, magnetoplumbites.	Conventional Teaching
12	Optical properties-photoconductivity, photovoltaic effects, luminescence. Applications of optical properties	Conventional Teaching ICT
13-14	Super conductivity-Type I and Type II superconductors, Frolich diagram, Cooper pairs, theory of low temperature super conductors, junctions using superconductors,	Conventional Teaching

15-16	BCS theory of superconductivity (derivation not required). Super conducting cuprates - YBaCu oxide system, Meisner effect, conventional superconductors, organic superconductors	Conventional Teaching
17-18	fullerenes, carbon nanotubes, high temperature superconductors	Conventional Teaching
1-2	<b>Unit 3: Inorganic Chains and Rings (18 Hrs) (SD)</b>  Chains - catenation, heterocatenation.	Conventional Teaching
3-4	Silicate minerals. Structure of silicate common silicates, silicates containing discrete anions, silicates containing infinite chains, silicates containing sheets, framework silicates.	Conventional Teaching
5	Silicones. Zeolites synthesis, structure and applications.	Conventional Teaching
6-7	Isopoly acids of vanadium, molybdenum and tungsten.	Conventional Teaching
8	Heteropoly acids of Mo and W.	Conventional Teaching
9	Condensed phosphates-preparation, structure and applications. Phosphate esters in biological systems.	Conventional Teaching ICT

10	Polythiazil-one dimensional conductors	Conventional Teaching
11	Rings-topological approach to boron hydrides, Styx numbers	Conventional Teaching
12-13	Structure and bonding in borazines, ring silicates and silicones,	Conventional Teaching ASSIGNMENT II
14	phosphorous-nitrogen compounds, phosphazenes.	Conventional Teaching
15-16	Heterocyclic inorganic ring systems-structure and bonding in phosphorous-sulphur and sulphur-nitrogen compounds.	Conventional Teaching
17-18	Homocyclic inorganic ring systems-structure and bonding in sulphur, selenium and phosphorous compounds.	Conventional Teaching
1-2	<b>Unit 4: Inorganic Cages and Metal Clusters (9 Hrs)(RKS)</b>  Cages: synthesis, structure and bonding of cage like structures of phosphorous.	Conventional Teaching ICT
3-4	Boron cage compounds-Wade Mingos Lauher rules, MNO rule	Conventional Teaching
5	boranes,carboranes, metallacarboranes.	Conventional Teaching

6-7	Metal clusters: dinuclear compounds of Re, Cu and Cr, metal-metal multiple bonding in $(Re_2X_8)_2$	Conventional Teaching
8	trinuclear clusters, tetranuclear clusters, hexanuclear clusters.	Conventional Teaching
9	Polyatomic zintl anion and cations. Infinite metal chains.	Conventional Teaching
1-2	<b>Unit 5: Chemistry of Materials (9 Hrs)(RKS)</b>  Glasses, ceramics	Conventional Teaching
3	composites	Conventional Teaching
4-5	nanomaterials-preparative procedures. Sol-gel synthesis,	Conventional Teaching
6	glassy state-glass formers and glass modifiers,	Conventional Teaching
7	ceramic structures mechanical properties,	Conventional Teaching
8	clay products,	Conventional Teaching
9	refractories- characterizations, properties and applications.	Conventional Teaching Assignment

### References

01. L.V. Azaroff, Introduction to Solids, Mc Graw Hill, 1984.
02. A.R. West, Solid State Chemistry and its Applications, Wiley-India, 2007.

03. D.K. Chakrabarty, Solid State Chemistry, New Age Pub., 2010.
04. D.M. Adams, Inorganic Solids: An Introduction to Concepts in Solid State Structural Chemistry, Wiley, 1974.
05. C.N.R. Rao, K.J. Rao, Phase Transitions in Solids, McGraw Hill, 2010.
06. B.E. Douglas, D.H. McDaniel, J.J. Alexander, Concepts and Models of Inorganic Chemistry, 3<sup>rd</sup> Edn., John Wiley & sons, 2006.
07. A. Earnshaw, Introduction to Magnetochemistry, Academic Press, 1968.
08. J.E. Huheey, E.A. Keiter, R.L. Keiter, Inorganic Chemistry Principles of Structure and Reactivity, 4<sup>th</sup> Edn., Harper Collins College Pub., 1993.



**COURSE PLAN****ACADEMIC YEAR 2014-15**

<b>PROGRAMME</b>	:	<i>M.Sc. Chemistry</i>	<b>LECTURE HOURS</b>	:	72
<b>SEMESTER</b>	:	3	<b>CREDITS</b>	:	4
<b>SUBJECT TITLE</b>	:	<i>Organic Syntheses</i>	<b>SUBJECT CODE</b>	:	<i>CH3C10</i>
<b>COURSE TEACHERS</b>	:	<i>Dr. V.S. Sebastian (VSS) ; Dr. Franklin J (FJ) ; Dr. Grace Thomas (GT) ; Dr. Ignatious Abraham (IGA); Dr. June Cyriac (JUC)</i>			
<b>Instructional Hours</b>	:				

GT	No. of Session	Session Topic and Discussion Theme	Value additions		
<i>UNIT 1 : Organic Synthesis via Oxidation and Reduction</i> (18 hours)	1	Survey of organic reagents and reactions in organic chemistry with special reference to oxidation and reduction.			
	2	Metal based and non-metal based oxidations of alcohols to carbonyls (Chromium, Manganese)			
	3	Metal based and non-metal based oxidations of alcohols to carbonyls (aluminium and DMSO based reagents)	ICT		
	4	alkenes to epoxides (peroxides/per acids based)-			
	5	Sharpless asymmetric epoxidation,			
	6	Jacobsen epoxidation, Shi epoxidation			
	7	alkenes to diols	Assignment No:2		
	8	(Manganese and Osmium based)-Prevost reaction			
	9	Woodward modification			
		<b>FIRST INTERNAL EXAMINATION</b>			
		<b>Text Books</b>	<ul style="list-style-type: none"> <li>❖ M.B. Smith, Organic Synthesis, 3rd Edn., Wavefunction Inc., 2010.</li> <li>❖ F.A. Carey, R. I. Sundberg, Advanced Organic Chemistry, Part A and B, 5th Edn., Springer, 2007.</li> <li>❖ W. Carruthers, I. Coldham, Modern Methods of Organic Synthesis, 4th Edn., Cambridge University Press, 2004.</li> <li>❖ J. Clayden, N. Greeves, S. Warren, P. Wothers, Organic Chemistry, Oxford University Press, 2001. L. Finar, <i>Organic Chemistry</i> - Volume I &amp; II - Pearson Education.</li> </ul>		
	10	alkenes to carbonyls with bond cleavage (Manganese and lead based, ozonolysis)			
	11	alkenes to alcohols/carbonyls without bond cleavage			
	12	- hydroboration-oxidation, Wacker oxidation, selenium/chromium based allylic oxidation			

	13	ketones to ester/lactones- Baeyer-Villiger oxidation		
	14	. Catalytic hydrogenation (Heterogeneous: Palladium/Platinum/Rhodium and Nickel. Homogeneous: Wilkinson).		
	15	Metal based reductions- Birch reduction, pinacol formation, acyloin formation		
	16	Hydride transfer reagents from Group III and Group IV in reductions - LiAlH <sub>4</sub> ,.		
	17	DIBAL-H, Red-Al, NaBH <sub>4</sub> and NaCNBH <sub>3</sub> , selectrides		
	18	trialkylsilanes and trialkylstannane. Meerwein-Ponndorf-Verley reduction. Baker's yeast		
<b>SECOND INTERNAL EXAMINATION</b>				
<b>Text Books</b>	<ul style="list-style-type: none"> <li>❖ M.B. Smith, Organic Synthesis, 3rd Edn., Wavefunction Inc., 2010.</li> <li>❖ F.A. Carey, R. I. Sundberg, Advanced Organic Chemistry, Part A and B, 5th Edn., Springer, 2007.</li> <li>❖ W. Carruthers, I. Coldham, Modern Methods of Organic Synthesis, 4th Edn., Cambridge University Press, 2004.</li> <li>❖ J. Clayden, N. Greeves, S. Warren, P. Wothers, Organic Chemistry, Oxford University Press, 2001. L. Finar, <i>Organic Chemistry</i> - Volume I &amp; II - Pearson Education.</li> </ul>			

**FJ**

<i>Unit II</i>	<b>No. of Sessions</b>	<b>Session Topic and Discussion Theme</b>	<b>Value additions</b>		
<i>Modern Synthetic Methods and Reagents (18 Hours)</i>	1	Baylis-Hillman reaction,			
	2	Henry reaction, Nef reaction,			
	3	Kulinkovich reaction, Ritter reaction,			
	4	Sakurai reaction, Tishchenko reaction, Ugi reaction,			
	5	Noyori reaction. Brook rearrangement.			
	7	Tebbe olefination.			
	8	Metal mediated C-C and C-X coupling reactions: Heck,			
	9	Stille,			
	10	Suzuki,			
	<b>1<sup>st</sup> Internal Examination</b>				
	11	Suzuki-Miyaura,			
	12	Negishi-Sonogashira, Nozaki-Hiyama,	Power Point Presentation		
	13	Buchwald-Hartwig, Ullmann and Glaser coupling reactions.			
	14	Wohl-Ziegler reaction. Reagents such as NBS			
	15	DDQ and DCC			
	16	Gilman reagent.			
	<b>2<sup>nd</sup> Internal Examination</b>				
	17	Introduction to multicomponent reactions			
18	Click reaction				
<b>End Semester Examination</b>					

<i>Text Books</i>	<ul style="list-style-type: none"> <li>❖ M.B. Smith, Organic Synthesis, 3rd Edn., Wavefunction Inc., 2010.</li> <li>❖ J. Clayden, N. Greeves, S. Warren, P. Wothers, Organic Chemistry, Oxford University Press.</li> <li>❖ R.O.C. Norman, J.M. Coxon, Principles of Organic Synthesis, 3rd Edn., Chapman and Hall, 1993.</li> <li>❖ V.K. Ahluwalia, L.S. Kumar, S. Kumar, Chemistry of Natural Products, CRS</li> </ul>				
<b>JUC</b>					
<i>Unit III</i>	<b>No. of Sessions</b>	<b>Session Topic and Discussion Theme</b>	<b>Value additions</b>		
<b>Construction of Carbocyclic and Heterocyclic Ring Systems</b> (9 Hours)	1	Different approaches towards the synthesis of three, four, five and six-membered rings.			
	2	Photochemical approaches for the synthesis of four membered rings-oxetanes and cyclobutanes			
	3	ketene cycloaddition (inter and intra molecular), Pauson-Khand reaction,	Power Point Presentation		
	4	Volhardt reaction, Bergman cyclization,			
	5	Nazarov cyclization, Mitsunobu reaction,			
	6	cation-olefin cyclization and radical-olefin cyclization.			
	<b>1<sup>st</sup> Internal Examination</b>				
	7	Inter-conversion of ring systems (contraction and expansion)-Demjenov reaction			
	8	Reformatsky reaction. Construction of macrocyclic rings-ring closing metathesis.			
	9	Formation of heterocyclic rings: 5-membered ring heterocyclic compounds with one or more than one hetero atom like N, S or O - pyrrole, furan, thiophene, imidazole, thiazole and oxazole			
	<b>2<sup>nd</sup> Internal Examination</b>				

<i>Text Books</i>	<ul style="list-style-type: none"> <li>❖ M.B. Smith, Organic Synthesis, 3rd Edn., Wavefunction Inc., 2010.</li> <li>❖ F.A. Carey, R. I. Sundberg, Advanced Organic Chemistry, Part A and B, 5th Edn., Springer, 2007.</li> <li>❖ W. Carruthers, I. Coldham, Modern Methods of Organic Synthesis, 4th Edn., Cambridge University Press, 2004.</li> <li>❖ J. Clayden, N. Greeves, S. Warren, P. Wothers, Organic Chemistry, Oxford University Press, 2001.</li> <li>❖ R. Noyori, Asymmetric Catalysis in Organic Synthesis, John Wiley &amp; Sons, 1994.</li> </ul>
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<b>VSS</b>				
<i>Unit IV</i>	<b>No. of Sessions</b>	<b>Session Topic and Discussion Theme</b>	<b>Value additions</b>	
<i>Protecting group Chemistry (9 Hours)</i>	1	Protection and deprotection of hydroxy, carboxyl,		
	2	carbonyl, and amino groups. Chemo and regio selective protection and deprotection.		
	3	Illustration of protection and deprotection in synthesis.	Power Point Presentation	
	4	Protection and deprotection in peptide synthesis.		
	5	common protecting groups used in peptide synthesis,	Group Discussion	
	6	protecting groups used in solution phase and		
	7	solid phase peptide synthesis (SPPS).		
	8	Functional equivalence and reactivity Umpolung.		
	9	Role of trimethyl silyl group in organic synthesis		
<b>1<sup>st</sup> Internal Examination</b>				

<i>Text Books</i>	<ul style="list-style-type: none"> <li>❖ M.B. Smith, Organic Synthesis, 3rd Edn., Wavefunction Inc., 2010.</li> <li>❖ F.A. Carey, R. I. Sundberg, Advanced Organic Chemistry, Part A and B, 5th Edn., Springer, 2007.</li> <li>❖ W. Carruthers, I. Coldham, Modern Methods of Organic Synthesis, 4th Edn., Cambridge University Press, 2004.</li> <li>❖ J. Clayden, N. Greeves, S. Warren, P. Wothers, Organic Chemistry, Oxford University Press, 2001.</li> <li>❖ R. Noyori, Asymmetric Catalysis in Organic Synthesis, John Wiley &amp; Sons, 1994.</li> </ul>
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<b>COURSE PLAN</b>			
<b>ACADEMIC YEAR 2014-15</b>			
<b>PROGRAMME</b>	:	<i>M.Sc. Chemistry</i>	<b>LECTURE HOURS</b> : 72
<b>SEMESTER</b>	:	3	<b>CREDITS</b> : 4
<b>SUBJECT TITLE</b>	:	<i>Physical Chemistry</i>	<b>SUBJECT CODE</b> : CH3C11
<b>COURSE TEACHERS</b>	:	<i>Dr Jorphin Joseph, Dr Jinu George, Dr Ignatious Abrhaham, Dr Abi T G</i>	
<b>COURSE OBJECTIVES</b>	:	To understand the basic concepts in Surface Chemistry, Electrochemistry, Photochemistry and Chemical Kinetics	
<b>Instructional Hours</b>	:	4 HOURS/WEEK	

<b>IGA</b>				
<b>Unit V</b>	<b>No. of Sessions</b>	<b>Session Topic and Discussion Theme</b>	<b>Value additions</b>	
<b>Retrosynthetic Analysis</b> (9 Hours)	1	Basic principles and terminology of retrosynthesis: method.		
	2	synthesis of aromatic compounds, one group		
	3	two group C-X disconnections, one group C-C and two group C-C disconnections.		
	4	Amine and alkene synthesis: important strategies of retrosynthesis,		
	5	functional group transposition, important functional group interconversions.		
	6	important functional group interconversions,		
	7	Enantioselective synthesis of Corey lactone		
	8	longifolene and luciferin.		
	9	Umpolung equivalent – Peterson olefination, enolate formation, Ireland		
	<b>1<sup>st</sup> Internal Examination</b>			
<b>Unit VI</b>	<b>No. of Sessions</b>	<b>Session Topic and Discussion Theme</b>	<b>Value additions</b>	
<b>Biosynthesis and Biomimetic Synthesis</b> (9 Hours)	1	Basic principles of the biosynthesis of terpenes,		
	2	steroids, alkaloids,.		
	3	carbohydrates,		
	4	proteins and nucleic acids. e		
	5	Biosynthesis of cholesterol,		
	6	$\alpha$ - terpineol, morphine		
	7	glucose and phenyl alanine.		
	8	Biogenesis of isoprenoids and alkaloids.		
	9	Biomimetic synthesis of progesterone and spatrein		
<b>2<sup>nd</sup> Internal Examination</b>				
<b>Text Books</b>	<ul style="list-style-type: none"> <li>❖ M.B. Smith, Organic Synthesis, 3rd Edn., Wavefunction Inc., 2010.</li> <li>❖ F.A. Carey, R. I. Sundberg, Advanced Organic Chemistry, Part A and B, 5th Edn., Springer, 2007.</li> <li>❖ W. Carruthers, I. Coldham, Modern Methods of Organic Synthesis, 4th Edn., Cambridge University Press, 2004.</li> <li>❖ J. Clayden, N. Greeves, S. Warren, P. Wothers, Organic Chemistry, Oxford University Press, 2001.</li> </ul>			



	❖ R. Noyori, <i>Asymmetric Catalysis in Organic Synthesis</i> , John Wiley & Sons, 1994.
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	No. of Session	Session Topic and Discussion Theme	Value additions	
<b>UNIT 1 CHEMICAL KINETICS I</b> (14 hours)	1	<b>Theories of reaction rates:</b> Collision theory-steric factor, potential energy surfaces.		
	2	Conventional transition state theory-Eyring equation,		
	3	Comparison of the two theories.	Assignment	
	4	Thermodynamic formulation of the two theories.		
	5	Thermodynamic formulation of the reaction rates.		
	6	Significance of $\Delta G^*$ , $\Delta H^*$ and $\Delta S^*$ . Volume of activation.		
	7	Effect of pressure and volume on velocity of gas reactions.		
	8	<b>Introduction</b> to Molecular Reaction Dynamics		
	9	<b>FIRST INTERNAL EXAMINATION</b>		
<b>Text Books</b>	1.	J. Rajaram, J.C. Kuriakose, Kinetics and Mechanisms of Chemical Transformations, Macmillan India, 2000.		
	2.	K.J. Laidler, Chemical kinetics, 3 <sup>rd</sup> Edn. Harper & Row, 1987.		
	3.	C. Kalidas, Chemical Kinetic Methods: Principles of Fast Reaction Techniques and Applications, New Age International, 2005.		
	4.	J.W. Moore, R.G. Pearson, Kinetics and Mechanisms, John Wiley & Sons, 1981.		
	5.	P.W. Atkins, Physical Chemistry, ELBS, 1994.		
	10	<b>Lindemann-Hinshelwood mechanism</b>	ICT	

	11	Qualitative idea of RRKM theory		
	<b>No. of Session</b>	<b>Session Topic and Discussion Theme</b>	<b>Value additions</b>	
	12	Chain reactions, free radical and chain reactions		
	13	Steady state treatment, kinetics of H <sub>2</sub> -Cl <sub>2</sub> and H <sub>2</sub> -Br <sub>2</sub> reactions,	Group Discussion	
		<b>SECOND INTERNAL EXAMINATION</b>		
<b>CHEMICAL KINETICS - II (14 Hrs.)</b>	14	Rice –Herzfeld mechanism, Branching chains H <sub>2</sub> -O <sub>2</sub>		
	15	Semenov-Hinshelwood mechanism of explosive reactions.		
	16	<b>Kinetics of polymerization:</b> mechanism of step growth		
	17	Ionic and addition polymerization	PowerPoint presentation	
	18	Kinetics of anionic and cationic polymerization.	PowerPoint presentation	
<b>Unit III</b>	<b>No. of Sessions</b>	<b>Session Topic and Discussion Theme</b>	<b>Value additions</b>	
Unit 4: Nanotechnology and Green Chemistry	1	Basic principles of nanochemistry,.		
	2	methods of synthesis of nanomaterials, a brief study of carbon nanotubes, fullerenes, quantum dots and metal nanoparticles. Applications of nanomaterials in medicine: immunogold labelling,		
	3	applications in medical diagnosis,		
	4	nanobased drug delivery,		
	5	biomimetic nanotechnology,		
	6	DNA nanotechnology and structural biomimicry.		

<b>1<sup>st</sup> Internal Examination</b>				
	8	5.2 Principles of green chemistry		
	9	basic concepts, atom economy, twelve laws of green chemistry,	Power Point Presentation	
<i>Text Books</i>				
<b>No. of Sessions</b>	<b>Session Topic and Discussion Theme</b>		<b>Value additions</b>	
10	principles of green organic synthesis.			
11	5.3 Green alternatives of organic synthesis:		Power Point Presentation	
12	coenzyme catalysed reactions,		Power Point Presentation	
13	green alternatives of molecular rearrangements,			
14	electrophilic aromatic substitution reactions,		Group Discussion	
<b>2<sup>nd</sup> Internal Examination</b>				
15	oxidation-reduction reactions, clay catalysed synthesis,			
16	condensation reactions. Green photochemical reactions.			
17	Microwave assisted organic synthesis.		Individual Assignment: Various intermolecular forces	
18	5.4 Green chemistry in the pharmaceutical industry: Ibuprofen manufacture, biocatalysis.			
<p>Reference:</p> <p>Principles of green chemistry, basic concepts, atom economy, twelve laws of green chemistry, principles of green organic synthesis.</p> <p>5.3 Green alternatives of organic synthesis: coenzyme catalysed reactions, green alternatives of molecular rearrangements, electrophilic aromatic substitution reactions, oxidation-reduction reactions, clay catalysed synthesis, condensation reactions. Green photochemical reactions.</p> <p>Microwave assisted organic synthesis.</p> <p>5.4 Green chemistry in the pharmaceutical industry: Ibuprofen manufacture, biocatalysis.</p>				
<i>Unit IV</i>	<b>No. of Sessions</b>	<b>Session Topic and Discussion Theme</b>	<b>Value additions</b>	

<b>SURFACE CHEMISTRY AND COLLOIDS</b>	1	4.2 Spectroscopic techniques for probing solid surfaces			
	2	Temperature programmed desorption (TPD)			
	3	Reflection absorption infrared spectroscopy (RAIRS)			
	4	High resolution electron energy loss spectroscopy (HREELS).			
	5	4.3 Surface films -Introduction film pressure			
	7	criteria for spreading of one liquid on another			
	<b>1<sup>st</sup> Internal Examination</b>				
	8	<b>4.4 Adsorption from solutions</b>			
	9	Electrostatic adsorption, Gibbs adsorption isotherm (derivation) - verifications.	Power Point Presentation		
<b>Unit IV</b>	<b>No. of Sessions</b>	<b>Session Topic and Discussion Theme</b>	<b>Value additions</b>		
	10	<b>4.5 Colloids &amp; Micellar systems</b>			
	11	Types of colloids, Electrical properties of colloids	Power Point Presentation		
	12	Electrical double layer, zeta potential	Power Point Presentation		
	13	Miscelles, and miscellisation			
	14	Structure of miscelles - ionic miscelles.	Group Discussion		
<b>2<sup>nd</sup> Internal Examination</b>					
	15	➤ <b>5.1 Laws of Photochemistry:</b>			
	16	Grothus –Draper Law, Stark-Einstein's Law, Laws of light absorption, Quantum yield. Chemical actinometry			
	17	➤ Excimers and exciplexes, photosensitization	Individual Assignment: Various intermolecular forces		
	18	chemiluminescence, bioluminescence, thermo luminescence			

<i>Unit V</i>	<b>No. of Sessions</b>	<b>Session Topic and Discussion Theme</b>	<b>Value additions</b>		
<b>PHOTOCHEMISTRY</b>	1	pulse radiolysis, hydrated electrons, photo stationary state, dimerization of anthracene.			
	2	<b>5.2Photo physical processes in electronically excited molecules,</b>			
	3	Jablonsky diagram			
	4	Fluorescence and Phosphorescence.			
	5	Quenching of fluorescence and its kinetics			
	7	Stern-Volmer equation, static and dynamic quenching.			
	<b>1<sup>st</sup> Internal Examination</b>				
	8	Concentration quenching,			
	9	E-type and P-type. Effect of temperature on emissions,		Power Point Presentation	
	<b>No. of Sessions</b>	<b>Session Topic and Discussion Theme</b>	<b>Value additions</b>		
	10	Two photon absorption spectroscopy			
	11	Principle of utilization of solar energy	Power Point Presentation		
	12	Solar cells and their working.	Power Point Presentation		
	13	Photochemistry of vision.			
	14	delayed fluorescence,	Group Discussion		
	<b>2<sup>nd</sup> Internal Examination</b>				
	15	Numericals			
	16	Revision			
	17	Revision		Individual Assignment: Various intermolecular forces	
18	Revision				
<b>Text Books</b>	6.	D.A. McQuarrie, J.D. Simon, Physical chemistry: A Molecular Approach, University Science Books, 1997			
	8.	K.K. Rohatgi-Mukherjee, Fundamentals of Photochemistry, 2 <sup>nd</sup> Edn. New Age International, 1986.			
	9.	G. Aruldas, Molecular structure and Spectroscopy, PHI Learning, 2007.			
	10.	M.R Wright, An Introduction to Chemical Kinetics, John Interscience-2007			
	11.	A.W & Sons, Adamson, A.P. Gast, Physical chemistry of surfaces, 6 <sup>th</sup> Edn, John Wiley, 1997			
	12.	D.O. Cowan, R.L. Drisko, Elements of Organic Photochemistry, Plenum Press., 1976			

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Programme: **M Sc Chemistry**

Semester: III

Course: **CH3C12** Spectroscopic Methods In Chemistry

Term – I (Before I Internal tests) – 30 % of the syllabus					
Sl No	Topic/Module	Hour/session	Teacher/invited persons etc.	Method of teaching *	Remarks: Books, reference etc
1	<b>Unit 1: Drugs acting on ANS 1.1, 1.2, 1.3</b>	6 hrs	Dr Jorphin Joseph	Lecture ICT enabled	D.L. Pavia, G.M. Lampman, G.S. Kriz, Introduction to Spectroscopy
2	<b>Unit 2: Drugs acting on CVS</b>	6 hrs	Dr. Grace Thomas	Lecture ICT enabled	
3	<b>Unit 3: Chemotherapy 3.1, 3.2</b>	6 hrs	Midhun Dominic C D	Lecture ICT enabled	
4	<b>Unit 4: Antineoplastic Drugs</b>	6 hrs	Senju Devassykutty	Lecture	
5	<b>Unit 6: Miscellaneous class of compounds 6.1, 6.2</b>	6 hrs	June Cyriac	Lecture ICT enabled	

\*ICT enabled, Lecture method (conventional)

Term – II – 40 % of the syllabus ( before the second Internal tests)					
Sl No	Topic/Module	Hour/session	Teacher/invited persons etc.	Method of teaching *	Remarks: Books, reference etc
1	<b>Unit 1: Drugs acting on ANS 1.4, 1.5, 1.6</b>	6 hrs	Dr Jorphin Joseph	Lecture ICT enabled	W. Kemp, Organic Spectroscopy, 2 <sup>nd</sup> Edn
2		6 hrs	Dr. Grace Thomas	Lecture ICT enabled	



3	<b>Unit 3: Chemotherapy 3.3, 3.4</b>	6 hrs	Midhun Dominic C D	Lecture ICT enabled	
4		6 hrs	Senju Devassykutty	Lecture	
5	<b>Unit 6: Miscellaneous class of compounds 6-3, 6.4, 6.5</b>	6 hrs	June Cyriac	Lecture ICT enabled	

Term – III – 30 % of the syllabus (before the model examination)					
Sl No	Topic/Module	Hour/ session	Teacher/invited persons etc.	Method of teaching *	Remarks: Books, reference etc
1	<b>Unit 1: Drugs acting on ANS</b>	6 hrs	Dr Jorphin Joseph	Lecture ICT enabled	R.M. Silverstein, G.C. Bassler, T.C. Morril, Spectroscopic Identification of Organic Compounds, 5 <sup>th</sup> Edn.,
2		6 hrs	Dr. Grace Thomas	Lecture ICT enabled	
3	<b>Unit 3: Chemotherapy 3.5</b>	6 hrs	Midhun Dominic C D	Lecture ICT enabled	
4		6 hrs	Senju Devassykutty	Lecture	
5	<b>Unit 6: Miscellaneous class of compounds 6.6, 6.7</b>	6 hrs	June Cyriac	Lecture ICT enabled	