STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 86

M.Sc. DEGREE BRANCH - IV : CHEMISTRY

COURSES OF STUDY

(Effective from the academic year 2011 - 2012)

CREDIT BASED SYSTEM

Subject Code	Title of Course	Credits	Total Teaching			Exam Hours	Continuous Assessment	End Semester	Maximum Marks
			Lecture Hours	Tutorial Hours	Practical Hours				
Semester - I									
11CH/PC/OM14	Organic Reaction Mechanisms and Stereochemistry	4	4	1	0	3	50	50	100
11CH/PC/SI14	Structural Inorganic Chemistry	4	4	1	0	3	50	50	100
11CH/PC/RM14	Research Methodology	4	3	0	2	3	50	50	100
11CH/PC/P114	Inorganic Qualitative and Quantitative Analysis - Practical	4	0	0	6	6	50	50	100
11CH/PE/IM14	Industrial Waste Management	4	4	0	0	3	50	50	100
OR									
11CH/PE/PM14	Polymer Materials and Applications	4	4	0	0	3	50	50	100
11CH/PA/FW12	Food Adulteration and Water Pollution	2	2	0	0	-	50	-	100
Semester - II									
11CH/PC/AI24	Analytical Instrumentation	4	4	1	0	3	50	50	100
11CH/PC/QG24	Quantum Chemistry and Group Theory	4	4	1	0	3	50	50	100
11CH/PC/P222	Analytical Instrumentation - Practical	2	0	0	3	3	50	50	100
11CH/PC/P324	Organic Separation and Analysis - Practical	4	0	0	6	6	50	50	100
11CH/PK/SS22	Soft Skills	2	2	0	0	-	50	-	100
Semester - III									
11CH/PC/MS34	Molecular Spectroscopy	4	4	1	0	3	50	50	100
11CH/PC/PC34	Advanced Physical Chemistry	4	4	1	0	3	50	50	100
11CH/PC/P434	Organic Synthesis and Purification - Practical	4	0	0	6	6	50	50	100
11CH/PC/P532	Physical Chemistry - Practical	2	0	0	3	3	50	50	100
11CH/PE/BC34	Biochemistry	4	4	0	0	3	50	50	100
11CH/PN/SI32	Summer Internship	2	-	-	-	-	50	-	100
Semester - IV									
11CH/PC/CO44	Coordination Chemistry	4	4	1	0	3	50	50	100
11CH/PC/SO44	Synthetic Organic Chemistry and Natural Products	4	4	1	0	3	50	50	100
11CH/PC/DI48	Dissertation	8	0	0	12	-	50	50	100
11CH/PE/NC44	Nanochemistry	4	4	0	0	3	50	-	50
Offered to Other Departments									
11CH/PE/ES24	Entrepreneurial Skills	4	4	0	0	3	50	50	100
11CH/PE/MH34	Medicines and Healthcare	4	4	0	0	3	50	50	100
Independent Study Courses									
11CH/PI/IC24	Industrial Chemistry and Management	4	-	-	-	3	-	50	100
11CH/PI/NP24	Chemistry of Natural Products	4	-	-	-	3	-	50	100

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600086

M.Sc DEGREE: BRANCH IV- CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 - 2012)

ORGANIC REACTION MECHANISMS AND STEREOCHEMISTRY

CODE:11CH/PC/OM 14

CREDITS : 4
L T P : 4 1 0
TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE

- To understand the importance of reaction intermediates
- To emphasize the importance of stereo chemical changes in transformations
- To suggest mechanism for a given reaction.

Unit 1 **(15 hrs)**

Study of reaction Mechanisms

1.1 Thermodynamic and kinetic requirements of reactions: Baldwin rules for ring closure. Hammond postulate, microscopic reversibility and Marcus theory.

1.2 Quantitative relationships between molecular structure and chemical reactivity- Hammett and Taft equations.

1.3 Methods of determining mechanism-identification of products and intermediates, isotopic labeling, stereochemical evidences, isotopic effects, trapping of intermediates and cross-over experiments.

Unit 2 **(15 hrs)**

Name reactions of synthetic importance

2.1 Condensation- Aldol, Perkin, Stobbe, Dieckmann, Claisen , Mannich

2.2 Addition- Grignard, Diels-Alder, Michael, hydroboration, Robinson Annulation, Woodward and Prevost hydroxylation, Reformatsky, Stork enamine reactions

2.3 Substitution- Chichibabin, Friedel-Crafts, Vilsmeier-Haack, Reimer-Tiemann, Gatterman-Koch, Hoesch, Bischler-Napieralski, Hunsdiecker, Fries, Sommelet-Hauser rearrangements

2.4 Elimination- Peterson synthesis, Shapiro ,Cope

2.5 Reduction- Birch, Wolff Kishner, Clemmenson and selective reduction of 4-tert-butyl cyclohexanone using selectrides-hydride reduction

2.6 Oxidation- Oppenaeur, Swern, Baeyer Villiger, SeO_2 (methylene to carbonyl), allylic oxidation of olefins, Cr(VI) reagents, oxidation of aryl methanes.

(Stereochemical aspects to be studied wherever necessary)

Unit 3 **(13hrs)**

Reactive intermediates

3.1 Formation, stability, reactions and rearrangements
- Carbocations (Wagner Meerwein rearrangements)
- Carbanions (Wittig, Favorski rearrangement)
- Carbene(Skattebol , Wolff rearrangement, Insertion of C-H and X-H bonds),
- Nitrenes (Hofmann, Schmidt, Lossen, Curtius, Beckmann rearrangements),
- Carbon radicals (acyloin condensation,Dimerisation, Mc Murry reactions)
- Arynes (Dimerisation reactions)

3.2 Neighbouring group participation and non classical carbonium ion.

Unit 4 **(8hrs)**

Aromaticity

4.1 Huckel's rule , Antiaromaticity. Diatropic and paratropic behaviour (in NMR).

4.2 Benzenoid and non-benzenoid aromatics, homo aromatic and pseudoaromatic compounds.

4.3 Aromaticity in Annulenes, Heteroannulenes, and fullerenes

Unit 5 **(14 hrs)**

Stereochemistry and Conformational Analysis

5.1 Concept of chirality, asymmetry and dissymmetry, D/L and R/S nomenclature, optical activity of allenes, biphenyls and spiro compounds. Identification of diastereotopic ligands and faces and prochiral carbons and nomenclature of enantiotopic hydrogens.

5.2 Erythro and threo nomenclature.Interconversion of Fischer, Sawhorse and Newmann projection.

5.3 Geometrical isomers (E/Z notation). Geometrical and optical isomerisms of disubstituted cyclopropane, cyclobutane and cyclopentane.

5.4 Conformation, stability and reactivity in mono and di-subsituted cyclohexanes, and decalins (9 methyldecalin)

5.5 Stereospecific and stereoselective reactions-syn and anti (addition and elimination)

5.6 Asymmetric synthesis- Cram's and Prelog's rules, Sharpless asymmetric epoxidation

Self study to be tested internally

- Aromatic electrophilic substitution mechanism, orientation and directing effect of substituents in benzene, naphthalene, pyrrole, furan, thiophene , pyridine and
  Indole.

- S_N1, S_N2,S_Ni, E_1, E_2, E_{1CB}-mechanisms

BOOKS FOR REFERENCE

Ahuliwalia V.K. & Parashar R.K. Organic Reaction Mechanism**,** New Delhi :Narosa Publishing House, 2002.

Buxton S.R. and Roberts S.M. Guide to Organic Stereo Chemistry, London: Orient Longman publications, 1990.

Eliel E.L. Stereochemistry of organic compounds**,** New York :John Wiley & sons, 1997.

Finar I.L., Organic Chemistry, Volume II, 5th ed., London: ELBS, 1980.

Graham Solomons T.W. and Craig B. Fryhle. Organic Chemistry, 7th ed. New York: John Wiley & Sons, 2000.

Jagadamba Singh, Yadav.L.D.S., Advanced Organic Chemistry, Meerut: Pragati Prakashan, 2010

Kalsi P.S., Stereochemistry, 4th ed. New Delhi: New Age Publishers, 2006.

Moody C.J. Witham G.H. Organic Reactive Intermediates**,** New York : Oxford Chemistry Printers, 1992.

Nasipuri D. Stereochemistry of Organic Compounds – Principles and Applications, New Delhi: Wiley Eastern, 1992.

Raj K. Bansal, Organic reaction mechanism , 3rd ed. New Delhi, Tata McGraw-Hill.2006.

END SEMESTER EXAMINATION:

Total Marks: 100 Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 20 x 1 = 20 Marks (All questions to be answered, questions to be of objective type: MCQ'S, fill in the blanks, T/F, Match and answer in a line or two)

Section B – 5 x 8 = 40 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 3 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE: BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 - 2012)

RESEARCH METHODOLOGY

CODE: 11CH/PC/RM 14

CREDITS : 4

L T P : 3 0 2

TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE

- To expose students to the developing avenues in Chemistry
- To give a training in seminars, group work ,communication and thesis writing.
- To equip the students to use computing techniques in solving problems, visualise and draw the molecules.
- To enable them to simulate spectral data for the given molecules using online data.

Unit 1 **(10hrs)**

Chemical Literature

1.1 Sources of Chemical information – primary, secondary and tertiary sources.

1.2 Indexes and abstracts in science and technology. Chemical abstracts, chemical titles, current chemical reactions, current chemical contents Science citation index and impact factor.

1.3 Online Literature Search- Sci finder and science direct

Unit 2 **(10hrs)**

Research reports and Thesis writing

2.1 The art of Scientific Writing – Forms of scientific writing, Research reports, Theses, Journals articles and books.

2.2 Format of research report- Chemical nomenclature, quantities, figures, tables, footnotes / notes, heading, pagination, citations& bibliography, proof reading.

2.3 Plagiarism, copyright and Patent Laws.

2.4 Academic writing skills- APA and MLA writing format

***Unit 3** **(15hrs)**

Topics on New Frontiers in chemistry

3.1 Chemistry and Nature - Green Chemistry, Astrochemistry, Herbal Chemistry, Phytochemistry,

3.2 Synthetic Chemistry - Medicinal Chemistry, Supra molecular Chemistry, Macrocyclic Chemistry,

3.3 Material Science - Nanotechnology, Nano clusters , Nano dendrimers, Photo electronoics, Cheminformatics.

Unit 4 **(15hrs)**

MS Excel and mathematical concepts in chemistry

4.1 Components of Excel – Spreadsheets, database, chart and building up workbooks.

4.2 Building formulae user mode and statistical functions, formatting cells

4.3 Managing and organizing data - creating link, analyzing data.

4.4 Plotting data - Evaluation of analytical functions, transferring data and graph interpretation

4.5 Solving problems from physcial chemistry (chemical kinetics, phase rule, Lother Meyer Graph of atomic volume, entropy ,heat capacity Calculations), analytical chemistry (statistical problems)

4.6 Simple functions and graphs, plotting exercises on most useful functions in chemistry-the exponential, the Gaussian, polynomial functions used in chemistry.

Unit 5 **(15 hrs)**

Computational techniques in chemistry

5.1 Chemdraw -Writing chemical equation schemes using software, editing, transporting picture to word document.

5.2 Building molecules, measurement of bond angles, bond energy and bond length.

5.3 Energy minimization techniques- Basic concepts and simple applications to geometry and molecular properties such as dipole moments and thermochemical properties.

5.4 Basics of molecular mechanics - force fields, potential model for bond stretching, bending, dihedral angles.

5.5 Use of Internet in chemical research-spectral, data simulated results from web sources.

* Unit 3- Seminar Presentation – tested internally

Self study to be tested internally

- To collect list of journals, reviews etc.,
- To take papers of articles from journals for understanding the formatting of a research paper
- To use chem. 3D pro to understand the structures of molecules.
- To use matlab for the study of eigen value, eigen function & schrodinger wave equation.

BOOKS FOR REFERENCES

Gopalan R. Thesis writing**.** Chennai : Vijay Nicole Imprints Private Ltd., 2005.

Janet C. Dodds. The ACS Style Guide – A Manual for Authors and Editors**.** American Chemical Society Publishers, 1998.

Jerry March. Advanced Organic Chemistry. 4th ed. New York: Wiley Interscience Publications, 1992.

Nature, Science, Chemistry in Britain and other journals, magazines, (2000–till date)

Carley, A.F. and P.H., Morgan. Computational Methods in Chemical Sciences**.** Chi Chester: Ellis Horwood Ltd., 1989.

Christopher J. Cramer. Essentials of Computational Chemistry**.** Theories and Models. 2nd ed. Wiley, 2004.

Johnson, K.J. Numerical Methods in Chemistry**.** New York: Marcel Dekkar, 1980.

Leach A. R. Molecular Modeling Principles and Practice. 2nd ed**.** Prentice-Hall, 2001.

Lewars Errol. Computational Chemistry-Introduction to the theory and applications of molecular and Quantum Chemistry**.**.NY: First Education Springer 2003, Indian Education, 2006.

Softwares:
Data Management/Mining -CHED, ChemFileBrowser, ChemTK,ChemTree, DiscoveryCenter;

Drawing and Nomenclature-ChemDraw Net Plugin, ChemInnovation

<http://www.ndsu.nodak.edu/qsar_soc/resource/software.htm>

END SEMESTER EXAMINATION:

Total Marks: 100 Duration: 3 Hours

QUESTION PAPER PATTERN

Theory - 1½ hours – 50 marks (Unit 1, 2, 4 and Unit 5)

Section A – 10 x 2 = 20 Marks (10 out of 12 to be answered)
Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Practical - 1½ hours – 50 marks (Unit 4 and Unit 5)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086
M.Sc. DEGREE : BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 - 2012)

INORGANIC QUALITATIVE AND QUANTITATIVE ANALYSIS - PRACTICAL

CODE :11CH/PC/P1 14

CREDITS : 4
L T P : 0 0 6
TOTAL HOURS : 78

Unit 1

Semimicro Qualitative Analysis

Analysis of four cations- two rare cations and two common cations- in a salt mixture.

Unit 2

Quantitative Analysis
Complexometry : Estimation of Mg^{2+}, Zn^{2+}, Ca^{2+} and Ni^{2+}
Cerimetry : Estimation of Fe^{2+} / Oxalic acid
Determination of Chlorine in bleaching powder.

Unit 3

Preparation of Inorganic Complexes
Tetraammine copper (II) sulphate
Tris (thiourea) copper (I) sulphate
Hexammine cobalt (III) chloride
Bis (acetylacetanato) (II) / Bis (acetylacetanato) nickel (II)

A comprehensive viva will be conducted during the practical hours.

BOOKS FOR REFERENCE

Ramanujam V.V. Inorganic Semimicro Qualitative Analysis**.** Chennai: National Publishing House, 1995.

Mendham J. Denny R.C., Barnes J.D. and Thomas M, Vogel's Text Book of Quantitative Chemical Analysis. 6th Ed., London: Pearson Education Ltd., 2002.

END SEMESTER EXAMINATION

Total Marks : 100 Duration: 6 hours

- **Inorganic complex preparation** : **15 Marks**

  Preparation – quantity & quality [10]

  Procedure & Structure of the complex [5]

- **Semi micro qualitative analysis** : **40 Marks**

  General Procedure- 10 Marks

  Rare radicals (2 X 10) -20 Marks

  Common radicals – (2X 5) - 10 Marks

- **Volumetric Analysis : 40 Marks**

  Error 1% = 40 Marks

  2% = 35 Marks

  3% = 25 Marks

  Viva **: 5 marks**

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE : BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 - 2012)

STRUCTURAL INORGANIC CHEMISTRY

CODE :11CH/PC/SI 14

CREDITS : 4
L T P : 4 1 0
TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE

- To provide knowledge to appreciate and analyse the chemistry of structurally important compounds.
- To give an overview and understanding of transition metal compounds and organo- metallic compounds.
- To provide fundamental knowledge about industrially important non-transition metal compounds.

Unit 1 (14 hrs)

Structure and defects in solids

1.1 Lattice energy, Born Lande equation, packing of ions in crystals,% void, crystal imperfections – stoichiometric defects (Schottky, Frenkel) and non-stoichoiometric defects (F Center) – conductivity by ion migration, factors affecting crystal structures.

1.2 Structures of simple inorganic solids of type AX, AX_2, A_2X_3, perovskite, spinel and inverse spinels.

1.3 Bonding in metals: Band theory and metallic properties. Interstitial compounds, insulators, semi conductors and super conductors. Super conductivity-Principle, Meissner effect.

1.4 Electrical and magnetic properties of solids.

Unit 2 (8 hrs)

Techniques of structure determination in solid state

2.1 X-Ray Diffraction studies - Structural determination of NaCl using Powder method.

2.2 Electron and Neutron Diffraction studies- Principles and applications.

Unit 3 (18 hrs)

Structure and Chemistry of Organometallic compounds

3.1 Classification of organometallic compounds

3.2 Preparation, bonding and structure of
Metal carbonyls, metal nitrosyls and metal hydride complexes.

Alkyl complexes, carbenes, carbynes, carbides, non aromatic alkene and Alkyne complexes, allyl and pentadienyl complexes, Aryl complexes, carbonyl hydride complexes and dinitrogen complexes.

3.3 Molecular Orbital treatment of metallocenes -Ferrocene.

Unit 4 **(12 hrs)**

Oragnometallic compounds in catalysis

4.1 Olefins-Wilkinson's catalyst, Oxo process, Ziegler- Natta catalysis, Wacker process, cyclo-oligomerisation(Reppe's catalyst).

4.2 Role of catalyst in Monsanto Acetic acid process and in the synthesis of gasoline.

Unit 5 **(13 hrs)**

Structure and Chemistry of non transition and transition metals

5.1 Preparation, properties and structures of hydrides, boranes, phophazenes , carboranes, metallocarboranes, silicates and silicones, supramolecular assembly-Zeolites.

5.2 Preparation, Properties and structures of Iso and Heteropolyacids of Mo and W.

Self study to be tested internally

- Metallocene analogues derived from boranes& carboranes
- Compounds of Mn(VII), Tc(VII) & Re(VII)
- Carbonyl halides & metal clusters
- Hapticity of ligands
- Toxicity of metal ions and role of metal ions in drugs.

BOOKS FOR REFERENCE:

Cotton F.A. and Wilkinson G. Advanced Inorganic Chemistry, 5th Ed., New York: John Wiley & Sons, 1998.

Huheey. James E. and Keiter. Ellen A. Inorganic Chemistry - Principles of Structure and Reactivity , New York: Addison Wesley Publications, 2004.

Jolly W.L. Modern Inorganic Chemistry, New York: McGraw – Hill, Inc., , 1991.

Moeller T. Inorganic Chemistry, New York : John Wiley & Sons, 1982.

Purcell. Keith.F. and Kotz. John C. An Introduction to Inorganic Chemistry, Philadelphia: W.B.Saunders Company, 1982.

Wells A.F., Structural Inorganic Chemistry, London: ELBS, 1981.

West A.R. Solid State Chemistry and its applications. New York: John Wiley & Sons, 1994.

END SEMESTER EXAMINATION

Total Marks: 100 Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 20 x 1 = 20 Marks (All questions to be answered, questions to be of objective type: MCQ'S, fill in the blanks, T/F, Match and answer in a line or two)

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M.Sc. DEGREE : BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 - 2012)

INORGANIC QUALITATIVE AND QUANTITATIVE ANALYSIS - PRACTICAL

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END SEMESTER EXAMINATION

Total Marks : 100 Duration: 6 hours

- **Inorganic complex preparation** : **15 Marks**

  Preparation – quantity & quality [10]

  Procedure & Structure of the complex [5]

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  General Procedure- 10 Marks

  Rare radicals (2 X 10) -20 Marks

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- **Volumetric Analysis : 40 Marks**

  Error 1% = 40 Marks

  2% = 35 Marks

  3% = 25 Marks

  Viva **: 5 marks**

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M.Sc. DEGREE : BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 - 2012)

DISSERTATION

CODE :11CH/PC/DI48 **CREDITS : 8**

GUIDELINES FOR DISSERTATION

Project should be done individually. Each student will choose a topic of her interest and the student will be assigned to a supervisor.

The project will require practical work with the submission of a project report. It should include experimental lab work. The duration of the project work is between 3 and 6 months

The project report should be submitted in the prescribed format containing a minimum of 50 pages. References should not be counted with the main pages. The report should be enhanced with graphs, spectra, tables and or photographs.

Each candidate has to give three periodical reviews to the internal guide on the scheduled dates prescribed by the department.

Each candidate can prepare 4 hard copies of the thesis. 1 copy for her and 3 copies must be submitted to the department. The project should be submitted on the scheduled date prescribed by the Department. The student should appear for Viva-voce before a panel comprising the External Examiner, the supervisor and the Head of the Department.

Guidelines for Evaluation

The maximum marks for the dissertation is 200 and **this will be converted to 100 marks by Controller of Examination**

Internal evaluation : 100

* attendance, log book, experimental work and project report

External evaluation : 100

* project report and *viva voce*

STELLA MARIS COLLEGE(AUTONOMOUS) CHENNAI-86
M.Sc DEGREE : BRANCH 1V –CHEMISTRY

SYLLABUS
(Effective from the academic year 2011 - 2012)

POLYMER MATERIALS AND APPLICATIONS

CODE: 11CH/PE/PM14 **CREDITS : 4**
L T P : 4 0 0
TOTAL TEACHING HOURS : 52

OBJECTIVE OF THE COURSE

To give an introduction to the main concepts and modern developments in polymer chemistry
To understand the techniques of polymer analysis
To motivate the students to pursue research in polymer chemistry

Unit 1 **(10 hrs)**

Introduction to polymer materials

1.1 Polymer chain structure and configuration : Nomenclature , functionality, method of linking.

1.2 Natural polymers and synthetic polymers (PU,PMMA, silicone polymers)- structure, properties and application.

1.3 Types of degradation (thermal, mechanical, ultrasound, photo and bio)

1.4 Speciality polymers-conducting, IPN, Polymer composites - structure, properties and application.

Unit 2 **(8 hrs)**

Mechanism and Kinetics of polymerization

2.1 Types of polymerization (free radical, ionic, graft, copolymerization, and group transfer polymerization)

2.2 Kinetics-Free radical polymerisation , Phase techniques in polymerisation

2.3 Homogenous and heterogeneous catalysts with special reference to Ziegler Natta catalyst

Unit 3 **(10 hrs)**

Molecular weight Distribution

3.1 Number average and Weight average molecular weight

3.2 Determination and methods of absolute molecular weight- Light scattering method, GPC, viscometry and end group analysis.

3.3 Mechanical properties of polymers on the basis of molecular weight

3.4 Intrinsic viscosity- Mark Houwnik equation

Unit 4 (12 hrs)

Physical chemistry of polymers

4.1 Thermodynamics of polymer solutions, Flory Higgins theory (Derivation not required) Phase equilibrium , solubility parameter.

4.2 Amorphous and crystalline polymers, conformation of the polymer chain, single crystal spherulites, liquid crystalline polymers.

4.3 Glass transition temperature-Factors influencing, heat distortion and crystallisability.

4.4 Melt rheology of polymers(PVC,PU,PS), stress- strain properties and viscoelastic behavior of polymers. Basic processing operations(extrusion, mastication, molding, calendaring) Newtonian and non Newtonian behavior of polymers, flow properties of polymer melts and solutions

Unit 5 (12 hrs)

Testing of polymers

5.1 Mechanical properties of polymers , hardness , dynamic mechanical testing , stress relaxation , aberration testing- ASTEM method.

5.2 Thermal properties, thermal conductivity, thermal expansion, TGA, DTA,DSC (special reference to PET, PMMA)

5.3 Spectroscopic characterization of polymers (FT IR and NMR).

Self study to be tested internally

- Ionomers, Polyelectrolytes,dendrimers and nanohybrid polymers.
- Super conducting polymers, interfacial polymersand poly metallocenes.

BOOKS FOR REFERENCE

Bhatnagar M.S., Text Book of Polymers**.** Vol. 1 – 111, 1st edition, New Delhi: S.Chand & Co.,

Billmeyer F.W., Text Book of Polymer Science**.** 3rd Edition, New York: A Wiley Interscience Publications,

Brandolini Anita J and Deborah D., Hills NMR Spectra of Polymers and Polymer additives**.** New York: Marcel Decker Inc.

Flory P.J. Principles of Polymer Chemistry. Ithaca: Cornell University Press,

Gowariker, V.R., N.V. Viswanathan, Jaydev Sreedhar, (1996), Polymer Science**.** 1st edition, New Delhi: New Age International.

Gupta B.R., Applied Rheology in Polymer Processing**.** New Delhi:Asian Book Pvt. Ltd., , 2005.

Joel.R .Fried, Polymer science & Technology. second edition , New Delhi:Prentice – Hall of India private limited, 2005.

Misra G.S. Introduction to Polymer Science**.** New Delhi:New Age International, 2001.

Munk P**.** Introduction to Macromolecular Science**.** New York: John Wiley & Sons,1989.

Stuart H Barbara, Polymer Analysis**.** New York :John Wiley & Sons, 2002.

Sujata V. Bhat., Biomaterials. New Delhi: Narosa Publishing house,.

Young R.P., Lovell, Introduction to Polymers**.** London: Chapman & Hall, , 1996.

END SEMESTER EXAMINATION

Total Marks: 100 Duration : 3 hours

QUESTION PAPER PATTERN

Section A – 20 x 1 = 20 Marks (All questions to be answered, questions to be of objective type: MCQ'S, fill in the blanks, T/F, Match and answer in a line or two)

Section B – 5 x 8 = 40 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 3 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE : BRANCH IV - CHEMISTRY

SYLLABUS
(Effective from the academic year 2011- 2012)

INDUSTRIAL WASTE MANAGEMENT

CODE :11CH/ PE/IM14 **CREDITS : 4**
L T P : 4 0 0
TOTAL TEACHING HOURS : 52

OBJECTIVES OF THE COURSE

- To expose the students to the present environmental scenario and educate them on the causes and consequences of environmental degradation
- To expose the students to the nature of industrial wastes
- To work towards effective and efficient management of the industrial wastes
- To give an overview of Environmental management , Environmental Impact Assessment and Pollution control measures for working towards Green Earth

Unit 1 **(10 hrs)**

Air Pollution Control

1.1 Air Quality Standards, Classification of air pollutants, sources of air pollution, ozone depletion, Green House Effect – causes and consequences

1.2 Pollution Control of Particulates – gravity settling chamber, cyclone collector, filters, wet scrubbers, electrostatic filters, electrostatic precipitator

1.3 Control of CO, Oxides of nitrogen, Oxides of sulphur, Hydrocarbons, Photochemical pollutants, Green house gases

Unit 2

Treatment and disposal of Industrial Effluents **(12 hrs)**

2.1 Water Quality Standards, sources of water pollution, characterization of waste water by physical and chemical characteristics

2.2 Primary treatment - Sedimentation, neutralization, coagulation, equalization, grid removal Secondary treatment: Aerobic treatment, Oxidation ponds, Oxidation ditches, Trickling filters, Activated Sludge process, Aerated lagoons, Anaerobic treatment Tertiary treatment: Reverse Osmosis, Electro dialysis, Desalination.

2.3 Industrial effluents: Characteristics and treatment options for effluents from various industries: Textiles and Dyes, Paper and pulp , Leather , Food and Dairy , Fertilizers, Electroplating industries, Distilleries.

2.4 Sewage Treatment

2.5 Water conservation, Recycling of waste water and Rain water harvesting

Unit 3

Solid waste management **(10 hrs)**

3.1 Solid Wastes- Types , Characteristics, Solid waste disposal – Sanitary landfills, Vermi composting, Incineration. Waste minimization and recycling,

Unit 4

Environmental Toxicology: (6 hrs)

4.1 Toxicity , Threshold Limiting Value of Pollutants, LD_{50}

4.2 Toxic effects of Pb, As, Cd, Hg, PCBs, Pesticides, heavy metals

4.3 Case studies: Bhopal Gas Tragedy, Chernobyl Accident, Love Canal Episode, Minamata Disease, Itai-Itai disease

Unit 5

Environmental Management (14 hrs)

5.1 Sustainable Development: Definition, Sustainability cycle, Biodiversity, Problems of urbanization and steps towards sustainable development

5.2 Environmental Impact Assessment: Concept, Environmental Risk Assessment, Legal and regulatory aspects in India- Environmental (Protection) Act 1986, Air (Prevention and Control of Pollution) Act 1981, Water (Prevention and Control of Pollution) Act 1981, ISO 14000, Tsunami Disaster.

5.3 Industrial safety and Health: EPA, OSHA – regulations, Polluter Pays Principle

5.4 Global and National efforts: Steps taken towards Green Future at the National and Global level.

5.5 Coastal management

BOOKS FOR REFERENCE

Dara S.S. A Text Book of Environment Chemistry and Pollution Control**,** 7th ed, New Delhi: S.Chand and Co. 2004.

Gaur G. Soil and Solid Waste Pollution and its Management, New Delhi :Sarup and Sons, 2000.

Kent. James. A. Riegel's Handbook of Industrial Chemistry**,** 9th ed, CBS Publishers and Distributors, 1977.

Leelakrishnan. Environmental laws in India, New Delhi: Butterworths, 2002.

Mohan I, Environmental Pollution and Management, New Delhi: Ashish Publications, 1990.

NIIR Board, Modern Technology of Waste Management- Pollution Control, Recycling, Treatment and Utilization, New Delhi: Asia Pacific Business Press Inc., 2003.

Paul L. Bishop, Pollution Prevention - Fundamentals and Practices, New York: McGraw Hill International Edition, 2000.

Sharma B.K. and Kaur H. Environmental Chemistry, 4th ed, Meerut: Goel Publishing House, 1998.

Trivedy R.K. and Raman N.S. Industrial Pollution and Environmental Management, Jodhpur: Scientific Publishers, 2003.

Willen Rudolf. Industrial Wastes Their Disposal and Treatment, Bikaneer: Allied Scientific Publishers, 1997.

END SEMESTER EXAMINATION

TOTAL MARKS: 100

DURATION : 3 HOURS

QUESTION PAPER PATTERN

Section A – 20 x 1 = 20 Marks (All questions to be answered, questions to be of objective type: MCQ'S, fill in the blanks, T/F, Match and answer in a line or two)

Section B – 5 x 8 = 40 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 3 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE : BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 onwards)

INTRODUCTORY FORENSIC CHEMISTRY

(Independent Study Elective Course)

CODE :11/CH/PI/IF24

CREDITS : 4

Objectives of the Course

- To acquaint the students to the role of chemistry in crime detection
- To give an insight into diagnostic testing and to encourage the students to work in the field of Forensic chemistry and to pursue Research in Forensic Science.

Unit 1 Forensic Science (8 hrs)

1.1 Definition-brief history of Forensic Science. Function of forensic science in the laboratory

1.2 Processing the scene of crime and Forensic photography.

Unit 2

Physical Evidence (Tracks and trails) (12 hrs)

2.1 Physical evidence –classification. Significance of finger prints and palm prints, foot prints, shoe and tyre impression.

2.2 Trace evidence-soil, glass, paint.

2.3 Biological material-blood, hair, bones, teeth-application of DNA profiling

Unit 3

Toxicology and analysis techniques (12 hrs)

3.1 Radioactive decay reactions and neutron activation analysis.

3.2 Atomic absorption spectroscopy and X-ray analysis to detect samples.

3.1 Poisons-classification. Symptoms and antidotes for some common poison

Unit 4

Tracking Forgery (10 hrs)

4.1 Disputed documents-types-document examination. Use of UV rays in detection of counterfeit currency and stamp paper.

4.2 Identification of forgery in hand written and typed document.

4.3 Paper chromatography of ink

Unit 5 **(10 hrs)**

Fire-Arson and Explosives

5.1 Characteristics of accidental fires

5.2 Arson-evidence from fire affected area to detect the cause of the fire.

5.3 Explosive-classification-evidence from the scene of explosion to detect the cause of explosion.

Text Books

Vapuly A K (2006) **Forensic Science its approach in Crime Investigation**, Paras Medical Pubication, Hyderabad.

Sharma B.R (2006) **Forensic Science in Criminal Investigation and trials**, 4th Edition, Universal law publication Co. Pvt. Ltd: New Delhi

Reference Books

Russel Max M Houck, Jay A Siegel (2006) **Fundamentals of forensic Science,** Elsevier Academic Press, Amsterdam.

Henry C. Lee, Timothy Palmbach, Marilyn C.Miller (2001) **Henry Lee's Crime Scene Hand book,** Elsevier Academic Press, Amsterdam.

END SEMESTER EXAMINATION

TOTAL MARKS: 100 DURATION : 3 HOURS

QUESTION PAPER PATTERN

Section A – 20 x 1 = 20 Marks (All questions to be answered,questions to be of objective type(MCQ'S), fill in the blanks and answer in a line or two)

Section B – 5 x 8 = 40 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 3 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086
M.Sc. DEGREE : BRANCH IV - CHEMISTRY

SYLLABUS
(Effective from the academic year 2011 - 2012)

CHEMISTRY OF NATURAL PRODUCTS

CODE: 11/CH/PI/NP24

CREDITS : 4

OBJECTIVES OF THE COURSE

- To understand the origin and classification of natural products.
- To appreciate the chemical strucure of physiological functions of natural products and their derivatives.
- To think critically about the use of herbal remedies and the potential of drug development from natural products.

Unit 1 **(12 hrs)**

Amino acids peptides and proteins

1.1 Introduction to amino acids
1.2 General methods of preparation and properties of amino acids
1.3 Naturally occurring peptides and nomenclature of poly peptides.
1.4 General principle of poly peptide synthesis.
1.5 Representation of poly peptides. Determination of structure of peptides.
1.6 Classification of proteins. Primary , secondary and tertiary structure of proteins

Unit 2 **(10hrs)**

Steroids

2.1 Nomenclature and stereochemistry(configuration of substiuent, ring and side chain)
2.2 Classification of sterols and related colour reactions.
2.3 Cholesterol- occurrence, isolation, clinical significance, structure elucidation and total synthesis.
2.4 Steroid hormones- synthesis of oestrone and progesterone

Unit 3 **(10hrs)**

Terpenoids

3.1 Source and extraction.
3.2 Classification and isolation.
3.3 General methods of structure determination of terpenoids.
3.4 Structure elucidation of Carvone-d, longifolene, abetic acid and β-carotene.

Unit 4 **(10 hrs)**

Alkaloids

4.1 Occurance and functions.
4.2 Classification and nomenclature.
4.3 General methods of structure determination and pharmaceutical applications.
4.4 Structure elucidation and of Conine, Nicotine and Caffeien.

Unit 5 **(10 hrs)**

Plant pigments

5.1 Representation of flavonoids,flavones,flavonols,and isoflavones
5.2 Glycosides of flavones and flavonols.
5.3 General methods of structure determination of flavonoids.
5.4 Structure elucidation of Apigenin and Quercetin
5.5 Anthocyanidins and anthocyanins- general methods of structure determination.
5.6 Structure elucidation of cyanidin and Hirsutidin.
5.7 Structural relationship between flavonols(Quercetin) anthocyanidin(cyanidin) and catechins(epicatechin).

TEXT BOOKS

Bhat, S.V., B.A.Nagasampagi, M.Siva Kumar Chemistry of natural Products, New Delhi, Narosa Publishing house, 2006.

Ahluwali, V.K., Sanjiv Kumar, Chemistry of Natural Products, New Delhi, CRC Press, 2007.

BOOKS FOR REFERENCE

Stephen P.Stanforth, Natural Product Chemistry at a Glance, Wiley Blackwell, 2006.

END SEMESTER EXAMINATION

Total Marks: 100 Duration : 3 Hours

QUESTION PAPER PATTERN

Section A – 20 x 1 = 20 Marks (All questions to be answered, questions to be of objective type: MCQ'S, fill in the blanks, T/F, Match and answer in a line or two)

Section B – 5 x 8 = 40 Marks (5 out of 7 to be answered)
Section C – 2 x 20 = 40 Marks (2 out of 3 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086

M.Sc. DEGREE : BRANCH IV - CHEMISTRY

SYLLABUS
(Effective from the academic year 2011 – 2012)

SOFT SKILLS

CODE : 11CH/PK/SS22

CREDITS : 2

L T P : 2 0 0

TOTAL TEACHING HOURS : 26

OBJECTIVES OF THE COURSE

- To empower and create opportunities for self development
- To instill confidence and face challenges.

Unit 1 **(6 hrs)**

Behavioural Traits

1.1 Self Awareness
1.2 Communication Skills – Verbal and Non Verbal
1.3 Leadership Qualities
1.4 Etiquette and mannerisms
1.5 Experiential Learning – Based on activities

Unit 2 **(5 hrs)**

Team Work

2.1 Interpersonal Skills
2.2 People Management
2.3 Creative Thinking
2.4 Critical Thinking
2.5 Experiential Learning – Based on activities

Unit 3 **(5 hrs)**

Time Management

3.1 Importance of time management
3.2 Planning and Prioritizing
3.3 Organizing skills
3.4 Action Plan
3.5 Experiential Learning – Based on activities

Unit 4 **(5 hrs)**

Conflict Resolution

4.1 Reasons for conflict
4.2 Consequences of conflict
4.3 Managing emotions
4.4 Methods of resolving conflicts
4.5 Experiential Learning – Based on activities

Unit 5 **(5 hrs)**

Career Mapping

5.1 Goal setting
5.2 Career Planning
5.3 Resume writing
5.4 Handling Interviews
5.5 Experiential Learning – Based on activities

BOOKS FOR REFERENCE

Khera, Shiv, You Can Win**,** New Delhi, Macmillan India Ltd., 2002.

Mishra, Rajiv K., Personality Development : Transform Yourself**,** New Delhi, Rupa and Co., 2004.

Newstrom, John W. and Scannell, Edward E., Games Trainers Play: Experiential Learning**,** New Delhi, Tata McGraw Hill, 1980.

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE : BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 - 2012)

ANALYTICAL INSTRUMENTATION

CODE :11CH/PC/AI 24

CREDITS : 4
L T P : 4 1 0
TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE

- To equip the students about recent analytical techniques, with a focus on applications in industries and research laboratories.
- To give an insight to the key concepts of analytical instrumentation techniques to pursue research.

Unit 1

Spectroscopic techniques (16hrs)

Principle and instrumentation of -

1.1 UV/Visible spectroscopy, Atomic absorption and emission spectroscopy.
1.2 Inductively Coupled Plasma Atomic Emission Spectroscopy(ICPAES)
1.3 Infrared Spectroscopy, Dispersive and Fourier Transformed Raman, Resonance Raman and Surface Enhanced Raman Spectroscopy- Dispersive and Fourier Transformed
1.4 Spectropolarimeters (optical rotatory dispersion) and Spectrophotometer (circular dichroism)

Unit 2 (10 hrs)

Surface Characterisation Techniques

Principle, Instrumentation and applications of -

2.1 Photoelectron spectroscopy – ultraviolet and X-ray photoelectron spectroscopy (UPS & XPS), Auger electron spectroscopy (AES),ESCA
2.2 Electron microscopy: Scanning electron microscopy (SEM), Scanning Tunnelling microscopy (STM).
2.3 Low energy electron diffraction

Unit 3 (20 hrs)

Electrochemical Techniques

Principle, Instrumentation and applications of -

3.1 Polarography (DC, AC and pulse), Anodic and Cathodic stripping voltammetry
3.2 Coulometry: Current- Voltage relationship during an electrolysis, Coulometric methods of analysis, Potentiostatic coulometry, Coulometric Titrations(Amperostatic Coulometry)
3.3 Amperometry, Amperometric titrations, Biamperometry
3.4 Chronomethods: Chronoamperometry, Chronopotentiometry and Chronocoulometry
3.5 Cyclic Voltammetry

Unit 4 **(14hrs)**

Thermoanalytical and Radiochemical Techniques

4.1 Thermogravimetry (TG), Differential Thermal analysis. Differential scanning calorimetry - Principle, Instrumentation, Factors affecting the thermogram & Applications, Evolved gas analysis,

4.2 Thermometric titrations – Principle, working & applications.

4.3 Neutron activation analysis-Principle, instrumentation and applications

Unit 5 **(5hrs)**

Coupled Techniques

Applications of GC-IR, TG-IR Spectroscopy, GC-Mass Spectroscopy.

Self study to be tested internally

- Applications of spectroscopy techniques.
- Few applications of SEM & TEM in study of nano particles
- Circular Dichroism
- Hotstage optical Polarising Microscope

BOOKS FOR REFERENCE

Anjaneyulu. Y, Chandrasekhar.K, Valli Manickam. A text Book of Analytical Chemistry. India: Pharma Book Syndicate, 2006.

R.D. Brown, Introduction to Instumental Analysis, McGraw Hill, Singapore, 1987.

Douglas A Skoog, James F Holler and Niemen. Principles of Instrumental Analysis. 5th ed. Singapore: Haracourt Asia Pvt. Ltd., 2001.

J.H.D.Eland, Photoelectron Spectra, Butterworths, London, 1984.

Douglas A.Skoog , Donald M West and James F Holler, Stanley R. Crouch. Fundamentals of Analytical Chemistry, New York: Saunders College Publishing, 2004.

Ewing Galen W. Instrumental Methods of Chemical Analysis. 5th ed. New York: McGraw Hill, 1985.

A.J.Bard and L.R.Faulkner, Electrochemical methods, fundamentals and applications, Wiley, New York, reprint 2006.

Fifield F.W. and Kealy D. Principles and Practice of Analytical Chemistry. 5th ed. USA: Blackwell Science Publishing, 2004.

Gary D.Christian and James E. O'Reilly. **Analytical Chemistry**. 6th ed. New York: John Wiley & Sons, 2004.Sharma B.K. Instrumental Methods of Chemical Analysis. 23rd ed. Meerut: Goel Publishing House, 2004.

Willard, Dean, Merritt, Settle. Instrumental Methods of Analysis. 7th ed. London: CBS, 2004.

W.W.Wendlandt, Thermal Analysis, 3rd Ed., Wiley, New York, 1980.

T.L.Barr, Modern ESCA : the principles and practice of X-ray photoelectron spectroscopy, CRC Press, Boca Raton, 1994

J.H.D.Eland, Photoelectron Spectra. Butterworth, London, 1984.

END SEMESTER EXAMINATION:

Total Marks: 100 Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 20 x 1 = 20 Marks (All questions to be answered, questions to be of objective type: MCQ'S, fill in the blanks, T/F, Match and answer in a line or two)

Section B – 5 x 8 = 40 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 3 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE : BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011- 2012)

QUANTUM CHEMISTRY AND GROUP THEORY

CODE: 11CH/PC/QG24 **CREDITS: 4**

L T P: 4 1 0

TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE

- To give an understanding of basic principles of quantum mechanics and their applicability to study the internal structure of atoms and molecules.
- To give an understanding of the important concepts of group theory

Unit 1

Matter waves and Quantum mechanical formalism (8 hrs)

1.1 Wave particle duality, uncertainty principle, theory of wave motion, particle wave and Schrödinger wave equation, wave functions, properties of wave function,

1.2 Conditions of normalization and orthogonality.

1.3 Operators and their algebra, *eigen* values and *eigen* functions, Hermitian properties of operators, postulates of quantum and some theorems related the same.

Unit 2

Application to simple systems (16 hrs)

2.1 Free particle, particle in one dimensional box with infinite potential barrier, quantization and quantum numbers, use of box model, particle in a three dimensional box, degeneracy, particle in a box with finite potential barriers, quantum mechanical tunneling, problems

2.2 Harmonic oscillator (classical & quantum mechanical), Schrodinger wave equation and its solution, Hermite polynomial, complete wave function, vibrational quantum numbers, physical picture of ψ and ψ^2.

2.3 Particle in a ring and sphere, Schrödinger wave equation in spherical coordinates(Derivation not expected), Legendre and associated Legendre functions, rotational quantum numbers, spherical harmonics, rotation of a diatomic molecule, problems

2.4 Schrodinger wave equation in spherical coordinates, splitting equation into r, θ and φ equations, solving r- equation, Laguerre polynomial and Associated Laguerre polynomials, radial functions, quantum numbers n and l, energy eigen

values in atomic units, complete wave function of hydrogen like atoms, physical representation of orbitals, radial plots and angular plots, probability function and plots, average distance of electron, problem

Unit 3

Atomic Structure (20 hrs)

3.1 Approximation methods –Variational method (linear band non-linear variation), Perturbation theory (non-degenerate, first order), application to Helium atom. Ground state.
3.2 Symmetric and Anti symmetric wave functions, electron spin, spin orbitals, Pauli's principle
3.3 Excited state of He atom, singlet and triplet states, multielectron atoms, Determinantal form of wave functions,
3.4 Hartee- Fork self consistent field theory. Walsh diagrams. Angular momentum of many electron atoms, R-S coupling, spectra of alkali metal atoms, Hund's rule Zeeman effect.
3.5 LCAO-MO for H_2^+, Molecular orbital approximation for ethylene, butadiene and benzene. Plots and nodes of molecular orbitals

Unit 4

Group theory : Fundamental Concepts (16 hrs)

4.1 Symmetry operation and elements, defining coordinate system, combining symmetry operations, Symmetry point groups, point group of molecules, systematic point group classification, optical activity and symmetry.
4.2 Irreducible representation, unit vector transformation, reducible representations, systematic reduction of reducible representation,
4.3 Group multiplication tables, sub groups and classes, The Great Orthogonality theorem
4.4 Construction of character table for point groups. ($D_{2h,}$ C_{2V}, C_{3V},), explanation for the complete character table for the above groups.

Unit 5

Application of group theory: (5 hrs)

5.1 Application of group theory in (i) electronic spectra –HCHO (ii) vibrational spectra –H_2O
5.2 Application of group theory in hybridization schemes for simple molecules-CH_4, H_2O and NH_3

BOOKS FOR REFERENCE

Prasad, R.K Quantum Chemistry, New Delhi: New Age International, 1997

Atkins, P.W. Molecular Quantum Mechanics, Qxford: Clarendon Press, 1983

Chandra A K. Introductory Quantum Chemistry. New Delhi: Tata McGraw Hill,1968

Cotton, F.A**.** Chemical Applications of Group Theory, New York : Wiley Eastern Ltd, 2000

Carter, R.L. Molecular Symmetry and Group Theory, John Wiley and Sons, Inc, 2005

Levine, I.R., Quantum Chemistry, 4th ed., Prentice Hall of India, New Delhi, 1994

Prasad, R.K Quantum Chemistry through problems and solutions, New Delhi: New Age International, 1997.

Lowe, J.P., Quantum Chemistry, 2nd ed., Academic Press, Sandiego, 1993.

McQuairrie, Donald A Quantum Chemistry**,** Oxford: Oxford University Press, , 1982

P.A.Cox, Introduction to quantum theory and atomic structure, Oxford Chemistry Primers, Oxford university press, 1996

T.A.Albright and J.K.Burdett, Problems in molecular orbital theory, Oxford university press, 1992

D.M.Bishop, Group Theory and chemistry. Dover, New York, 1993

END SEMESTER EXAMINATION:

Total Marks: 100 Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 20 x 1 = 20 Marks (All questions to be answered, questions to be of objective type: MCQ'S, fill in the blanks, T/F, Match and answer in a line or two)

Section B – 5 x 8 = 40 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 3 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

Post Elective Course Offered by the Department of Mathematics for M.A. / M.Sc. / M.Com Degree Programme

SYLLABUS

(Effective from the academic year 2011 - 2012)

ENTREPRENEURIAL SKILLS

CODE: 11CH/PE/ES 24 **CREDITS : 4**

L T P : 4 0 0

TOTAL TEACHING HOURS : 52

OBJECTIVES OF THE COURSE

- To motivate and make the youth understand the nature and importance of entrepreneurship
- To enhance their self employment opportunities
- To develop entrepreneurial skills and activities
- To impart Skill development Training to the students with inter disciplinary

Unit 1 ***(10 hrs)***

Entrepreneurial Perspective

1.1 The nature and importance of entrepreneurs
1.2 Entrepreneurship enterprise and entrepreneurs – definition and concept – new venture formation
1.3 Characteristics and importance of entrepreneurship and entrepreneur
1.4 Classification and functions of entrepreneurs – core competence for entrepreneurial activities

Unit 2 **(10 hrs)**

Entrepreneurial Motivation

2.1 Innovation and initiation of entrepreneurial venture – desire, decision and formulation
2.2 Study of entry barriers to entrepreneurship – steps to overcome the barriers
2.3 Promotion of a venture – opportunity analysis, environment and entrepreneurship, technological environment and competitive factors
2.4 Case studies – Interaction with successful entrepreneurs

Unit 3 **(10 hrs)**

Women Entrepreneurship

3.1 Concept of Women Entrepreneurs
3.2 Empowerment of women through enterprise
3.3 Factors governing women entrepreneurship
3.4 Schemes for women entrepreneurs

Unit 4 **(12 hrs)**

Business Project Proposal

4.1 Demand analysis, Cost benefit analysis and break-even point and identification of entrepreneurial opportunities

4.2 Financial and business collaboration – Business project proposal – Planning and Processing

4.3 Entrepreneurial Performance and Rewards

4.4 Preparation of Model Project Proposal

Unit 5 **(10 hrs)**

Skill Development Training (To be tested internally)

The Skill Development Training will be imparted in any of the current fields of interest such as:

Fruit/Vegetable Processing and Preservation
Food and Water Analysis
Preparation of Herbal Products
Paper Conversion Products
Jewellery Designing
Vermi composting
PET bottle recycling
Injection moulding

BOOKS FOR REFERENCE

Anand Saxena, Entrepreneurship Motivation, Performance and Rewards New Delhi: Deep and Deep Publications Pvt. Ltd., 2006.

David H. Holt, Entrepreneurship – New Venture Creation. New Delhi: Prentice Hall of India Pvt. Ltd., 2006.

John Legge and Kevin Hindle, Entrepreneurship-Context. New York: Vision and Planning, Macmillan Pvt. Ltd., , 2004.

Madhurima Lall and Shikha Sahai, Entrepreneurship. New Delhi:Excel Printers, , 2006.

Robert D. Hisrich, Michael P. Peters and Dean A. Shepherd, Entrepreneurship 6th ed.,New Delhi :Tata McGraw Hill Publication Co. Ltd., , 2007.

Saini, J. S. and Gurjar B. R., Entrepreneurship and Education – Challenges and Strategies.Jaipur: Rawat Publication, 2001.

Sangram Keshari Mohanty, Fundamentals of Entrepreneurship New Delhi: Prentice Hall of India Pvt. Ltd., 2005.

END SEMESTER EXAMINATION

Total Marks: 100 Duration : 3 Hours

QUESTION PAPER PATTERN

Section A – 2x10 = 20 Marks (All questions to be answered)
Section B – 5 x 8 = 40 Marks (5 out of 7 to be answered)
Section C – 2 x 20 = 40 Marks (2 out of 3 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE: BRANCH IV - CHEMISTRY
SYLLABUS
(Effective from the academic year 2011 - 2012)
INDUSTRIAL CHEMISTRY AND MANAGEMENT
CODE: 11CH/PI/IC24

CREDIT: 4

OBJECTIVES OF THE COURSE

- To create an awareness in students about the various dimensions of a chemical industry
- To help students look at wider career options

Unit 1

Indian chemical industry - Challenges and opportunities
Need for chemical business managers
Self employment as career option

Unit 2

Government procedures affecting chemical industry
WTO , antidumping and safeguard duties
Carbon Trading & Montreal Protocol
Environmental issues
Quality aspects and certification procedures

Unit 3

Successes and failures in Indian chemical industry
Case study of unexploited chemical projects

Unit 4

Methodology for identification of investment opportunities in chemical industry and Market research
Marketing practices
Issues in export marketing

Unit 5

Profiles of key players in Indian chemical industry
Performance analysis of a few top Indian chemical companies

END SEMESTER EXAMINATION

Total Marks: 100 Duration : 3 Hours

QUESTION PAPER PATTERN

Section A – 20 x 1 = 20 Marks (All questions to be answered, questions to be of objective type: MCQ'S, fill in the blanks, T/F, Match and answer in a line or two)

Section B – 5 x 8 = 40 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 3 to be answered)

BOOKS FOR REFERENCE

Anand Saxena, Entrepreneurship Motivation, Performance and Rewards New Delhi: Deep and Deep Publications Pvt. Ltd., 2006.

David H. Holt, Entrepreneurship – New Venture Creation. New Delhi: Prentice Hall of India Pvt. Ltd., 2006.

Goldratt, E.M., The goal, England, Gower publishing house,1999.

John Durkee, Management of Industrial Cleaning Technology and Processes, 2006

Madhurima Lall and Shikha Sahai, Entrepreneurship. New Delhi:Excel Printers, , 2006.

Philip J. Chenier.Survey of Industrial Chemistry, Elsevier, 2002.

Robert D. Hisrich, Michael P. Peters and Dean A. Shepherd, Entrepreneurship 6th ed.,New Delhi :Tata McGraw Hill Publication Co. Ltd., , 2007.

Sangram Keshari Mohanty, Fundamentals of Entrepreneurship New Delhi: Prentice Hall of India Pvt. Ltd., 2005.

The Lean Office : Collected Practices and Cases, Productivity Press Development Team, 2005.

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE: BRANCH IV - CHEMISTRY

SYLLABUS
(Effective from the academic year 2011 - 2012)

MOLECULAR SPECTROSCOPY

CODE: 11CH/PC/MS 34

CREDITS: 4
L T P: 4 1 0
TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To understand and apply the principles of spectroscopy
- To interpret the spectra of molecules and predict structure of compounds
- To understand the complementary nature of spectra in structural elucidation

Unit 1 **(6 hrs)**

Electromagnetic spectrum

1.1 Basic Principles of Spectroscopy: Width and intensity of spectral lines Transition probability and selection rules, time independent perturbation Fourier transform spectroscopy, Lasers (He-Ne laser, dye lasers), ultrafast spectroscopy.

1.2 Regions of the spectrum, Quantisation of energy: rotational, vibrational and electronic transitions in molecules, Absorption and emission spectra.

Unit 2 **(12 hrs)**

Rotational, Rotational-vibrational and Vibrational Spectroscopy

2.1 Rotation of molecules, diatomic molecules as rigid rotors- rotational energy levels, transitions, selection rules, microwave spectra.

2.2 Diatomic molecules as harmonic and anharmonic oscillators – energy levels and the vibrational transitions.

2.3 Selection rules, vibrations of polyatomic molecules – linear and Nonlinear molecules and their symmetry.

2.4 Infrared absorption frequencies of typical functional groups, applications of IR in structure determination.

2.5 Principles and applications of Raman Spectroscopy. Raman spectra as complementary to IR.

Unit 3 **(10 hrs)**

Electronic Absorption Spectroscopy

3. 1. Principle of UV-Visible spectroscopy, Franck Condon principle, Born –Oppenheimer approximation, factors affecting absorption spectra.

3.2 Re-emission of energy by an excited molecule.
3.3 Chemical analysis by electronic spectra, UPS Koopmans' theorem and XPS.

Unit 4 **(20 hrs)**

Nuclear Magnetic Resonance Spectroscopy

4.1 Nuclear spin, nuclear magnetic moment, NMR transitions, relaxation processes.

4.2 Chemical shift, shielded and deshielded protons, spin-spin coupling,

Factors affecting spin coupling constants and Pascal's diagram,

higher order coupling.

4.3 Spin decoupling, shift reagents.
4.4 Applications of proton NMR in structural determination, NMR of macromolecules.
4.5 C^{13} NMR, The Nuclear overhauser effect, NMR in solid state and 2D and 3D NMR, ^{31}P and ^{19}F NMR (features)

Unit 5 **(17 hrs)**

Mass Spectrometry

5.1 Basic principles, fragmentation patterns as applied to simple aliphatic and aromatic compounds.

5.2 Interpretation of mass spectra: Molecular ion peak, Isotope peaks, Base peak, meta stable peak, Nitrogen rule.

5.3 Rearrangements: Mc Lafferty rearrangement, Retro Diels Alder rearrangement.
5.4 Determination of structure of simple organic molecules by comprehensive (UV, IR, NMR, Mass) spectral data.

Self study to be tested internally

- Visit to advanced research labs to study the State of art instruments.
- MRI and medical applications
- Spectra and inorganic molecules

BOOKS FOR REFERENCE:

Banwell Colin and Mckash Elaine. Fundamentals of Molecular Spectroscopy. New Delhi: Tata McGraw Hill Ltd., 1996.

Barrow Gordon M. Introduction to Molecular Spectroscopy. New York: McGraw Hill International, 1976.

Dudley H Williams and Ian Fleming. Spectroscopic Methods in Organic Chemistry. Tata McGraw-Hill Publishing Company Limited, 2005.

Harris Daniel C. et.al. Symmetry and Spectroscopy An Introduction to Vibrational and Electronic Spectroscopy. New York: Oxford University Press, 1980.

Kemp William. Organic Spectroscopy. 2nd ed. New Delhi: Macmillan India, 1998.

Pavia Donald L, Introduction to Spectroscopy- A guide for students of Organic chemistry. Singapore: Harcourt Asia Pvt. Ltd., 2001.

Sathyanarayana, D.N. Vibrational spectroscopy. New Age International Publishers, 2007.

Scheimann. An introduction to spectroscopic methods for identification of organic compounds. London: Pergamon Press, 1970.

Silverstein, Bassler, Morril. Spectrometric Identification of Organic Compounds, New York: John Wiley & Sons Inc., 1996.

END SEMESTER EXAMINATION

Total Marks: 100 Duration : 3 Hours

QUESTION PAPER PATTERN

Section A – 20 x 1 = 20 Marks (All questions to be answered, questions to be of objective type: MCQ'S, fill in the blanks, T/F, Match and answer in a line or two)

Section B – 5 x 8 = 40 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 3 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE: BRANCH IV - CHEMISTRY

SYLLABUS
(Effective from the academic year 2011 - 2012)

SUMMER INTERNSHIP

CODE : 11CH/PN/SI32 **CREDITS : 2**

OBJECTIVES OF THE COURSE

- To enhance the experiential learning of the students by observing and hands on training at research institutes / chemical industries.
- To expose them to various experimental and analytical techniques employed in quality research.
- Enhance their skills in application - oriented courses.
- To familiarize the students to research ambience.

The Summer Internship program is for a minimum period of one month. The students are expected to have regular attendance in their respective Institute and submit a report to the Department about their summer internship along with the attendance certificate. The students are expected to give a seminar presentation in the third semester of the work they have observed and conducted.

Guidelines for Evaluation

The maximum marks for the Summer Internship is 50 and is divided into the following :

a) Summer Internship - Report (20 Marks)
b) Seminar presentation (20 Marks)
c) Attendance along with the log book (10 Marks)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE: BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 - 2012)

BIOCHEMISTRY

CODE:11CH/PE/BC 34

CREDITS : 4

L T P : 4 0 0

TOTAL TEACHING HOURS : 52

OBJECTIVES OF THE COURSE

- To expose the students to the structure-function relationship of biomolecules
- To give an insight into the metabolic pathways and the consequences of deviation from normal.
- To instill interest into research in Biochemistry.

Unit 1 ***(10 hrs)***

Introduction to biochemistry

1.1 Scope of Biochemistry, Relationship between biochemistry and medicine; normal biochemical process – basis of health

1.2 Water as a biological solvent and its importance in maintaining the structure of biomolecules

1.3 Acid base balance, biological buffers - Bi-carbonate, Phosphate, Protein and Haemoglobin - Acidosis and Alkalosis.

Unit 2 **(8 hrs)**

Bioenergetics

2.5 Bioenergetics: Conventions in biochemical energetics.

2.6 ATP as the universal currency for free energy in biological systems

2.7 Free energy of hydrolysis of ATP and other organophosphates.

2.8 Structural basis for the high group transfer potential of ATP

2.9 Standard free energy changes for representative chemical reactions

2.10Inter-conversion of Adenine nucleotides.

Unit 3 **(12 hrs)**

Biomolecules

3.5 Biomolecules: Elementary structure of proteins, nucleic acids and membrane bilipids (fluid mosaic structure).

3.6 Relationship between the structure and function of proteins and the consequences of deviation from normal.

Unit 4 **(10hrs)**

Biocatalysts – Enzymes

4.5 Enzymes, definition, co-factor, apoenzyme

4.6 General properties, active site, factors affecting enzyme action.

4.7 Enzyme regulation; allosteric, feedback regulation, product inhibition.

4.8 Immobilization of Enzymes, methods and applications.

Unit 5 (12 hrs)

Metabolism

5.1 Definition, terminology and functions of metabolism
5.2 Metabolism of carbohydrates – glycolysis, gluconeogenesis, glycogen metabolism, and TCA cycle.
5.3 Proteins – oxidative deamination, Transamination and urea cycle.
5.4 Lipids – beta oxidation of fatty acids and biosynthesis of fatty acids, triglycerides and cholesterol.
5.5 Xenobiotics - general methods of detoxification.

BOOKS FOR REFERENCE

Albert, Lehninger et al. Biochemistry. 5th ed. New York: Worth Publishing, 2008

Brandon and Tooze. Introduction to protein structure. New York: Garland Publishing, 2000

Conn, E.E. and Stumpf. Biochemistry. 4th ed. New York: Wiley Eastern, 1976.

Glick, R. Bernard. Pasternak, J. Jack. Molecular biotechnology, Principles and applications of Recombinant DNA. 2nd ed. Washington: Asm Press, 2005.

Lubert, Stryer. Biochemistry, 5th ed. New York: W.H. Freeman, 2009.

Jain, J.L. Fundamentals of Biochemistry**,** 4th ed. New Delhi: S. Chand and Company, 2008.

Jeremy, M. Berg. Biochemistry. 5th ed. New York: W.H. Freeman, 2001.

Voet, D. and Voet, G.Biochemistry**,** 2nd ed. New York: John Wiley and Sons, 2007.

END SEMESTER EXAMINATION

Total Marks: 100 Duration : 3 Hours

QUESTION PAPER PATTERN

Section A – 20 x 1 = 20 Marks (All questions to be answered, questions to be of objective type: MCQ'S, fill in the blanks, T/F, Match and answer in a line or two)

Section B – 5 x 8 = 40 Marks (5 out of 7 to be answered)
Section C – 2 x 20 = 40 Marks (2 out of 3 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE: BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 - 2012)

ADVANCED PHYSICAL CHEMISTRY

CODE: 11CH/PC/PC 34

CREDITS: 4

T P: 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To learn to integrate thermodynamics with quantum statistics
- To appreciate and correlate theoretical concepts and experimental details
- To realize the importance of kinetics of Chemical transformations and reactions
- To learn theories of electrolysis
- To encourage a problem solving approach to learning

Unit 1 (18 hrs)

Statistical Thermodynamics

1.1 Introduction to language of statistical mechanics (Permutation, Probability), microstates, distributions and the most probable distribution, evaluation of Boltzmann parameters using Lagrange's method of undetermined multipliers, Stirling approximation.

1.2 Partition function, evaluation of translational, rotational, vibrational and electronic partition functions for ideal gases, N particles(distinguishable and indistinguishable) systems

1.3 Applications: Calculation of thermodynamic properties in terms of partition function, heat capacities of ideal gases, heat capacity of solids, residual entropies, equilibrium constant.

Unit 2:

Quantum Statistics (13hrs)

2.1 Bose-Einstein and Fermi-Dirac Statistics, Comparison between Bose-Einstein, Fermi-Dirac and Boltzmann Statistics, Application to radiation and electron gas in metals

2.2 Entropy production and entropy flow pertaining to Chemical reactions in homogenous systems.

2.3 Irreversible processes relating to mass, electricity and heat exchanges between two homogenous isotropic phases, Phenomenological equations and Onsager reciprocity relation

Unit 3 **(12 hrs)**

Molecules in Motion

3.1 Accounting for rate laws: simple reactions, temperature dependent on reaction rates, consecutive reactions(rate determining steps approximation and steady state approximation), pre-equilibria and unimolecular reactions Lindemann- Hinshelwood mechanism

3.2 Kinetics of complex reactions- chain reactions, polymerization reactions, explosions Photo chemical reactions, oscillating reactions.

3.3 Molecular reaction dynamics: collision theory, steric factor, diffusion controlled reactions, activated complex theory, Eyring equation, reaction coordinates and transition state, thermodynamic aspects, reaction between ions, Effect of solvent on reaction rates, Effect of ionic strength on reaction rates (salt effects), dynamics of molecular collisions (molecular beams), potential energy surfaces.

Unit 4 **(14 hrs)**

Theories of Electrochemistry

4.1 Electrodes and electrochemical cells-evaluation of thermodynamic quantities

4.2 The electrical double layer at the electrode – electrolyte interface, Models:Helmholtz Perrin Model, Gouy-Chapmann model and Stern model, potentials (Galvanic and voltaic) – theory of multiple layer capacity – electro-capillarity – Lippmann potential – structure of double layers.

4.3 Diffusion – electro kinetic phenomena – membrane potential .I – E Variation – different types of overpotentials – Butler – Volmer equation for one electron transfer (derivation not required), Tafel plots, exchange current density – standard rate constants – transfer coefficient – Tafel andNernst equations – Polarisation. Rate determining step in electrode kinetics – The Hydrogen overvoltage, Oxygen overvoltage – Anodic and cathodic processes – redox reactions. Fuel cells: oxygen-hydrogen fuel cells.

Unit 5:

Surface chemistry: **(8 hrs)**

5.1 Adsorption isotherms, Gibb's adsorption isotherm, BET isotherm, Harkins-Jura equation, determination of surface area.

5.2 Heterogeneous catalysis: catalytic activity at surfaces, Adsorption and catalysis- The Eley- Rideal mechanism, Langmuir- Hinshelwood mechanism, molecular beams studies, Examples of catalysis- hydrogenation, oxidation, cracking /pyrolysis and reforming.

Self study to be tested internally

- Batteries: Working principle, cell reactions, cell performances of Ni-Cd batteries

  Lithium batteries- primary and secondary, Li-based conducting polymer batteries, molten carbonate fuel cells, solid polymer electrolytes fuel cell.

- Cold fusion Experiments

BOOKS FOR REFERNECE

Nash, K.N., Elements of Statistical Thermodynamics, New York, Dover, 1986.

M.C.Gupta, Statistical Thermodynamics, 2nd ed., New Delhi, New Age International, 1998.

M.Dole, An introduction of Statistical Thermodynamics, New York, Dover, 1986.

Rajaram J. and Kuriacose J.C. Kinetics and Mechanism of Chemical Transformations**,** 3rd ed. New Delhi: Macmillan India Ltd., 1993.

E.D.Kaufmann, Advanced concepts in Physical Chemistry, New York, McGraw Hill, 1966.

R.Hasse, Thermodynamics of Irreversible Processes, London, Addison Wesley, 1969

Barrow Gordon, M. Physical Chemistry**,** New York: Orient Longman Publishers, 1977.

Castellan, G.W., Physical Chemistry**,** 3rd ed. New Delhi: Addison – Wesley / Narosa Publications. 2004.

Peter Atkins and Jolio de Paula. Atkins Physical Chemistry**,** 7th ed. Oxford: Oxford Press, 2002.

Kuriacose, J.C. and Rajaram J. Thermodynamics for Students of Chemistry, 3rd ed. New Delhi: Sultan Naginchand and Co. 1999.

Viswanathan B., Sundaram S., Venkataraman R., Rengarajan K., Raghavan P.S. Electrochemistry–Principles and Applications. Chennai: S. Viswanathan Pvt. Ltd., 2007.

Narayan,R and Viswanathan, B., Chemical and electrochemical energy systems, University Press. 2003.

D.Chandler, Introduction to modern Statistical mechanics, Oxford university press. 1997.

D.A.McQuarrie and J.D.Simon, Molecular Thermodynamics, Sansalito, University Science books,. 1999

A.W.Adamson and A.PGast, Physical Chemistry of surfaces, New York, Wiley. 1997

Y.K.Lim, Problems and solutions on thermodynamics and Statistical mechanics. Singapore, World Scientific, 1990.

END SEMESTER EXAMINATION:

Total Marks: 100 Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 20 x 1 = 20 Marks (All questions to be answered, questions to be of objective type: MCQ'S, fill in the blanks, T/F, Match and answer in a line or two)

Section B – 5 x 8 = 40 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 3 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE: BRANCH IV - CHEMISTRY

SYLLABUS
(Effective from the academic year 2011 - 2012)

ORGANIC SEPARATION AND ANALYSIS - PRACTICAL

CODE: 11CH/PC/P324 **CREDITS : 4**
L T P : 0 0 6
TOTAL HOURS : 78

Unit 1

Preparation of Reagents used for Qualitative Organic Analysis
Tollen's reagent, Fehling's Reagents A & B, Barfoed's reagent, Benedict's Reagent, Molisch's reagent, Bromine Water, Brady's reagent, Schiff's reagent

Unit 2

Separation and analysis of a mixture of two organic compounds

- Solvent separation based on solubility in acid, base or neutral media.
- Pilot separation & Bulk separation.
- Identification of functional groups, Preparation of derivatives for functional groups and determination of their melting points.
- Compounds can be separated using Soxhlet and rotary vaccum evaporator (demonstration only)
- Identification of separated compounds & derivatives using UV&IR(demonstration only)

A comprehensive viva will be conducted during the practical hours.

BOOKS FOR REFERENCE

Ahluwalia, V.K. Renu Aggarwal. Comprehensive Practical Organic Chemistry-Preparation and Quantitative Analysis**.** ., Hyderabad :University Press (India), Ltd: 2000.

Mohan J. Organic Analytical Chemistry – Theory and Practice**.** New Delhi: Narosa Publishing House,: 2003.

Raj., K. Bansal. Laboratory Manual of Organic Chemistry**.** 3rd Ed., New Delhi: Wiley Eastern Limited, New Delhi, 1994.

Vogel A.I. Elementary Practical Organic Chemistry Part II, Qualitative Organic Analysis**.** New Delhi: CBS Publishers, , 1998.

Unit 1 to be tested internally

END SEMESTER EXAM:

Total Marks : 50 Duration : 6 hours

Pilot test	**: 3 marks**

For each compound:

Aliphatic/Aromatic	: 2 marks
Saturated/Unsaturated	: 2 marks
Special Elements	: 3 marks
Procedure	: 4 marks
Derivative	: 2 marks
Functional Group	: 4+2 marks
Melting point	: 2 marks
Total	**: 21**

For two compounds : 2 x 21	**: 42 marks**
Viva voce	**: 5 marks**
TOTAL	**: 50 marks**

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI-600086.

Post Elective Course Offered by the Department of Mathematics for M.A. / M.Sc. / M.Com Degree Programme

SYLLABUS

(Effective from the Academic Year 2011 - 2012)

MEDICINES AND HEALTH CARE

CODE:11CH/ PE/MH 34

CREDITS: 4
L T P : 4 0 0
TOTAL TEACHING HOURS : 52

OBJECTIVES OF THE COURSE

- To give an overview of medicines in day to day life - a field of interest to humanity
- To enlighten students on the application of chemistry to keep good health.

Unit 1 **(5 hrs)**

General Introduction to drugs

1.1 Terminology- Pharmacy, Pharmacology, Pharmacodynamics, Pharmacokinetics, Antimetabolites, Mutation, Pharmacognosy, Toxicology, Pharmacotherapeutics, Chemotherapy, therapeutic index
1.2 Classification of Drugs-Biological, chemical and commercial classification.
1.3 Diseases – Communicable and Non Communicable, Pathogens – Bacteria, Virus, Fungi, Protozoans

Unit 2 **(10 hrs)**

Common Diseases And Their Treatment By Drugs

2.1 Common diseases: insect borne -Malaria, air borne - whooping cough, measles, common cold and TB. Waterborne -Cholera, typhoid, dysentery- Etiology, symptoms, prevention and remedy.
2.2 Common disorders of the digestive system –Hepatitis A and B; respiratory system- Asthma; nervous system- Epilepsy. Prevention and treatment.
2.3 AIDs, HIV1, HIV 2 – Awareness, prevention and treatment
2.4 Fungal dermatitis – anti fungal drugs.

Unit 3 **(10 hrs)**

Blood and Hematological agents

3.1 Blood pressure, hypertension-cause, diet, prevention. Antihypertensive agents -Aldomet, reserpine.

3.2 Clotting of blood- mechanism, haematological agents, anaemia –causes and control- antianaemic drugs.
3.3 Cardiovascular diseases- Cardiac glycosides-Digoxin, antiarrhythmic drugs-Quinidine- dosage, therapeutic uses-Calcium blockers.
3.4 Antianginal agents- nitriles, vasodilators-Sodium Nitroprusside, Papaverine, nicotinic acid

Unit 4 **(10 hrs)**

Drugs in daily life

4.1 Anaesthetics- types-general, local, intravenous – (ether, $CHCl_3$, halothane, nitrous oxide, Cocaine), - advantages and disadvantages.
4.2 Antiseptics and disinfectants- (Phenols, chloramines, bleaching powder, Dyes-Crystal violet).
4.3 Analgesics, anti pyretic and anti-inflammatory agents- narcotic and non-narcotic drugs-morphine, source, activity and uses – (pethadine, aspirin, paracetamol, phenyl butazione, brufen).

Unit 5 **(17 hrs)**

Drugs of Importance

5.1 Sulpha Drugs – use of sulpha drugs-limitations-(sulphapyridine and sulphadiazine).
5.2 Antibiotics-Classification - therapeutic uses of Chloramphenicol, Penicillin-potency of the drug, (Streptomycin, tetracyclines, Erythromycin).
5.3 Antipsychotic drugs- tranquiliser (piperazine, benzamides), adverse effects; antidepressants-sedatives and hypnotics- (barbiturates).
5.4 Diabetes – Types – hypoglycemic agents, sugar substitutes.
5.5 Cancer causes - types – treatments - antineoplastic drugs - antimetabolites and plant products; hormone therapy and adrenocortecosteroids, radioactive isotopes.

BOOKS FOR REFERENCE

Alex, Kaplan, Laverne L. Szabo, Kent E. Opheim, Clinical Chemistry Interpretation and Techniques. 3rd ed. USA: Lea and Febiger, 1988.

Bagavathi Sundari.K Applied Chemistry MJP publishers, 2006

Chockalingam and Devadasan. Pharmaceutical Chemistry. V.V. Publications, 1990.

Craig R., Robert. E., Stitzel. Modern Pharmacology. 4th ed. USA: Little Brown and Co, 1994.

David, A. Williams, Thomas L. Lemke. Foye's Principles of Medicinal Chemistry. 5th ed, Lippincott Williams & Wilkins, 2005.

Graham, Patrick. An Introduction to Medicinal Chemistry**.** 2nd ed. Oxford University Press, 2001.

Jayasree Ghosh. A text book of Pharmaceutical Chemistry. 1st ed. New Delhi: S.Chand & Co Ltd, 1997.

John, H. Block, John M. Beale, Jr. Organic Medicinal and Pharmaceutical Chemistry**,** 11th ed. Lippincott Williams & Wilkins, 2004.

Sujatha, V. Bhat. Biomaterials. 2nd ed. Chennai: Narosa Publishing House, 2005.

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END SEMESTER EXAMINATION

Total Marks: 100 Duration : 3 Hours

QUESTION PAPER PATTERN

Section A – 20 x 1 = 20 Marks (All questions to be answered, questions to be of objective type: MCQ'S, fill in the blanks, T/F, Match and answer in a line or two)

Section B – 5 x 8 = 40 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 3 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI-600086

M.Sc DEGREE:BRANCH IV- CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 - 2012)

SYNTHETIC ORGANIC CHEMISTRY AND NATURAL PRODUCTS

CODE:11CH/PC/SO44
CREDITS : 4
L T P : 4 1 0

TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE

- To understand the application of photochemistry in organic reactions.
- To perform retro synthetic analysis and identify the target molecule
- To design synthesis of a given compound
- To appreciate the role of reagents in the synthesis of organic compounds
- To impart the knowledge on the extraction and synthesis of natural products.

Unit 1 **(16 hrs)**

Photochemistry and Pericyclic reactions

1.1 Fundamentals of photochemistry, Jablonski diagram

1.2 Cis-trans isomerisation, Paterno Buchi reaction ,Norrish type-I and type-II reactions, di-pimethane rearrangement.

1.3 Photochemistry of cyclohexadienones ,Photoreduction of ketones,, Photooxidation of olefins.

1.4 Pericyclic reactions: classification, orbital symmetry, Woodward-Hofmann rules (con & dis rotation).

Electrocyclic reactions-thermal and photochemical(cyclisation and ring openings). Stereochemistry, FMO and correlation diagrams for butadiene to cyclobutene and 1,3,5-hexatriene to 1,3- cyclohexadiene systems.

Cycloaddition reactions- thermal and photochemical, stereochemistry, FMO and correlation diagrams of (2+2 and 4+2) reactions. Stereochemistry of 1,3 dipolar reactions

1.5 Sigmatropic rearrangements – Cope, oxy-Cope and Claisen rearrangement.

1.6 Fluxional molecules – Homotropylidene, barbaelone, bullvalene.

Unit 2 **(14 hrs)**

Strategies for synthesis

2.1 Analysis, identification of synthons and planning for synthesis of organic Compounds.

2.2 Introduction, removal and interconversion of functional groups

2.3 Protection, activation of functional groups, removal of protecting groups

2.4 Retrosynthetic analysis- Alternate synthetic routes. Synthesis of organic mono and bifunctional compounds via disconnection approach. Umpolung synthesis.

2.5 Stereochemical control of products-selective aldol and Michael reactions.

Unit 3 **(13 hrs)**

Novel reagents in organic synthesis

Use of the following reagents in organic synthesis and functional group transformations:

3.1 Diborane, OsO_4, NBS, Phenylisothiocyanate, DCC, lead tetra acetate, PCC, Tosyl chloride, trifluoroacetic acid, DDQ, selenium dioxide, TMSI, Gilmann reagent.

3.2 Organometallic reagents-n-butyl lithium, LDA, LAH, tri-n-butyl tin hydride, Organo Aluminium, Copper, Cobalt, ,Znic, Palladium compounds

3.3 Wilkinson catalyst, Bakers yeast.

Unit 4 **(12 hrs)**

Alkaloids,Terpenoids and Steroids

4.1 General methods of Structure determination of alkaloids, terpenoids and steroids

4.2 Structure elucidation of zingiberine (terpenoid), papaverine (alkaloid),

Unit 5 **(10 hrs)**

Flavonoids

5.1 General methods of structure determination of flavonoids.

5.2 Structure elucidation of Apigenin (flavones), Quercetin (flavonols) and Daidzein (isoflavones).

5.3 Distinction of flavonoids by characteristic colour reactions and absorption spectra (UV-Visible).

Self study to be tested internally

- Occurrence and methods of extraction of natural products
- Spectral details of alkaloids and terpenoids
- Reactions of flavonoids
- Reactions of steroids

BOOKS FOR REFERENCE

Agarwal, O.P. Reactions and Reagents**,** Meerut: Goel Publishing House, 2003.

Ahluwalia V.K. & Parashar R.K. Organic Reaction Mechanisms, New Delhi : Narosa Publishing House, 2002.

Finar I.L. Organic Chemistry, Volume II, 5th ed. London: ELBS, 2000

Francis A. Cary and Richard J Sundburg. Advanced Organic Chemistry**,** New York: Plenum Press, 2004.

A.Gilbert,Norman S.Allen, Photochemistry**,** Vol 36, RSC Publishing, 2007.

Jerry March. Advanced Organic Chemistry, 3rd ed. New York: Wiley Interscience Publication, 1993.

Michael Harmata ,Strategies and tactics in organic synthesis,Vol 7, London, Academic Press, 2008.

Nicholas J.Turro, Modern Molecular Photochemistry , USA, University science books, 1991.

Reinhard Bruker. Advanced Organic Chemistry- Reaction Mechanisms, New York: Academic Press, 2003.

Sujata V. Bhat, Bhimsa A. Nagasampagi, Meenakshi Siva kumar, Chemistry of natural Products , India, Narosa, 2005.

Warren S. Designing of Organic Synsthesis- a programmed introduction to the Synthon approach, New York: Wiley, 1978.

Warren S. Organic Synthesis- the Disconnection Approach, New York: Wiley, 1978.

Warren S Workbook for Organic Synthesis, New York: Wiley, 1978.

END SEMESTER EXAMINATION:

Total Marks: 100 Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 20 x 1 = 20 Marks (All questions to be answered, questions to be of objective type: MCQ'S, fill in the blanks, T/F, Match and answer in a line or two)

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STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086

M.Sc DEGREE: BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 - 2012)

NANOCHEMISTRY

CODE: 11CH/ PE/NC44 **CREDITS : 4**

L T P : 4 0 0

TOTAL TEACHING HOURS : 52

OBJECTIVES OF THE COURSE.

- To study the top-down and bottom-up approaches to nanochemistry
- To describe methods by which nanoscale manufacturing can be enabled..
- To discuss the concept and context of nanotechnology within society

Unit 1 **(10 hrs)**

Introduction

1.1 Concepts of Nanoscience and nanotechnology

1.2 Classification of nano materials, properties and applications

1.3 Self assembly – Materials and molecules, Self Assembled Monolayers, (SAM) and Soft lithography.

1.4 Nanowires and Nanomachines, Techniques used in nanochemistry and nanomanipulation.

Unit 2 **(13 hrs)**

Fabrication of Nanoparticles

2.1 Techniques for synthesis of nanophase materials - sol-gel synthesis , electrodeposition, inert gas condensation, CVD, PVD,mechanical alloying.

2.2 Properties of nanophase materials –Size effects-Kinetics and thermodynamic features of nano materials. applications of nanophase materials.

Unit 3 **(12 hrs)**

Nanocomposites and Metal atoms

3.1 Introduction, Polymer as matrix, Nylons, Polystyrene, Epoxyresins, Nanomaterials as fillers – Nanofibre and Nanoclays.

3.2 Fabrication and processing of composites, nanostructured materials, applications of nanocomposites.

3.3 Techniques used in the synthesis of pure metals – Gold, Silver and Cobalt. Characterisation- Surface plasmon resonance and its application.

Unit 4 **(12 hrs)**

Experimental techniques in nanochemistry

4.1 Experimental techniques- Instrumentation and structure determination studies: Transmission electron microscopy (TEM),Scanning electron

microscopy (SEM) Scanning tunneling microscope (STM), Atomic force microscopy (AFM)
X ray diffraction (XRD)

Unit 5 (5 hrs)

Interfaces of nanoscience

5.1 Nanomaterials interface with biological systems, environmental and health aspects.

5.2 Social implications of nanoscience and technology.

Self study to be tested internally

- *Examples of some nanosystems like carbon nanotubes, semiconductor quantum dots, core-shell nanoparticles etc and their applications could be included.*
- Application of biology and medical science.

BOOKS FOR REFERENCE

P.Atkins, T.Overton, J.Rourke, M.Weller and F.Armstrong, Shriver &Atkins Inorganic Chemistry. Chennai: Oxford University Press, 2006.

C. Brechigneae, P. Houdy, M. Lahmai, Nanomaterials and Nanochemistry. Berlin: Springer, 2007.

Kenneth J.Klabunde. Nanoscale materials in Chemistry. New York: John Wiley & Sons, 2001.

Pradeep T, Nano: The essentials - understanding Nanoscience and Nanotechnology. New Delhi: McGraw Hill Education, 2007.

C.P.Poole and F.J.Owens, Introduction to Nanotechnology. Hoboken: Wiley-Interscience 2003.

Rao,C.N.R Muller, Achim, Cheetham,K Anthony, The Chemistry of Nanomaterials-Synthesis,Properties and Applications. New York: Wiley-VCH, 2004.

M. Ratner and D.Ratner, Nanotechnology:The Next Big Idea, New York: Prentice Hall, 2003

J. W. Steed, D. R.Turner, K. Wallace, Core Concepts in Supramolecular Chemistry and Nanochemistry, Wiley, 2007.

H. Watarai, N. Teramae, Tsugo Sawada, Interfacial Nanochemistry. Springer, 2005.

Wilson, M. K. Kannangara, G. Smith, M. Simmons and B.Rague. Nanotechnology: Basic Science and Emerging Technologies. CRS Press, 2002.

END SEMESTER EXAMINATION

Total Marks: 100 Duration : 3 Hours

QUESTION PAPER PATTERN

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STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE: BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 - 2012)

ORGANIC SYNTHESIS AND PURIFICATION - PRACTICAL

CODE: 11CH/PC/P4 34 **CREDITS : 4**

L T P : 0 0 6

TOTAL HOURS : 78

Unit 1

Purification and of Organic compounds- Paper chromatography/TLC / Column chromatography (to be tested internally)

Unit 2

Organic Preparation

2.1 Single Step Preparations

- 2.1.1 Preparation of o-chloro benzoic acid (Sandmeyer reaction)
- 2.1.2 Preparation of methyl orange (Diazotisation)
- 2.1.3 Preparation of Benzpinacol (Photoreduction)
- 2.1.4 Preparation of Benzoicacid and benzyl alcohol (Cannizaro Reaction)
- 2.1.5 Preparation of Benzil (Oxidation)

2.2 Two Step Preparations

- 2.1.1. Preparation of p-bromo acetanilde from aniline (Acetylation, Bromination)
- 2.1.2. Preparation of s-tribromo benzene from aniline (Bromination, Reduction)
- 2.1.3. Preparation of m-nitroaniline from nitrobenzene (Nitration, Reduction)

2.3 Microwave assisted Preparations

- 2.3.1. **Preparation of Fluorescein (Xanthene dye)**
- 2.3.2. **Preparation of Benzalacetophenone (Clasien Schmidt condensation)**
- 2.3.3. **Preparation of ethyl-2-cyano-3-(4-methoxy phenyl)propenoate (Knovenegal reaction)**

Note :

Spectroscopic identification / purification by chromatographic methods wherever applicable.

BOOKS FOR REFERENCE

Mohan, J. Organic Analytical Chemistry – Theory and Practice. New Delhi: Narosa Publishing House, 2003.

Raj, K. Bansal. Laboratory Manual of Organic Chemistry**.** 3rd ed. New Delhi: Wiley Eastern Limited, 2003.

Vogel A.I., Elementary Practical Organic Chemistry Part I, Small Scale Preparation, New Delhi: CBS Publishers, 1998.

END SEMESTER EXAMINATION:

Total Marks :50 marks Duration : 6 hours

Viva Voce : **5 Marks**
Procedure for the Preparation : 5Marks

(i) Two Stage Preparation : (40 marks)

Quantity of Product 1 = 15 Marks
Quantity of Product 2 = 15 Marks

Quality of Final Product
a) Recrystallisation = 5 Marks
b) Melting Point = 5 Marks

OR : 40 Marks

(ii) Two Single Stage Preparations : (40 marks)

Quantity of Product = 10 Marks (each)

Quality of Final Product
a) Recrystallisation = 5 Marks (each)
b) Melting Point = 5Marks (each)

TOTAL : 50 marks

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE : BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 - 2012)

DISSERTATION

CODE :11CH/PC/DI48 **REDITS : 8**

GUIDELINES FOR DISSERTATION

Project should be done individually. Each student will choose a topic of her interest and the student will be assigned to a supervisor.

The project will require practical work with the submission of a project report. It should include experimental lab work. The duration of the project work is between 3 and 6 months

The project report should be submitted in the prescribed format containing a minimum of 50 pages. References should not be counted with the main pages. The report should be enhanced with graphs, spectra, tables and or photographs.

Each candidate has to give three periodical reviews to the internal guide on the scheduled dates prescribed by the department.

Each candidate can prepare 4 hard copies of the thesis. 1 copy for her and 3 copies must be submitted to the department. The project should be submitted on the scheduled date prescribed by the Department. The student should appear for Viva-voce before a panel comprising the External Examiner, the supervisor and the Head of the Department.

Guidelines for Evaluation
The maximum marks for the dissertation is 200 and **this will be converted to 100 marks by Controller of Examination**

Internal evaluation : 100

* attendance, log book, experimental work and project report

External evaluation : 100

* project report and *viva voce*

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE: BRANCH IV - CHEMISTRY

SYLLABUS
ANALYTICAL INSTRUMENTATION - PRACTICAL

CODE :11CH/PC/P222

CREDITS : 2
L T P : 0 0 3
TOTAL HOURS : 39

Colorimetry

1. Estimation of Vitamin- A / Cholesterol
2. Estimation of stability constants of complexes

Spectrophotometry

3. Estimation of DNA / RNA
4. Simultaneous determination of caffeine and aspirin .

Fluorimetry

5. Estimation of Riboflavin/Thyamine/ Fluorescein .

Flame Photometry

6. Estimation of Sodium /Potassium.

Thin Layer Chromatography

7. Rf determination and separation of a mixture of aminoacids

Statistical treatment of data

8. Estimation of Mn/Fe.

Infrared spectroscopy [Demonstration]

9. Interpretation of IR spectra.

BOOKS FOR REFERENCE

Alexander Findlay. Practical Physical Chemistry. 7th ed. London: Longman Green and Co Ltd., 1967.

National Institute of Nutrition, ICMR. A Manual of Laboratory Techniques . Hyderabad: National Institute of Nutrition, 1983.

Plummer,David.T. An Introduction to Practical Biochemistry. New Delhi: Tata McGraw Hill Publishing Company Ltd.,2000.

Sadasivam S and Manickam A. Biochemical Methods, New Delhi: New Age International , 1996.

Venkateswaran V. Veerasamy, R. Kulandaivelu A. R. Principles of Practical Chemistry. 2nd ed. New Delhi: Sultan Chand and Sons, 1997.

Viswanathan, B. and Raghavan, P.S. Practical Physical Chemistry, New Delhi: Viva Books Pvt. Ltd., 2005.

END SEMESTER EXAMINATION:

Total Marks : 50 Duration : 3hours

Procedure = 10 (marks)

Vivavoce = 5 (marks)

Reported value = 35 (marks)

Continuous assessment Internal:

Class Work = 30 (marks) – inclusive of *viva*

CA Test = 20 (marks)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE: BRANCH IV - CHEMISTRY

SYLLABUS

PHYSICAL CHEMISTRY – PRACTICAL

CODE :11CH/PC/P532

CREDITS: 2
L T P : 0 0 3
TOTAL HOURS : 39

Phase rule

1. Three component system(water- Toluene- Acetic acid)

Solubility product

2. Variation of the solubility of (calcium sulphate /Zinc Sulphate/ Nickel sulphate) with ionic strength and hence determine the thermodynamic solubility product (complexometric titration with EDTA)

Chemical Kinetics

3. Effect of ionic strength on the reaction rate : Persulphate and potassium iodide reaction.
4. Kinetics of hydrolysis of t-butyl chloride (by conductometric measurements)

Viscometery

5. Determination of relative molecular mass / intrinsic viscosity of polystyrene from viscosity measurements

Partial Molal Quantities

6. Determination of Partial molal volume of methanol in dilute aqueous solutions (by method of intercepts)

Conductometry

7. Determination of critical micelle concentration conductometrically.
8. Titration of mixture of three acid (trichloroacetic acid, dichloroacetic acid and acetic acid) conductometrically.

pH metry

9. Determination of pKa values of glycine /Maleic acid / phosphoric acid potentiometrically using glass electrode.

Spectrophometer

10. Determination of the composition and stability constant of a complex formed between iron(III) ions and salicylic acid by Job's method.

BOOKS FOR REFERENCE

Alexander Findlay. Practical Physical Chemistry. 7th ed. London: Longman Green and Co Ltd., 1967.

National Institute of Nutrition, ICMR. A Manual of Laboratory Techniques . Hyderabad: National Institute of Nutrition, 1983.

Plummer,David.T. An Introduction to Practical Biochemistry. New Delhi: Tata McGraw Hill Publishing Company Ltd.,2000.

Sadasivam S and Manickam A. Biochemical Methods, New Delhi: New Age International , 1996.

Venkateswaran V. Veerasamy, R. Kulandaivelu A. R. Principles of Practical Chemistry. 2nd ed. New Delhi: Sultan Chand and Sons, 1997.

Viswanathan, B. and Raghavan, P.S. Practical Physical Chemistry, New Delhi: Viva Books Pvt. Ltd., 2005.

END SEMESTER EXAMINATION :

Total Marks : 50 Duration : 3 hours

Procedure = 10 (marks)

Vivavoce = 10 (marks)

Reported value = 30 (marks)

Continuous assessment Internal: 50 marks

Class Work = 30 (marks) – inclusive of *viva*

CA Test = 20 (marks)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE: BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 - 2012)

RESEARCH METHODOLOGY

CODE: 11CH/PC/RM 14

CREDITS : 4

L T P : 3 0 2

TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE

- To expose students to the developing avenues in Chemistry
- To give a training in seminars, group work ,communication and thesis writing.
- To equip the students to use computing techniques in solving problems, visualise and draw the molecules.
- To enable them to simulate spectral data for the given molecules using online data.

Unit 1 **(10hrs)**

Chemical Literature

1.1 Sources of Chemical information – primary, secondary and tertiary sources.

1.2 Indexes and abstracts in science and technology. Chemical abstracts, chemical titles, current chemical reactions, current chemical contents Science citation index and impact factor.

1.3 Online Literature Search- Sci finder and science direct

Unit 2 **(10hrs)**

Research reports and Thesis writing

2.1 The art of Scientific Writing – Forms of scientific writing, Research reports, Theses, Journals articles and books.

2.2 Format of research report- Chemical nomenclature, quantities, figures, tables, footnotes / notes, heading, pagination, citations& bibliography, proof reading.

2.3 Plagiarism, copyright and Patent Laws.

2.4 Academic writing skills- APA and MLA writing format

***Unit 3** **(15hrs)**

Topics on New Frontiers in chemistry

3.1 Chemistry and Nature - Green Chemistry, Astrochemistry, Herbal Chemistry, Phytochemistry,

3.2 Synthetic Chemistry - Medicinal Chemistry, Supra molecular Chemistry, Macrocyclic Chemistry,

3.3 Material Science - Nanotechnology, Nano clusters , Nano dendrimers, Photo electronoics, Cheminformatics.

Unit 4 **(15hrs)**

MS Excel and mathematical concepts in chemistry

4.1 Components of Excel – Spreadsheets, database, chart and building up workbooks.

4.2 Building formulae user mode and statistical functions, formatting cells

4.3 Managing and organizing data - creating link, analyzing data.

4.4 Plotting data - Evaluation of analytical functions, transferring data and graph interpretation

4.5 Solving problems from physcial chemistry (chemical kinetics, phase rule, Lother Meyer Graph of atomic volume, entropy ,heat capacity Calculations), analytical chemistry (statistical problems)

4.6 Simple functions and graphs, plotting exercises on most useful functions in chemistry-the exponential, the Gaussian, polynomial functions used in chemistry.

Unit 5 **(15 hrs)**

Computational techniques in chemistry

5.1 Chemdraw -Writing chemical equation schemes using software, editing, transporting picture to word document.

5.2 Building molecules, measurement of bond angles, bond energy and bond length.

5.3 Energy minimization techniques- Basic concepts and simple applications to geometry and molecular properties such as dipole moments and thermochemical properties.

5.4 Basics of molecular mechanics - force fields, potential model for bond stretching, bending, dihedral angles.

5.5 Use of Internet in chemical research-spectral, data simulated results from web sources.

* Unit 3- Seminar Presentation – tested internally

Self study to be tested internally

- To collect list of journals, reviews etc.,
- To take papers of articles from journals for understanding the formatting of a research paper
- To use chem. 3D pro to understand the structures of molecules.
- To use matlab for the study of eigen value, eigen function & schrodinger wave equation.

BOOKS FOR REFERENCES

Gopalan R. Thesis writing**.** Chennai : Vijay Nicole Imprints Private Ltd., 2005.

Janet C. Dodds. The ACS Style Guide – A Manual for Authors and Editors**.** American Chemical Society Publishers, 1998.

Jerry March. Advanced Organic Chemistry. 4th ed. New York: Wiley Interscience Publications, 1992.

Nature, Science, Chemistry in Britain and other journals, magazines, (2000–till date)

Carley, A.F. and P.H., Morgan. Computational Methods in Chemical Sciences**.** Chi Chester: Ellis Horwood Ltd., 1989.

Christopher J. Cramer. Essentials of Computational Chemistry**.** Theories and Models. 2nd ed. Wiley, 2004.

Johnson, K.J. Numerical Methods in Chemistry**.** New York: Marcel Dekkar, 1980.

Leach A. R. Molecular Modeling Principles and Practice. 2nd ed**.** Prentice-Hall, 2001.

Lewars Errol. Computational Chemistry-Introduction to the theory and applications of molecular and Quantum Chemistry**.**.NY: First Education Springer 2003, Indian Education, 2006.

Softwares:
Data Management/Mining -CHED, ChemFileBrowser, ChemTK,ChemTree, DiscoveryCenter;

Drawing and Nomenclature-ChemDraw Net Plugin, ChemInnovation

<http://www.ndsu.nodak.edu/qsar_soc/resource/software.htm>

END SEMESTER EXAMINATION:

Total Marks: 100 Duration: 3 Hours

QUESTION PAPER PATTERN

Theory - 1½ hours – 50 marks (Unit 1, 2, 4 and Unit 5)

Section A – 10 x 2 = 20 Marks (10 out of 12 to be answered)
Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Practical - 1½ hours – 50 marks (Unit 4 and Unit 5)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086
M.Sc. DEGREE : BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 - 2012)

INORGANIC QUALITATIVE AND QUANTITATIVE ANALYSIS - PRACTICAL

CODE :11CH/PC/P1 14

CREDITS : 4
L T P : 0 0 6
TOTAL HOURS : 78

Unit 1

Semimicro Qualitative Analysis

Analysis of four cations- two rare cations and two common cations- in a salt mixture.

Unit 2

Quantitative Analysis
Complexometry : Estimation of Mg^{2+}, Zn^{2+}, Ca^{2+} and Ni^{2+}
Cerimetry : Estimation of Fe^{2+} / Oxalic acid
Determination of Chlorine in bleaching powder.

Unit 3

Preparation of Inorganic Complexes
Tetraammine copper (II) sulphate
Tris (thiourea) copper (I) sulphate
Hexammine cobalt (III) chloride
Bis (acetylacetanato) (II) / Bis (acetylacetanato) nickel (II)

A comprehensive viva will be conducted during the practical hours.

BOOKS FOR REFERENCE

Ramanujam V.V. Inorganic Semimicro Qualitative Analysis**.** Chennai: National Publishing House, 1995.

Mendham J. Denny R.C., Barnes J.D. and Thomas M, Vogel's Text Book of Quantitative Chemical Analysis. 6th Ed., London: Pearson Education Ltd., 2002.

END SEMESTER EXAMINATION

Total Marks : 100 Duration: 6 hours

- **Inorganic complex preparation** : **15 Marks**

  Preparation – quantity & quality [10]

  Procedure & Structure of the complex [5]

- **Semi micro qualitative analysis** : **40 Marks**

  General Procedure- 10 Marks

  Rare radicals (2 X 10) -20 Marks

  Common radicals – (2X 5) - 10 Marks

- **Volumetric Analysis : 40 Marks**

  Error 1% = 40 Marks

  2% = 35 Marks

  3% = 25 Marks

  Viva **: 5 marks**

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE : BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 - 2012)

STRUCTURAL INORGANIC CHEMISTRY

CODE :11CH/PC/SI 14

CREDITS : 4
L T P : 4 1 0
TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE

- To provide knowledge to appreciate and analyse the chemistry of structurally important compounds.
- To give an overview and understanding of transition metal compounds and organo- metallic compounds.
- To provide fundamental knowledge about industrially important non-transition metal compounds.

Unit 1 **(14 hrs)**

Structure and defects in solids

1.1 Lattice energy, Born Lande equation, packing of ions in crystals,% void, crystal imperfections – stoichiometric defects (Schottky, Frenkel) and non-stoichoiometric defects (F Center) – conductivity by ion migration, factors affecting crystal structures.

1.2 Structures of simple inorganic solids of type AX, AX_2, A_2X_3, perovskite, spinel and inverse spinels.

1.3 Bonding in metals: Band theory and metallic properties. Interstitial compounds, insulators, semi conductors and super conductors. Super conductivity-Principle, Meissner effect.

1.4 Electrical and magnetic properties of solids.

Unit 2 **(8 hrs)**

Techniques of structure determination in solid state

2.1 X-Ray Diffraction studies - Structural determination of NaCl using Powder method.

2.2 Electron and Neutron Diffraction studies- Principles and applications.

Unit 3 **(18 hrs)**

Structure and Chemistry of Organometallic compounds

3.1 Classification of organometallic compounds

3.2 Preparation, bonding and structure of
Metal carbonyls, metal nitrosyls and metal hydride complexes.
Alkyl complexes, carbenes, carbynes, carbides, non aromatic alkene and Alkyne complexes, allyl and pentadienyl complexes, Aryl complexes, carbonyl hydride complexes and dinitrogen complexes.

3.3 Molecular Orbital treatment of metallocenes -Ferrocene.

Unit 4 **(12 hrs)**

Oragnometallic compounds in catalysis

4.1 Olefins-Wilkinson's catalyst, Oxo process, Ziegler- Natta catalysis, Wacker process, cyclo-oligomerisation(Reppe's catalyst).

4.2 Role of catalyst in Monsanto Acetic acid process and in the synthesis of gasoline.

Unit 5 **(13 hrs)**

Structure and Chemistry of non transition and transition metals

5.1 Preparation, properties and structures of hydrides, boranes, phophazenes , carboranes, metallocarboranes, silicates and silicones, supramolecular assembly-Zeolites.

5.2 Preparation, Properties and structures of Iso and Heteropolyacids of Mo and W.

Self study to be tested internally

- Metallocene analogues derived from boranes& carboranes
- Compounds of Mn(VII), Tc(VII) & Re(VII)
- Carbonyl halides & metal clusters
- Hapticity of ligands
- Toxicity of metal ions and role of metal ions in drugs.

BOOKS FOR REFERENCE:

Cotton F.A. and Wilkinson G. Advanced Inorganic Chemistry, 5th Ed., New York: John Wiley & Sons, 1998.

Huheey. James E. and Keiter. Ellen A. Inorganic Chemistry - Principles of Structure and Reactivity , New York: Addison Wesley Publications, 2004.

Jolly W.L. Modern Inorganic Chemistry, New York: McGraw – Hill, Inc., , 1991.

Moeller T. Inorganic Chemistry, New York : John Wiley & Sons, 1982.
Purcell. Keith.F. and Kotz. John C. An Introduction to Inorganic Chemistry, Philadelphia: W.B.Saunders Company, 1982.

Wells A.F., Structural Inorganic Chemistry, London: ELBS, 1981.

West A.R. Solid State Chemistry and its applications. New York: John Wiley & Sons, 1994.

END SEMESTER EXAMINATION

Total Marks: 100 Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 20 x 1 = 20 Marks (All questions to be answered, questions to be of objective type: MCQ'S, fill in the blanks, T/F, Match and answer in a line or two)
Section B – 5 x 8 = 40 Marks (5 out of 7 to be answered)
Section C – 2 x 20 = 40 Marks (2 out of 3 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE : BRANCH IV - CHEMISTRY

SYLLABUS
(Effective from the academic year 2011- 2012)

INDUSTRIAL WASTE MANAGEMENT

CODE :11CH/ PE/IM14 **CREDITS : 4**
L T P : 4 0 0
TOTAL TEACHING HOURS : 52

OBJECTIVES OF THE COURSE

- To expose the students to the present environmental scenario and educate them on the causes and consequences of environmental degradation
- To expose the students to the nature of industrial wastes
- To work towards effective and efficient management of the industrial wastes
- To give an overview of Environmental management , Environmental Impact Assessment and Pollution control measures for working towards Green Earth

Unit 1 **(10 hrs)**

Air Pollution Control

1.1 Air Quality Standards, Classification of air pollutants, sources of air pollution, ozone depletion, Green House Effect – causes and consequences

1.2 Pollution Control of Particulates – gravity settling chamber, cyclone collector, filters, wet scrubbers, electrostatic filters, electrostatic precipitator

1.3 Control of CO, Oxides of nitrogen, Oxides of sulphur, Hydrocarbons, Photochemical pollutants, Green house gases

Unit 2

Treatment and disposal of Industrial Effluents **(12 hrs)**

2.1 Water Quality Standards, sources of water pollution, characterization of waste water by physical and chemical characteristics

2.2 Primary treatment - Sedimentation, neutralization, coagulation, equalization, grid removal Secondary treatment: Aerobic treatment, Oxidation ponds, Oxidation ditches, Trickling filters, Activated Sludge process, Aerated lagoons, Anaerobic treatment Tertiary treatment: Reverse Osmosis, Electro dialysis, Desalination.

2.3 Industrial effluents: Characteristics and treatment options for effluents from various industries: Textiles and Dyes, Paper and pulp , Leather , Food and Dairy , Fertilizers, Electroplating industries, Distilleries.

2.4 Sewage Treatment

2.5 Water conservation, Recycling of waste water and Rain water harvesting

Unit 3

Solid waste management **(10 hrs)**

3.1 Solid Wastes- Types , Characteristics, Solid waste disposal – Sanitary landfills, Vermi composting, Incineration. Waste minimization and recycling,

Unit 4

Environmental Toxicology: (6 hrs)

4.1 Toxicity , Threshold Limiting Value of Pollutants, LD_{50}

4.2 Toxic effects of Pb, As, Cd, Hg, PCBs, Pesticides, heavy metals

4.3 Case studies: Bhopal Gas Tragedy, Chernobyl Accident, Love Canal Episode, Minamata Disease, Itai-Itai disease

Unit 5

Environmental Management (14 hrs)

5.1 Sustainable Development: Definition, Sustainability cycle, Biodiversity, Problems of urbanization and steps towards sustainable development

5.2 Environmental Impact Assessment: Concept, Environmental Risk Assessment, Legal and regulatory aspects in India- Environmental (Protection) Act 1986, Air (Prevention and Control of Pollution) Act 1981, Water (Prevention and Control of Pollution) Act 1981, ISO 14000, Tsunami Disaster.

5.3 Industrial safety and Health: EPA, OSHA – regulations, Polluter Pays Principle

5.4 Global and National efforts: Steps taken towards Green Future at the National and Global level.

5.5 Coastal management

BOOKS FOR REFERENCE

Dara S.S. A Text Book of Environment Chemistry and Pollution Control**,** 7th ed, New Delhi: S.Chand and Co. 2004.

Gaur G. Soil and Solid Waste Pollution and its Management, New Delhi :Sarup and Sons, 2000.

Kent. James. A. Riegel's Handbook of Industrial Chemistry**,** 9th ed, CBS Publishers and Distributors, 1977.

Leelakrishnan. Environmental laws in India, New Delhi: Butterworths, 2002.

Mohan I, Environmental Pollution and Management, New Delhi: Ashish Publications, 1990.

NIIR Board, Modern Technology of Waste Management- Pollution Control, Recycling, Treatment and Utilization, New Delhi: Asia Pacific Business Press Inc., 2003.

Paul L. Bishop, Pollution Prevention - Fundamentals and Practices, New York: McGraw Hill International Edition, 2000.

Sharma B.K. and Kaur H. Environmental Chemistry, 4th ed, Meerut: Goel Publishing House, 1998.

Trivedy R.K. and Raman N.S. Industrial Pollution and Environmental Management, Jodhpur: Scientific Publishers, 2003.

Willen Rudolf. Industrial Wastes Their Disposal and Treatment, Bikaneer: Allied Scientific Publishers, 1997.

END SEMESTER EXAMINATION

TOTAL MARKS: 100

DURATION : 3 HOURS

QUESTION PAPER PATTERN

Section A – 20 x 1 = 20 Marks (All questions to be answered, questions to be of objective type: MCQ'S, fill in the blanks, T/F, Match and answer in a line or two)

Section B – 5 x 8 = 40 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 3 to be answered)

STELLA MARIS COLLEGE(AUTONOMOUS) CHENNAI-86

M.Sc DEGREE : BRANCH 1V –CHEMISTRY

SYLLABUS
(Effective from the academic year 2011 - 2012)

POLYMER MATERIALS AND APPLICATIONS

CODE: 11CH/PE/PM14 **CREDITS : 4**
L T P : 4 0 0
TOTAL TEACHING HOURS : 52

OBJECTIVE OF THE COURSE

To give an introduction to the main concepts and modern developments in polymer chemistry
To understand the techniques of polymer analysis
To motivate the students to pursue research in polymer chemistry

Unit 1 **(10 hrs)**

Introduction to polymer materials

1.1 Polymer chain structure and configuration : Nomenclature , functionality, method of linking.
1.2 Natural polymers and synthetic polymers (PU,PMMA, silicone polymers)- structure, properties and application.
1.3 Types of degradation (thermal, mechanical, ultrasound, photo and bio)
1.4 Speciality polymers-conducting, IPN, Polymer composites - structure, properties and application.

Unit 2 **(8 hrs)**

Mechanism and Kinetics of polymerization

2.1 Types of polymerization (free radical, ionic, graft, copolymerization, and group transfer polymerization)
2.2 Kinetics-Free radical polymerisation , Phase techniques in polymerisation
2.3 Homogenous and heterogeneous catalysts with special reference to Ziegler Natta catalyst

Unit 3 **(10 hrs)**

Molecular weight Distribution

3.1 Number average and Weight average molecular weight
3.2 Determination and methods of absolute molecular weight- Light scattering method, GPC, viscometry and end group analysis.
3.3 Mechanical properties of polymers on the basis of molecular weight
3.4 Intrinsic viscosity- Mark Houwnik equation

Unit 4 **(12 hrs)**

Physical chemistry of polymers

4.1 Thermodynamics of polymer solutions, Flory Higgins theory (Derivation not required) Phase equilibrium , solubility parameter.
4.2 Amorphous and crystalline polymers, conformation of the polymer chain, single crystal spherulites, liquid crystalline polymers.
4.3 Glass transition temperature-Factors influencing, heat distortion and crystallisability.
4.4 Melt rheology of polymers(PVC,PU,PS), stress- strain properties and

viscoelastic behavior of polymers. Basic processing operations(extrusion, mastication, molding, calendaring) Newtonian and non Newtonian behavior of polymers, flow properties of polymer melts and solutions

Unit 5 **(12 hrs)**

Testing of polymers

5.1 Mechanical properties of polymers , hardness , dynamic mechanical testing , stress relaxation , aberration testing- ASTEM method.

5.2 Thermal properties, thermal conductivity, thermal expansion, TGA, DTA,DSC (special reference to PET, PMMA)

5.3 Spectroscopic characterization of polymers (FT IR and NMR).

Self study to be tested internally

- Ionomers, Polyelectrolytes,dendrimers and nanohybrid polymers.
- Super conducting polymers, interfacial polymersand poly metallocenes.

BOOKS FOR REFERENCE

Bhatnagar M.S., Text Book of Polymers**.** Vol. 1 – 111, 1st edition, New Delhi: S.Chand & Co.,

Billmeyer F.W., Text Book of Polymer Science**.** 3rd Edition, New York: A Wiley Interscience Publications,

Brandolini Anita J and Deborah D., Hills NMR Spectra of Polymers and Polymer additives**.** New York: Marcel Decker Inc.

Flory P.J. Principles of Polymer Chemistry. Ithaca: Cornell University Press,

Gowariker, V.R., N.V. Viswanathan, Jaydev Sreedhar, (1996), Polymer Science**.** 1st edition, New Delhi: New Age International.

Gupta B.R., Applied Rheology in Polymer Processing**.** New Delhi:Asian Book Pvt. Ltd., , 2005.

Joel.R .Fried, Polymer science & Technology. second edition , New Delhi:Prentice –Hall of India private limited, 2005.

Misra G.S. Introduction to Polymer Science**.** New Delhi:New Age International, 2001.

Munk P**.** Introduction to Macromolecular Science**.** New York: John Wiley & Sons,1989.

Stuart H Barbara, Polymer Analysis**.** New York :John Wiley & Sons, 2002.

Sujata V. Bhat., Biomaterials. New Delhi: Narosa Publishing house,.

Young R.P., Lovell, Introduction to Polymers**.** London: Chapman & Hall, , 1996.

END SEMESTER EXAMINATION

Total Marks: 100 Duration : 3 hours

QUESTION PAPER PATTERN

Section A – 20 x 1 = 20 Marks (All questions to be answered, questions to be of objective type: MCQ'S, fill in the blanks, T/F, Match and answer in a line or two)

Section B – 5 x 8 = 40 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 3 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE : BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 onwards)

INTRODUCTORY FORENSIC CHEMISTRY

(Independent Study Elective Course)

CODE :11/CH/PI/IF24

CREDITS : 4

Objectives of the Course

- To acquaint the students to the role of chemistry in crime detection
- To give an insight into diagnostic testing and to encourage the students to work in the field of Forensic chemistry and to pursue Research in Forensic Science.

Unit 1 Forensic Science (8 hrs)

1.1 Definition-brief history of Forensic Science. Function of forensic science in the laboratory

1.2 Processing the scene of crime and Forensic photography.

Unit 2

Physical Evidence (Tracks and trails) (12 hrs)

2.1 Physical evidence –classification. Significance of finger prints and palm prints, foot prints, shoe and tyre impression.

2.2 Trace evidence-soil, glass, paint.

2.3 Biological material-blood, hair, bones, teeth-application of DNA profiling

Unit 3

Toxicology and analysis techniques (12 hrs)

3.1 Radioactive decay reactions and neutron activation analysis.

3.2 Atomic absorption spectroscopy and X-ray analysis to detect samples.

3.1 Poisons-classification. Symptoms and antidotes for some common poison

Unit 4

Tracking Forgery (10 hrs)

4.1 Disputed documents-types-document examination. Use of UV rays in detection of counterfeit currency and stamp paper.

4.2 Identification of forgery in hand written and typed document.

4.3 Paper chromatography of ink

Unit 5 (10 hrs)

Fire-Arson and Explosives

5.1 Characteristics of accidental fires

5.2 Arson-evidence from fire affected area to detect the cause of the fire.

5.3 Explosive-classification-evidence from the scene of explosion to detect the cause of explosion.

Text Books

Vapuly A K (2006) **Forensic Science its approach in Crime Investigation**, Paras Medical Pubication, Hyderabad.
Sharma B.R (2006) **Forensic Science in Criminal Investigation and trials**, 4th Edition, Universal law publication Co. Pvt. Ltd: New Delhi

Reference Books

Russel Max M Houck, Jay A Siegel (2006) **Fundamentals of forensic Science,** Elsevier Academic Press, Amsterdam.
Henry C. Lee, Timothy Palmbach, Marilyn C.Miller (2001) **Henry Lee's Crime Scene Hand book,** Elsevier Academic Press, Amsterdam.

END SEMESTER EXAMINATION

TOTAL MARKS: 100 DURATION : 3 HOURS

QUESTION PAPER PATTERN

Section A – 20 x 1 = 20 Marks (All questions to be answered,questions to be of objective type(MCQ'S), fill in the blanks and answer in a line or two)

Section B – 5 x 8 = 40 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 3 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086
M.Sc. DEGREE : BRANCH IV - CHEMISTRY

SYLLABUS
(Effective from the academic year 2011 - 2012)

CHEMISTRY OF NATURAL PRODUCTS

CODE: 11/CH/PI/NP24

CREDITS : 4

OBJECTIVES OF THE COURSE

- To understand the origin and classification of natural products.
- To appreciate the chemical strucure of physiological functions of natural products and their derivatives.
- To think critically about the use of herbal remedies and the potential of drug development from natural products.

Unit 1 **(12 hrs)**

Amino acids peptides and proteins

1.1 Introduction to amino acids
1.2 General methods of preparation and properties of amino acids
1.3 Naturally occurring peptides and nomenclature of poly peptides.
1.4 General principle of poly peptide synthesis.
1.5 Representation of poly peptides. Determination of structure of peptides.
1.6 Classification of proteins. Primary , secondary and tertiary structure of proteins

Unit 2 **(10hrs)**

Steroids

2.1 Nomenclature and stereochemistry(configuration of substiuent, ring and side chain)
2.2 Classification of sterols and related colour reactions.
2.3 Cholesterol- occurrence, isolation, clinical significance, structure elucidation and total synthesis.
2.4 Steroid hormones- synthesis of oestrone and progesterone

Unit 3 **(10hrs)**

Terpenoids

3.1 Source and extraction.
3.2 Classification and isolation.
3.3 General methods of structure determination of terpenoids.
3.4 Structure elucidation of Carvone-d, longifolene, abetic acid and β-carotene.

Unit 4 **(10 hrs)**

Alkaloids

4.1 Occurance and functions.
4.2 Classification and nomenclature.
4.3 General methods of structure determination and pharmaceutical applications.
4.4 Structure elucidation and of Conine, Nicotine and Caffeien.

Unit 5 **(10 hrs)**

Plant pigments

5.1 Representation of flavonoids,flavones,flavonols,and isoflavones
5.2 Glycosides of flavones and flavonols.
5.3 General methods of structure determination of flavonoids.
5.4 Structure elucidation of Apigenin and Quercetin
5.5 Anthocyanidins and anthocyanins- general methods of structure determination.
5.6 Structure elucidation of cyanidin and Hirsutidin.
5.7 Structural relationship between flavonols(Quercetin) anthocyanidin(cyanidin) and catechins(epicatechin).

TEXT BOOKS

Bhat, S.V., B.A.Nagasampagi, M.Siva Kumar Chemistry of natural Products, New Delhi, Narosa Publishing house, 2006.

Ahluwali, V.K., Sanjiv Kumar, Chemistry of Natural Products, New Delhi, CRC Press, 2007.

BOOKS FOR REFERENCE

Stephen P.Stanforth, Natural Product Chemistry at a Glance, Wiley Blackwell, 2006.

END SEMESTER EXAMINATION

Total Marks: 100 Duration : 3 Hours

QUESTION PAPER PATTERN

Section A – 20 x 1 = 20 Marks (All questions to be answered, questions to be of objective type: MCQ'S, fill in the blanks, T/F, Match and answer in a line or two)

Section B – 5 x 8 = 40 Marks (5 out of 7 to be answered)
Section C – 2 x 20 = 40 Marks (2 out of 3 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE: BRANCH IV - CHEMISTRY
SYLLABUS
(Effective from the academic year 2011 - 2012)
INDUSTRIAL CHEMISTRY AND MANAGEMENT

CODE: 11CH/PI/IC24

CREDIT: 4

OBJECTIVES OF THE COURSE

- To create an awareness in students about the various dimensions of a chemical industry
- To help students look at wider career options

Unit 1

Indian chemical industry - Challenges and opportunities
Need for chemical business managers
Self employment as career option

Unit 2

Government procedures affecting chemical industry
WTO , antidumping and safeguard duties
Carbon Trading & Montreal Protocol
Environmental issues
Quality aspects and certification procedures

Unit 3

Successes and failures in Indian chemical industry
Case study of unexploited chemical projects

Unit 4

Methodology for identification of investment opportunities in chemical industry and Market research
Marketing practices
Issues in export marketing

Unit 5

Profiles of key players in Indian chemical industry
Performance analysis of a few top Indian chemical companies

END SEMESTER EXAMINATION

Total Marks: 100 Duration : 3 Hours

QUESTION PAPER PATTERN

Section A – 20 x 1 = 20 Marks (All questions to be answered, questions to be of objective type: MCQ'S, fill in the blanks, T/F, Match and answer in a line or two)

Section B – 5 x 8 = 40 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 3 to be answered)

BOOKS FOR REFERENCE

Anand Saxena, Entrepreneurship Motivation, Performance and Rewards New Delhi: Deep and Deep Publications Pvt. Ltd., 2006.

David H. Holt, Entrepreneurship – New Venture Creation. New Delhi: Prentice Hall of India Pvt. Ltd., 2006.

Goldratt, E.M., The goal, England, Gower publishing house,1999.

John Durkee, Management of Industrial Cleaning Technology and Processes, 2006

Madhurima Lall and Shikha Sahai, Entrepreneurship. New Delhi:Excel Printers, , 2006.

Philip J. Chenier.Survey of Industrial Chemistry, Elsevier, 2002.

Robert D. Hisrich, Michael P. Peters and Dean A. Shepherd, Entrepreneurship 6th ed.,New Delhi :Tata McGraw Hill Publication Co. Ltd., , 2007.

Sangram Keshari Mohanty, Fundamentals of Entrepreneurship New Delhi: Prentice Hall of India Pvt. Ltd., 2005.

The Lean Office : Collected Practices and Cases, Productivity Press Development Team, 2005.

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086

M.Sc. DEGREE : BRANCH IV - CHEMISTRY

SYLLABUS
(Effective from the academic year 2011 – 2012)

SOFT SKILLS

CODE : 11CH/PK/SS22 **CREDITS : 2**
L T P : 2 0 0
TOTAL TEACHING HOURS : 26

OBJECTIVES OF THE COURSE

- To empower and create opportunities for self development
- To instill confidence and face challenges.

Unit 1 **(6 hrs)**

Behavioural Traits

1.1 Self Awareness
1.2 Communication Skills – Verbal and Non Verbal
1.3 Leadership Qualities
1.4 Etiquette and mannerisms
1.5 Experiential Learning – Based on activities

Unit 2 **(5 hrs)**

Team Work

2.1 Interpersonal Skills
2.2 People Management
2.3 Creative Thinking
2.4 Critical Thinking
2.5 Experiential Learning – Based on activities

Unit 3 **(5 hrs)**

Time Management

3.1 Importance of time management
3.2 Planning and Prioritizing
3.3 Organizing skills
3.4 Action Plan
3.5 Experiential Learning – Based on activities

Unit 4 **(5 hrs)**

Conflict Resolution

4.1 Reasons for conflict
4.2 Consequences of conflict
4.3 Managing emotions
4.4 Methods of resolving conflicts
4.5 Experiential Learning – Based on activities

Unit 5 **(5 hrs)**

Career Mapping

5.1 Goal setting
5.2 Career Planning
5.3 Resume writing
5.4 Handling Interviews
5.5 Experiential Learning – Based on activities

BOOKS FOR REFERENCE

Khera, Shiv, You Can Win**,** New Delhi, Macmillan India Ltd., 2002.

Mishra, Rajiv K., Personality Development : Transform Yourself**,** New Delhi, Rupa and Co., 2004.

Newstrom, John W. and Scannell, Edward E., Games Trainers Play: Experiential Learning**,** New Delhi, Tata McGraw Hill, 1980.

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE : BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 - 2012)

ANALYTICAL INSTRUMENTATION

CODE :11CH/PC/AI 24

CREDITS : 4
L T P : 4 1 0
TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE

- To equip the students about recent analytical techniques, with a focus on applications in industries and research laboratories.
- To give an insight to the key concepts of analytical instrumentation techniques to pursue research.

Unit 1

Spectroscopic techniques (16hrs)

Principle and instrumentation of -

1.1 UV/Visible spectroscopy, Atomic absorption and emission spectroscopy.

1.2 Inductively Coupled Plasma Atomic Emission Spectroscopy(ICPAES)

1.3 Infrared Spectroscopy, Dispersive and Fourier Transformed Raman, Resonance Raman and Surface Enhanced Raman Spectroscopy- Dispersive and Fourier Transformed

1.4 Spectropolarimeters (optical rotatory dispersion) and Spectrophotometer (circular dichroism)

Unit 2 (10 hrs)

Surface Characterisation Techniques

Principle, Instrumentation and applications of -

2.1 Photoelectron spectroscopy – ultraviolet and X-ray photoelectron spectroscopy (UPS & XPS), Auger electron spectroscopy (AES),ESCA

2.2 Electron microscopy: Scanning electron microscopy (SEM), Scanning Tunnelling microscopy (STM).

2.3 Low energy electron diffraction

Unit 3 (20 hrs)

Electrochemical Techniques

Principle, Instrumentation and applications of -

3.1 Polarography (DC, AC and pulse), Anodic and Cathodic stripping voltammetry

3.2 Coulometry: Current- Voltage relationship during an electrolysis, Coulometric methods of analysis, Potentiostatic coulometry, Coulometric Titrations(Amperostatic Coulometry)

3.3 Amperometry, Amperometric titrations, Biamperometry

3.4 Chronomethods: Chronoamperometry, Chronopotentiometry and Chronocoulometry
3.5 Cyclic Voltammetry

Unit 4 (14hrs)

Thermoanalytical and Radiochemical Techniques

4.1 Thermogravimetry (TG), Differential Thermal analysis. Differential scanning calorimetry - Principle, Instrumentation, Factors affecting the thermogram & Applications, Evolved gas analysis,
4.2 Thermometric titrations – Principle, working & applications.
4.3 Neutron activation analysis-Principle, instrumentation and applications

Unit 5 (5hrs)

Coupled Techniques

Applications of GC-IR, TG-IR Spectroscopy, GC-Mass Spectroscopy.

Self study to be tested internally

- Applications of spectroscopy techniques.
- Few applications of SEM & TEM in study of nano particles
- Circular Dichroism
- Hotstage optical Polarising Microscope

BOOKS FOR REFERENCE

Anjaneyulu. Y, Chandrasekhar.K, Valli Manickam. A text Book of Analytical Chemistry. India: Pharma Book Syndicate, 2006.

R.D. Brown, Introduction to Instumental Analysis, McGraw Hill, Singapore, 1987.

Douglas A Skoog, James F Holler and Niemen. Principles of Instrumental Analysis. 5th ed. Singapore: Haracourt Asia Pvt. Ltd., 2001.

J.H.D.Eland, Photoelectron Spectra, Butterworths, London, 1984.

Douglas A.Skoog , Donald M West and James F Holler, Stanley R. Crouch. Fundamentals of Analytical Chemistry, New York: Saunders College Publishing, 2004.

Ewing Galen W. Instrumental Methods of Chemical Analysis. 5th ed. New York: McGraw Hill, 1985.

A.J.Bard and L.R.Faulkner, Electrochemical methods, fundamentals and applications, Wiley, New York, reprint 2006.

Fifield F.W. and Kealy D. Principles and Practice of Analytical Chemistry. 5th ed. USA: Blackwell Science Publishing, 2004.

Gary D.Christian and James E. O'Reilly. **Analytical Chemistry**. 6th ed. New York: John Wiley & Sons, 2004.Sharma B.K. Instrumental Methods of Chemical Analysis. 23rd ed. Meerut: Goel Publishing House, 2004.

Willard, Dean, Merritt, Settle. Instrumental Methods of Analysis. 7th ed. London: CBS, 2004.

W.W.Wendlandt, Thermal Analysis, 3rd Ed., Wiley, New York, 1980.

T.L.Barr, Modern ESCA : the principles and practice of X-ray photoelectron spectroscopy, CRC Press, Boca Raton, 1994

J.H.D.Eland, Photoelectron Spectra. Butterworth, London, 1984.

END SEMESTER EXAMINATION:

Total Marks: 100 Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 20 x 1 = 20 Marks (All questions to be answered, questions to be of objective type: MCQ'S, fill in the blanks, T/F, Match and answer in a line or two)

Section B – 5 x 8 = 40 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 3 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE : BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011- 2012)

QUANTUM CHEMISTRY AND GROUP THEORY

CODE: 11CH/PC/QG24 **CREDITS: 4**

L T P: 4 1 0

TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE

- To give an understanding of basic principles of quantum mechanics and their applicability to study the internal structure of atoms and molecules.
- To give an understanding of the important concepts of group theory

Unit 1

Matter waves and Quantum mechanical formalism (8 hrs)

1.1 Wave particle duality, uncertainty principle, theory of wave motion, particle wave and Schrödinger wave equation, wave functions, properties of wave function,

1.2 Conditions of normalization and orthogonality.

1.3 Operators and their algebra, *eigen* values and *eigen* functions, Hermitian properties of operators, postulates of quantum and some theorems related the same.

Unit 2

Application to simple systems (16 hrs)

2.1 Free particle, particle in one dimensional box with infinite potential barrier, quantization and quantum numbers, use of box model, particle in a three dimensional box, degeneracy, particle in a box with finite potential barriers, quantum mechanical tunneling, problems

2.2 Harmonic oscillator (classical & quantum mechanical), Schrodinger wave equation and its solution, Hermite polynomial, complete wave function, vibrational quantum numbers, physical picture of ψ and ψ^2.

2.3 Particle in a ring and sphere, Schrödinger wave equation in spherical coordinates(Derivation not expected), Legendre and associated Legendre functions, rotational quantum numbers, spherical harmonics, rotation of a diatomic molecule, problems

2.4 Schrodinger wave equation in spherical coordinates, splitting equation into r, θ and φ equations, solving r- equation, Laguerre polynomial and Associated

Laguerre polynomials, radial functions, quantum numbers n and l, energy eigen values in atomic units, complete wave function of hydrogen like atoms, physical representation of orbitals, radial plots and angular plots, probability function and plots, average distance of electron, problem

Unit 3

Atomic Structure (20 hrs)

3.1 Approximation methods –Variational method (linear band non-linear variation), Perturbation theory (non-degenerate, first order), application to Helium atom. Ground state.
3.2 Symmetric and Anti symmetric wave functions, electron spin, spin orbitals, Pauli's principle
3.3 Excited state of He atom, singlet and triplet states, multielectron atoms, Determinantal form of wave functions,
3.4 Hartee- Fork self consistent field theory. Walsh diagrams. Angular momentum of many electron atoms, R-S coupling, spectra of alkali metal atoms, Hund's rule Zeeman effect.
3.5 LCAO-MO for H_2^+, Molecular orbital approximation for ethylene, butadiene and benzene. Plots and nodes of molecular orbitals

Unit 4

Group theory : Fundamental Concepts (16 hrs)

4.1 Symmetry operation and elements, defining coordinate system, combining symmetry operations, Symmetry point groups, point group of molecules, systematic point group classification, optical activity and symmetry.
4.2 Irreducible representation, unit vector transformation, reducible representations, systematic reduction of reducible representation,
4.3 Group multiplication tables, sub groups and classes, The Great Orthogonality theorem
4.4 Construction of character table for point groups. ($D_{2h,}$ C_{2V}, C_{3V},), explanation for the complete character table for the above groups.

Unit 5

Application of group theory: (5 hrs)

5.1 Application of group theory in (i) electronic spectra –HCHO (ii) vibrational spectra –H_2O
5.2 Application of group theory in hybridization schemes for simple molecules-CH_4, H_2O and NH_3

BOOKS FOR REFERENCE

Prasad, R.K Quantum Chemistry, New Delhi: New Age International, 1997

Atkins, P.W. Molecular Quantum Mechanics, Qxford: Clarendon Press, 1983

Chandra A K. Introductory Quantum Chemistry. New Delhi: Tata McGraw Hill,1968

Cotton, F.A**.** Chemical Applications of Group Theory, New York : Wiley Eastern Ltd, 2000

Carter, R.L. Molecular Symmetry and Group Theory, John Wiley and Sons, Inc, 2005

Levine, I.R., Quantum Chemistry, 4th ed., Prentice Hall of India, New Delhi, 1994

Prasad, R.K Quantum Chemistry through problems and solutions, New Delhi: New Age International, 1997.

Lowe, J.P., Quantum Chemistry, 2nd ed., Academic Press, Sandiego, 1993.

McQuairrie, Donald A Quantum Chemistry**,** Oxford: Oxford University Press, , 1982

P.A.Cox, Introduction to quantum theory and atomic structure, Oxford Chemistry Primers, Oxford university press, 1996

T.A.Albright and J.K.Burdett, Problems in molecular orbital theory, Oxford university press, 1992

D.M.Bishop, Group Theory and chemistry. Dover, New York, 1993

END SEMESTER EXAMINATION:

Total Marks: 100 Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 20 x 1 = 20 Marks (All questions to be answered, questions to be of objective type: MCQ'S, fill in the blanks, T/F, Match and answer in a line or two)

Section B – 5 x 8 = 40 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 3 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE: BRANCH IV - CHEMISTRY

SYLLABUS
ANALYTICAL INSTRUMENTATION - PRACTICAL

CODE :11CH/PC/P222

CREDITS : 2
L T P : 0 0 3
TOTAL HOURS : 39

Colorimetry

1. Estimation of Vitamin- A / Cholesterol
2. Estimation of stability constants of complexes

Spectrophotometry

3. Estimation of DNA / RNA
4. Simultaneous determination of caffeine and aspirin .

Fluorimetry

5. Estimation of Riboflavin/Thyamine/ Fluorescein .

Flame Photometry

6. Estimation of Sodium /Potassium.

Thin Layer Chromatography

7. Rf determination and separation of a mixture of aminoacids

Statistical treatment of data

8. Estimation of Mn/Fe.

Infrared spectroscopy [Demonstration]

9. Interpretation of IR spectra.

BOOKS FOR REFERENCE

Alexander Findlay. Practical Physical Chemistry. 7th ed. London: Longman Green and Co Ltd., 1967.

National Institute of Nutrition, ICMR. A Manual of Laboratory Techniques . Hyderabad: National Institute of Nutrition, 1983.

Plummer,David.T. An Introduction to Practical Biochemistry. New Delhi: Tata McGraw Hill Publishing Company Ltd.,2000.

Sadasivam S and Manickam A. Biochemical Methods, New Delhi: New Age International , 1996.

Venkateswaran V. Veerasamy, R. Kulandaivelu A. R. Principles of Practical Chemistry. 2nd ed. New Delhi: Sultan Chand and Sons, 1997.

Viswanathan, B. and Raghavan, P.S. Practical Physical Chemistry, New Delhi: Viva Books Pvt. Ltd., 2005.

END SEMESTER EXAMINATION:

Total Marks : 50 Duration : 3hours

Procedure = 10 (marks)

Vivavoce = 5 (marks)

Reported value = 35 (marks)

Continuous assessment Internal:

Class Work = 30 (marks) – inclusive of *viva*

CA Test = 20 (marks)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE: BRANCH IV - CHEMISTRY

SYLLABUS
(Effective from the academic year 2011 - 2012)

ORGANIC SEPARATION AND ANALYSIS - PRACTICAL

CODE: 11CH/PC/P324 **CREDITS : 4**
L T P : 0 0 6
TOTAL HOURS : 78

Unit 1

Preparation of Reagents used for Qualitative Organic Analysis
Tollen's reagent, Fehling's Reagents A & B, Barfoed's reagent, Benedict's Reagent, Molisch's reagent, Bromine Water, Brady's reagent, Schiff's reagent

Unit 2

Separation and analysis of a mixture of two organic compounds

- Solvent separation based on solubility in acid, base or neutral media.
- Pilot separation & Bulk separation.
- Identification of functional groups, Preparation of derivatives for functional groups and determination of their melting points.
- Compounds can be separated using Soxhlet and rotary vaccum evaporator (demonstration only)
- Identification of separated compounds & derivatives using UV&IR(demonstration only)

A comprehensive viva will be conducted during the practical hours.

BOOKS FOR REFERENCE

Ahluwalia, V.K. Renu Aggarwal. Comprehensive Practical Organic Chemistry-Preparation and Quantitative Analysis**.** ., Hyderabad :University Press (India), Ltd: 2000.

Mohan J. Organic Analytical Chemistry – Theory and Practice**.** New Delhi: Narosa Publishing House,: 2003.

Raj., K. Bansal. Laboratory Manual of Organic Chemistry**.** 3rd Ed., New Delhi: Wiley Eastern Limited, New Delhi, 1994.

Vogel A.I. Elementary Practical Organic Chemistry Part II, Qualitative Organic Analysis**.** New Delhi: CBS Publishers, , 1998.

Unit 1 to be tested internally

END SEMESTER EXAM:

Total Marks : 50 Duration : 6 hours

Pilot test	**: 3 marks**

For each compound:

Aliphatic/Aromatic	: 2 marks
Saturated/Unsaturated	: 2 marks
Special Elements	: 3 marks
Procedure	: 4 marks
Derivative	: 2 marks
Functional Group	: 4+2 marks
Melting point	: 2 marks
Total	**: 21**

For two compounds : 2 x 21	**: 42 marks**
Viva voce	**: 5 marks**
TOTAL	**: 50 marks**

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

Post Elective Course Offered by the Department of Mathematics for M.A. / M.Sc. / M.Com Degree Programme

SYLLABUS

(Effective from the academic year 2011 - 2012)

ENTREPRENEURIAL SKILLS

CODE: 11CH/PE/ES 24 **CREDITS : 4**

L T P : 4 0 0

TOTAL TEACHING HOURS : 52

OBJECTIVES OF THE COURSE

- To motivate and make the youth understand the nature and importance of entrepreneurship
- To enhance their self employment opportunities
- To develop entrepreneurial skills and activities
- To impart Skill development Training to the students with inter disciplinary

Unit 1 **(10 hrs)**

Entrepreneurial Perspective

1.1 The nature and importance of entrepreneurs
1.2 Entrepreneurship enterprise and entrepreneurs – definition and concept – new venture formation
1.3 Characteristics and importance of entrepreneurship and entrepreneur
1.4 Classification and functions of entrepreneurs – core competence for entrepreneurial activities

Unit 2 **(10 hrs)**

Entrepreneurial Motivation

2.1 Innovation and initiation of entrepreneurial venture – desire, decision and formulation
2.2 Study of entry barriers to entrepreneurship – steps to overcome the barriers
2.3 Promotion of a venture – opportunity analysis, environment and entrepreneurship, technological environment and competitive factors
2.4 Case studies – Interaction with successful entrepreneurs

Unit 3 **(10 hrs)**

Women Entrepreneurship

3.1 Concept of Women Entrepreneurs
3.2 Empowerment of women through enterprise
3.3 Factors governing women entrepreneurship
3.4 Schemes for women entrepreneurs

Unit 4 **(12 hrs)**

Business Project Proposal

4.1 Demand analysis, Cost benefit analysis and break-even point and identification of entrepreneurial opportunities

4.2 Financial and business collaboration – Business project proposal – Planning and Processing

4.3 Entrepreneurial Performance and Rewards

4.4 Preparation of Model Project Proposal

Unit 5 **(10 hrs)**

Skill Development Training (To be tested internally)

The Skill Development Training will be imparted in any of the current fields of interest such as:

Fruit/Vegetable Processing and Preservation
Food and Water Analysis
Preparation of Herbal Products
Paper Conversion Products
Jewellery Designing
Vermi composting
PET bottle recycling
Injection moulding

BOOKS FOR REFERENCE

Anand Saxena, Entrepreneurship Motivation, Performance and Rewards New Delhi: Deep and Deep Publications Pvt. Ltd., 2006.

David H. Holt, Entrepreneurship – New Venture Creation. New Delhi: Prentice Hall of India Pvt. Ltd., 2006.

John Legge and Kevin Hindle, Entrepreneurship-Context. New York: Vision and Planning, Macmillan Pvt. Ltd., , 2004.

Madhurima Lall and Shikha Sahai, Entrepreneurship. New Delhi:Excel Printers, , 2006.

Robert D. Hisrich, Michael P. Peters and Dean A. Shepherd, Entrepreneurship 6th ed.,New Delhi :Tata McGraw Hill Publication Co. Ltd., , 2007.

Saini, J. S. and Gurjar B. R., Entrepreneurship and Education – Challenges and Strategies.Jaipur: Rawat Publication, 2001.

Sangram Keshari Mohanty, Fundamentals of Entrepreneurship New Delhi: Prentice Hall of India Pvt. Ltd., 2005.

END SEMESTER EXAMINATION

Total Marks: 100 Duration : 3 Hours

QUESTION PAPER PATTERN

Section A – 2x10 = 20 Marks (All questions to be answered)
Section B – 5 x 8 = 40 Marks (5 out of 7 to be answered)
Section C – 2 x 20 = 40 Marks (2 out of 3 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE: BRANCH IV - CHEMISTRY

SYLLABUS
(Effective from the academic year 2011 - 2012)

MOLECULAR SPECTROSCOPY

CODE: 11CH/PC/MS 34
CREDITS: 4

L T P: 4 1 0
TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To understand and apply the principles of spectroscopy
- To interpret the spectra of molecules and predict structure of compounds
- To understand the complementary nature of spectra in structural elucidation

Unit 1 **(6 hrs)**

Electromagnetic spectrum

1.1 Basic Principles of Spectroscopy: Width and intensity of spectral lines Transition probability and selection rules, time independent perturbation Fourier transform spectroscopy, Lasers (He-Ne laser, dye lasers), ultrafast spectroscopy.

1.2 Regions of the spectrum, Quantisation of energy: rotational, vibrational and electronic transitions in molecules, Absorption and emission spectra.

Unit 2 **(12 hrs)**

Rotational, Rotational-vibrational and Vibrational Spectroscopy

2.1 Rotation of molecules, diatomic molecules as rigid rotors- rotational energy levels,
transitions, selection rules, microwave spectra.

2.2 Diatomic molecules as harmonic and anharmonic oscillators – energy levels and the
vibrational transitions.

2.3 Selection rules, vibrations of polyatomic molecules – linear and Nonlinear molecules and their symmetry.

2.4 Infrared absorption frequencies of typical functional groups, applications of IR
in structure determination.

2.5 Principles and applications of Raman Spectroscopy. Raman spectra as complementary to IR.

Unit 3 **(10 hrs)**

Electronic Absorption Spectroscopy

3. 1. Principle of UV-Visible spectroscopy, Franck Condon principle, Born –Oppenheimer approximation, factors affecting absorption spectra.
3.2 Re-emission of energy by an excited molecule.
3.3 Chemical analysis by electronic spectra, UPS Koopmans' theorem and XPS.

Unit 4 **(20 hrs)**

Nuclear Magnetic Resonance Spectroscopy

4.1 Nuclear spin, nuclear magnetic moment, NMR transitions, relaxation processes.

4.2 Chemical shift, shielded and deshielded protons, spin-spin coupling,

Factors affecting spin coupling constants and Pascal's diagram,

higher order coupling.

4.3 Spin decoupling, shift reagents.
4.4 Applications of proton NMR in structural determination, NMR of macromolecules.
4.5 C^{13} NMR, The Nuclear overhauser effect, NMR in solid state and 2D and 3D NMR, ^{31}P and ^{19}F NMR (features)

Unit 5 **(17 hrs)**

Mass Spectrometry

5.1 Basic principles, fragmentation patterns as applied to simple aliphatic and aromatic compounds.

5.2 Interpretation of mass spectra: Molecular ion peak, Isotope peaks, Base peak, meta stable peak, Nitrogen rule.

5.3 Rearrangements: Mc Lafferty rearrangement, Retro Diels Alder rearrangement.
5.4 Determination of structure of simple organic molecules by comprehensive (UV, IR, NMR, Mass) spectral data.

Self study to be tested internally

- Visit to advanced research labs to study the State of art instruments.
- MRI and medical applications
- Spectra and inorganic molecules

BOOKS FOR REFERENCE:

Banwell Colin and Mckash Elaine. Fundamentals of Molecular Spectroscopy. New Delhi: Tata McGraw Hill Ltd., 1996.

Barrow Gordon M. Introduction to Molecular Spectroscopy. New York: McGraw Hill International, 1976.

Dudley H Williams and Ian Fleming. Spectroscopic Methods in Organic Chemistry. Tata McGraw-Hill Publishing Company Limited, 2005.

Harris Daniel C. et.al. Symmetry and Spectroscopy An Introduction to Vibrational and Electronic Spectroscopy. New York: Oxford University Press, 1980.

Kemp William. Organic Spectroscopy. 2nd ed. New Delhi: Macmillan India, 1998.

Pavia Donald L, Introduction to Spectroscopy- A guide for students of Organic chemistry. Singapore: Harcourt Asia Pvt. Ltd., 2001.

Sathyanarayana, D.N. Vibrational spectroscopy. New Age International Publishers, 2007.

Scheimann. An introduction to spectroscopic methods for identification of organic compounds. London: Pergamon Press, 1970.

Silverstein, Bassler, Morril. Spectrometric Identification of Organic Compounds, New York: John Wiley & Sons Inc., 1996.

END SEMESTER EXAMINATION

Total Marks: 100 Duration : 3 Hours

QUESTION PAPER PATTERN

Section A – 20 x 1 = 20 Marks (All questions to be answered, questions to be of objective type: MCQ'S, fill in the blanks, T/F, Match and answer in a line or two)

Section B – 5 x 8 = 40 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 3 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE: BRANCH IV - CHEMISTRY

SYLLABUS
(Effective from the academic year 2011 - 2012)

ADVANCED PHYSICAL CHEMISTRY

CODE: 11CH/PC/PC 34
CREDITS: 4

T P: 4 1 0
TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To learn to integrate thermodynamics with quantum statistics
- To appreciate and correlate theoretical concepts and experimental details
- To realize the importance of kinetics of Chemical transformations and reactions
- To learn theories of electrolysis
- To encourage a problem solving approach to learning

Unit 1 **(18 hrs)**

Statistical Thermodynamics

1.1 Introduction to language of statistical mechanics (Permutation, Probability), microstates, distributions and the most probable distribution, evaluation of Boltzmann parameters using Lagrange's method of undetermined multipliers, Stirling approximation.

1.2 Partition function, evaluation of translational, rotational, vibrational and electronic partition functions for ideal gases, N particles(distinguishable and indistinguishable) systems

1.3 Applications: Calculation of thermodynamic properties in terms of partition function, heat capacities of ideal gases, heat capacity of solids, residual entropies, equilibrium constant.

Unit 2:

Quantum Statistics **(13hrs)**

2.1 Bose-Einstein and Fermi-Dirac Statistics, Comparison between Bose-Einstein, Fermi-Dirac and Boltzmann Statistics, Application to radiation and electron gas in metals

2.2 Entropy production and entropy flow pertaining to Chemical reactions in homogenous systems.

2.3 Irreversible processes relating to mass, electricity and heat exchanges between two homogenous isotropic phases, Phenomenological equations and Onsager reciprocity relation

Unit 3 **(12 hrs)**

Molecules in Motion

3.1 Accounting for rate laws: simple reactions, temperature dependent on reaction rates, consecutive reactions(rate determining steps approximation and steady state approximation), pre-equilibria and unimolecular reactions Lindemann- Hinshelwood mechanism

3.2 Kinetics of complex reactions- chain reactions, polymerization reactions, explosions Photo chemical reactions, oscillating reactions.

3.3 Molecular reaction dynamics: collision theory, steric factor, diffusion controlled reactions, activated complex theory, Eyring equation, reaction coordinates and transition state, thermodynamic aspects, reaction between ions, Effect of solvent on reaction rates, Effect of ionic strength on reaction rates (salt effects), dynamics of molecular collisions (molecular beams), potential energy surfaces.

Unit 4 **(14 hrs)**

Theories of Electrochemistry

4.1 Electrodes and electrochemical cells-evaluation of thermodynamic quantities

4.2 The electrical double layer at the electrode – electrolyte interface, Models:Helmholtz Perrin Model, Gouy-Chapmann model and Stern model, potentials (Galvanic and voltaic) – theory of multiple layer capacity – electro-capillarity – Lippmann potential – structure of double layers.

4.3 Diffusion – electro kinetic phenomena – membrane potential .I – E Variation – different types of overpotentials – Butler – Volmer equation for one electron transfer (derivation not required), Tafel plots, exchange current density – standard rate constants – transfer coefficient – Tafel andNernst equations – Polarisation. Rate determining step in electrode kinetics – The Hydrogen overvoltage, Oxygen overvoltage – Anodic and cathodic processes – redox reactions. Fuel cells: oxygen-hydrogen fuel cells.

Unit 5:

Surface chemistry: (**8 hrs)**

5.1 Adsorption isotherms, Gibb's adsorption isotherm, BET isotherm, Harkins-Jura equation, determination of surface area.

5.2 Heterogeneous catalysis: catalytic activity at surfaces, Adsorption and catalysis- The Eley- Rideal mechanism, Langmuir- Hinshelwood mechanism, molecular beams studies, Examples of catalysis- hydrogenation, oxidation, cracking /pyrolysis and reforming.

Self study to be tested internally

- Batteries: Working principle, cell reactions, cell performances of Ni-Cd batteries

  Lithium batteries- primary and secondary, Li-based conducting polymer batteries, molten carbonate fuel cells, solid polymer electrolytes fuel cell.

- Cold fusion Experiments

BOOKS FOR REFERNECE

Nash, K.N., Elements of Statistical Thermodynamics, New York, Dover, 1986.

M.C.Gupta, Statistical Thermodynamics, 2nd ed., New Delhi, New Age International, 1998.

M.Dole, An introduction of Statistical Thermodynamics, New York, Dover, 1986.

Rajaram J. and Kuriacose J.C. Kinetics and Mechanism of Chemical Transformations**,** 3rd ed. New Delhi: Macmillan India Ltd., 1993.

E.D.Kaufmann, Advanced concepts in Physical Chemistry, New York, McGraw Hill, 1966.

R.Hasse, Thermodynamics of Irreversible Processes, London, Addison Wesley, 1969

Barrow Gordon, M. Physical Chemistry**,** New York: Orient Longman Publishers, 1977.

Castellan, G.W., Physical Chemistry**,** 3rd ed. New Delhi: Addison – Wesley / Narosa Publications. 2004.

Peter Atkins and Jolio de Paula. Atkins Physical Chemistry, 7th ed. Oxford: Oxford Press, 2002.

Kuriacose, J.C. and Rajaram J. Thermodynamics for Students of Chemistry, 3rd ed. New Delhi: Sultan Naginchand and Co. 1999.

Viswanathan B., Sundaram S., Venkataraman R., Rengarajan K., Raghavan P.S. Electrochemistry–Principles and Applications. Chennai: S. Viswanathan Pvt. Ltd., 2007.

Narayan,R and Viswanathan, B., Chemical and electrochemical energy systems, University Press. 2003.

D.Chandler, Introduction to modern Statistical mechanics, Oxford university press. 1997.

D.A.McQuarrie and J.D.Simon, Molecular Thermodynamics, Sansalito, University Science books,. 1999

A.W.Adamson and A.PGast, Physical Chemistry of surfaces, New York, Wiley. 1997

Y.K.Lim, Problems and solutions on thermodynamics and Statistical mechanics. Singapore, World Scientific, 1990.

END SEMESTER EXAMINATION:

Total Marks: 100 Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 20 x 1 = 20 Marks (All questions to be answered, questions to be of objective type: MCQ'S, fill in the blanks, T/F, Match and answer in a line or two)

Section B – 5 x 8 = 40 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 3 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE: BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 - 2012)

ORGANIC SYNTHESIS AND PURIFICATION - PRACTICAL

CODE: 11CH/PC/P4 34 **CREDITS : 4**

L T P : 0 0 6

TOTAL HOURS : 78

Unit 1

Purification and of Organic compounds- Paper chromatography/TLC / Column chromatography (to be tested internally)

Unit 2

Organic Preparation

2.1 Single Step Preparations

- 2.1.1 Preparation of o-chloro benzoic acid (Sandmeyer reaction)
- 2.1.2 Preparation of methyl orange (Diazotisation)
- 2.1.3 Preparation of Benzpinacol (Photoreduction)
- 2.1.4 Preparation of Benzoicacid and benzyl alcohol (Cannizaro Reaction)
- 2.1.5 Preparation of Benzil (Oxidation)

2.2 Two Step Preparations

- 2.1.1. Preparation of p-bromo acetanilde from aniline (Acetylation, Bromination)
- 2.1.2. Preparation of s-tribromo benzene from aniline (Bromination, Reduction)
- 2.1.3. Preparation of m-nitroaniline from nitrobenzene (Nitration, Reduction)

2.3 Microwave assisted Preparations

- 2.3.1. Preparation of Fluorescein (Xanthene dye)
- 2.3.2. Preparation of Benzalacetophenone (Clasien Schmidt condensation)
- 2.3.3. Preparation of ethyl-2-cyano-3-(4-methoxy phenyl)propenoate (Knovenegal reaction)

Note :

Spectroscopic identification / purification by chromatographic methods wherever applicable.

BOOKS FOR REFERENCE

Mohan, J. Organic Analytical Chemistry – Theory and Practice. New Delhi: Narosa Publishing House, 2003.

Raj, K. Bansal. Laboratory Manual of Organic Chemistry**.** 3rd ed. New Delhi: Wiley Eastern Limited, 2003.

Vogel A.I., Elementary Practical Organic Chemistry Part I, Small Scale Preparation, New Delhi: CBS Publishers, 1998.

END SEMESTER EXAMINATION:

Total Marks :50 marks Duration : 6 hours

Viva Voce : **5 Marks**
Procedure for the Preparation **: 5Marks**

(i) Two Stage Preparation : (40 marks)

Quantity of Product 1 = 15 Marks
Quantity of Product 2 = 15 Marks

Quality of Final Product
a) Recrystallisation = 5 Marks
b) Melting Point = 5 Marks

OR **: 40 Marks**

(ii) Two Single Stage Preparations : (40 marks)

Quantity of Product = 10 Marks (each)

Quality of Final Product
a) Recrystallisation = 5 Marks (each)
b) Melting Point = 5Marks (each)

TOTAL **: 50 marks**

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE: BRANCH IV - CHEMISTRY

SYLLABUS

PHYSICAL CHEMISTRY – PRACTICAL

CODE :11CH/PC/P532

CREDITS: 2
L T P : 0 0 3
TOTAL HOURS : 39

Phase rule

1. Three component system(water- Toluene- Acetic acid)

Solubility product

2. Variation of the solubility of (calcium sulphate /Zinc Sulphate/ Nickel sulphate) with ionic strength and hence determine the thermodynamic solubility product (complexometric titration with EDTA)

Chemical Kinetics

3. Effect of ionic strength on the reaction rate : Persulphate and potassium iodide reaction.
4. Kinetics of hydrolysis of t-butyl chloride (by conductometric measurements)

Viscometery

5. Determination of relative molecular mass / intrinsic viscosity of polystyrene from viscosity measurements

Partial Molal Quantities

6. Determination of Partial molal volume of methanol in dilute aqueous solutions (by method of intercepts)

Conductometry

7. Determination of critical micelle concentration conductometrically.
8. Titration of mixture of three acid (trichloroacetic acid, dichloroacetic acid and acetic acid) conductometrically.

pH metry

9. Determination of pKa values of glycine /Maleic acid / phosphoric acid potentiometrically using glass electrode.

Spectrophometer

10. Determination of the composition and stability constant of a complex formed between iron(III) ions and salicylic acid by Job's method.

BOOKS FOR REFERENCE

Alexander Findlay. Practical Physical Chemistry. 7th ed. London: Longman Green and Co Ltd., 1967.

National Institute of Nutrition, ICMR. A Manual of Laboratory Techniques . Hyderabad: National Institute of Nutrition, 1983.

Plummer,David.T. An Introduction to Practical Biochemistry. New Delhi: Tata McGraw Hill Publishing Company Ltd.,2000.

Sadasivam S and Manickam A. Biochemical Methods, New Delhi: New Age International , 1996.

Venkateswaran V. Veerasamy, R. Kulandaivelu A. R. Principles of Practical Chemistry. 2nd ed. New Delhi: Sultan Chand and Sons, 1997.

Viswanathan, B. and Raghavan, P.S. Practical Physical Chemistry, New Delhi: Viva Books Pvt. Ltd., 2005.

END SEMESTER EXAMINATION :

Total Marks : 50 Duration : 3 hours

Procedure = 10 (marks)

Vivavoce = 10 (marks)

Reported value = 30 (marks)

Continuous assessment Internal: 50 marks

Class Work = 30 (marks) – inclusive of *viva*

CA Test = 20 (marks)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE: BRANCH IV - CHEMISTRY

SYLLABUS
(Effective from the academic year 2011 - 2012)

SUMMER INTERNSHIP

CODE : 11CH/PN/SI32 **CREDITS : 2**

OBJECTIVES OF THE COURSE

- To enhance the experiential learning of the students by observing and hands on training at research institutes / chemical industries.
- To expose them to various experimental and analytical techniques employed in quality research.
- Enhance their skills in application - oriented courses.
- To familiarize the students to research ambience.

The Summer Internship program is for a minimum period of one month. The students are expected to have regular attendance in their respective Institute and submit a report to the Department about their summer internship along with the attendance certificate. The students are expected to give a seminar presentation in the third semester of the work they have observed and conducted.

Guidelines for Evaluation

The maximum marks for the Summer Internship is 50 and is divided into the following :

a) Summer Internship - Report (20 Marks)
b) Seminar presentation (20 Marks)
c) Attendance along with the log book (10 Marks)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE: BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 - 2012)

BIOCHEMISTRY

CODE:11CH/PE/BC 34

CREDITS : 4
L T P : 4 0 0
TOTAL TEACHING HOURS : 52

OBJECTIVES OF THE COURSE

- To expose the students to the structure-function relationship of biomolecules
- To give an insight into the metabolic pathways and the consequences of deviation from normal.
- To instill interest into research in Biochemistry.

Unit 1 *(10 hrs)*

Introduction to biochemistry

1.1 Scope of Biochemistry, Relationship between biochemistry and medicine; normal biochemical process – basis of health

1.2 Water as a biological solvent and its importance in maintaining the structure of biomolecules

1.3 Acid base balance, biological buffers - Bi-carbonate, Phosphate, Protein and Haemoglobin - Acidosis and Alkalosis.

Unit 2 (8 hrs)

Bioenergetics

2.5 Bioenergetics: Conventions in biochemical energetics.

2.6 ATP as the universal currency for free energy in biological systems

2.7 Free energy of hydrolysis of ATP and other organophosphates.

2.8 Structural basis for the high group transfer potential of ATP

2.9 Standard free energy changes for representative chemical reactions

2.10 Inter-conversion of Adenine nucleotides.

Unit 3 (12 hrs)

Biomolecules

3.5 Biomolecules: Elementary structure of proteins, nucleic acids and membrane bilipids (fluid mosaic structure).

3.6 Relationship between the structure and function of proteins and the consequences of deviation from normal.

Unit 4 (10hrs)

Biocatalysts – Enzymes

4.5 Enzymes, definition, co-factor, apoenzyme

4.6 General properties, active site, factors affecting enzyme action.

4.7 Enzyme regulation; allosteric, feedback regulation, product inhibition.

4.8 Immobilization of Enzymes, methods and applications.

Unit 5 (12 hrs)

Metabolism

5.1 Definition, terminology and functions of metabolism
5.2 Metabolism of carbohydrates – glycolysis, gluconeogenesis, glycogen metabolism, and TCA cycle.
5.3 Proteins – oxidative deamination, Transamination and urea cycle.
5.4 Lipids – beta oxidation of fatty acids and biosynthesis of fatty acids, triglycerides and cholesterol.
5.5 Xenobiotics - general methods of detoxification.

BOOKS FOR REFERENCE

Albert, Lehninger et al. Biochemistry. 5th ed. New York: Worth Publishing, 2008

Brandon and Tooze. Introduction to protein structure. New York: Garland Publishing, 2000

Conn, E.E. and Stumpf. Biochemistry. 4th ed. New York: Wiley Eastern, 1976.

Glick, R. Bernard. Pasternak, J. Jack. Molecular biotechnology, Principles and applications of Recombinant DNA. 2nd ed. Washington: Asm Press, 2005.

Lubert, Stryer. Biochemistry, 5th ed. New York: W.H. Freeman, 2009.

Jain, J.L. Fundamentals of Biochemistry**,** 4th ed. New Delhi: S. Chand and Company, 2008.

Jeremy, M. Berg. Biochemistry. 5th ed. New York: W.H. Freeman, 2001.

Voet, D. and Voet, G.Biochemistry**,** 2nd ed. New York: John Wiley and Sons, 2007.

END SEMESTER EXAMINATION

Total Marks: 100 Duration : 3 Hours

QUESTION PAPER PATTERN

Section A – 20 x 1 = 20 Marks (All questions to be answered, questions to be of objective type: MCQ'S, fill in the blanks, T/F, Match and answer in a line or two)

Section B – 5 x 8 = 40 Marks (5 out of 7 to be answered)
Section C – 2 x 20 = 40 Marks (2 out of 3 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI-600086.

Post Elective Course Offered by the Department of Mathematics for M.A. / M.Sc. / M.Com Degree Programme

SYLLABUS

(Effective from the Academic Year 2011 - 2012)

MEDICINES AND HEALTH CARE

CODE:11CH/ PE/MH 34

CREDITS: 4
L T P : 4 0 0
TOTAL TEACHING HOURS : 52

OBJECTIVES OF THE COURSE

- To give an overview of medicines in day to day life - a field of interest to humanity
- To enlighten students on the application of chemistry to keep good health.

Unit 1 **(5 hrs)**

General Introduction to drugs

1.1 Terminology- Pharmacy, Pharmacology, Pharmacodynamics, Pharmacokinetics, Antimetabolites, Mutation, Pharmacognosy, Toxicology, Pharmacotherapeutics, Chemotherapy, therapeutic index
1.2 Classification of Drugs-Biological, chemical and commercial classification.
1.3 Diseases – Communicable and Non Communicable, Pathogens – Bacteria, Virus, Fungi, Protozoans

Unit 2 **(10 hrs)**

Common Diseases And Their Treatment By Drugs

2.1 Common diseases: insect borne -Malaria, air borne - whooping cough, measles, common cold and TB. Waterborne -Cholera, typhoid, dysentery- Etiology, symptoms, prevention and remedy.
2.2 Common disorders of the digestive system –Hepatitis A and B; respiratory system- Asthma; nervous system- Epilepsy. Prevention and treatment.
2.3 AIDs, HIV1, HIV 2 – Awareness, prevention and treatment
2.4 Fungal dermatitis – anti fungal drugs.

Unit 3 **(10 hrs)**

Blood and Hematological agents

3.1 Blood pressure, hypertension-cause, diet, prevention. Antihypertensive agents -Aldomet, reserpine.

3.2 Clotting of blood- mechanism, haematological agents, anaemia –causes and control- antianaemic drugs.
3.3 Cardiovascular diseases- Cardiac glycosides-Digoxin, antiarrhythmic drugs-Quinidine- dosage, therapeutic uses-Calcium blockers.
3.4 Antianginal agents- nitriles, vasodilators-Sodium Nitroprusside, Papaverine, nicotinic acid

Unit 4 **(10 hrs)**

Drugs in daily life

4.1 Anaesthetics- types-general, local, intravenous – (ether, $CHCl_3$, halothane, nitrous oxide, Cocaine), - advantages and disadvantages.
4.2 Antiseptics and disinfectants- (Phenols, chloramines, bleaching powder, Dyes-Crystal violet).
4.3 Analgesics, anti pyretic and anti-inflammatory agents- narcotic and non-narcotic drugs-morphine, source, activity and uses – (pethadine, aspirin, paracetamol, phenyl butazione, brufen).

Unit 5 **(17 hrs)**

Drugs of Importance

5.1 Sulpha Drugs – use of sulpha drugs-limitations-(sulphapyridine and sulphadiazine).
5.2 Antibiotics-Classification - therapeutic uses of Chloramphenicol, Penicillin-potency of the drug, (Streptomycin, tetracyclines, Erythromycin).
5.3 Antipsychotic drugs- tranquiliser (piperazine, benzamides), adverse effects; antidepressants-sedatives and hypnotics- (barbiturates).
5.4 Diabetes – Types – hypoglycemic agents, sugar substitutes.
5.5 Cancer causes - types – treatments - antineoplastic drugs - antimetabolites and plant products; hormone therapy and adrenocortecosteroids, radioactive isotopes.

BOOKS FOR REFERENCE

Alex, Kaplan, Laverne L. Szabo, Kent E. Opheim, Clinical Chemistry Interpretation and Techniques. 3rd ed. USA: Lea and Febiger, 1988.

Bagavathi Sundari.K Applied Chemistry MJP publishers, 2006

Chockalingam and Devadasan. Pharmaceutical Chemistry. V.V. Publications, 1990.

Craig R., Robert. E., Stitzel. Modern Pharmacology. 4th ed. USA: Little Brown and Co, 1994.

David, A. Williams, Thomas L. Lemke. Foye's Principles of Medicinal Chemistry. 5th ed, Lippincott Williams & Wilkins, 2005.

Graham, Patrick. An Introduction to Medicinal Chemistry**.** 2nd ed. Oxford University Press, 2001.

Jayasree Ghosh. A text book of Pharmaceutical Chemistry. 1st ed. New Delhi: S.Chand & Co Ltd, 1997.

John, H. Block, John M. Beale, Jr. Organic Medicinal and Pharmaceutical Chemistry**,** 11th ed. Lippincott Williams & Wilkins, 2004.

Sujatha, V. Bhat. Biomaterials. 2nd ed. Chennai: Narosa Publishing House, 2005.

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END SEMESTER EXAMINATION

Total Marks: 100 Duration : 3 Hours

QUESTION PAPER PATTERN

Section A – 20 x 1 = 20 Marks (All questions to be answered, questions to be of objective type: MCQ'S, fill in the blanks, T/F, Match and answer in a line or two)

Section B – 5 x 8 = 40 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 3 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE : BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 - 2012)

DISSERTATION

CODE :11CH/PC/DI48 **REDITS : 8**

GUIDELINES FOR DISSERTATION

Project should be done individually. Each student will choose a topic of her interest and the student will be assigned to a supervisor.

The project will require practical work with the submission of a project report. It should include experimental lab work. The duration of the project work is between 3 and 6 months

The project report should be submitted in the prescribed format containing a minimum of 50 pages. References should not be counted with the main pages. The report should be enhanced with graphs, spectra, tables and or photographs.

Each candidate has to give three periodical reviews to the internal guide on the scheduled dates prescribed by the department.

Each candidate can prepare 4 hard copies of the thesis. 1 copy for her and 3 copies must be submitted to the department. The project should be submitted on the scheduled date prescribed by the Department. The student should appear for Viva-voce before a panel comprising the External Examiner, the supervisor and the Head of the Department.

Guidelines for Evaluation
The maximum marks for the dissertation is 200 and **this will be converted to 100 marks by Controller of Examination**

Internal evaluation : 100

* attendance, log book, experimental work and project report

External evaluation : 100

* project report and *viva voce*

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI-600086

M.Sc DEGREE:BRANCH IV- CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 - 2012)

SYNTHETIC ORGANIC CHEMISTRY AND NATURAL PRODUCTS

CODE:11CH/PC/SO44
CREDITS : 4
L T P : 4 1 0

TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE

- To understand the application of photochemistry in organic reactions.
- To perform retro synthetic analysis and identify the target molecule
- To design synthesis of a given compound
- To appreciate the role of reagents in the synthesis of organic compounds
- To impart the knowledge on the extraction and synthesis of natural products.

Unit 1 **(16 hrs)**

Photochemistry and Pericyclic reactions

1.1 Fundamentals of photochemistry, Jablonski diagram

1.2 Cis-trans isomerisation, Paterno Buchi reaction ,Norrish type-I and type-II reactions, di-pimethane rearrangement.

1.3 Photochemistry of cyclohexadienones ,Photoreduction of ketones,, Photooxidation of olefins.

1.4 Pericyclic reactions: classification, orbital symmetry, Woodward-Hofmann rules (con & dis rotation).

Electrocyclic reactions-thermal and photochemical(cyclisation and ring openings). Stereochemistry, FMO and correlation diagrams for butadiene to cyclobutene and 1,3,5-hexatriene to 1,3- cyclohexadiene systems.

Cycloaddition reactions- thermal and photochemical, stereochemistry, FMO and correlation diagrams of (2+2 and 4+2) reactions. Stereochemistry of 1,3 dipolar reactions

1.5 Sigmatropic rearrangements – Cope, oxy-Cope and Claisen rearrangement.

1.6 Fluxional molecules – Homotropylidene, barbaelone, bullvalene.

Unit 2 **(14 hrs)**

Strategies for synthesis

2.1 Analysis, identification of synthons and planning for synthesis of organic Compounds.

2.2 Introduction, removal and interconversion of functional groups

2.3 Protection, activation of functional groups, removal of protecting groups

2.4 Retrosynthetic analysis- Alternate synthetic routes. Synthesis of organic mono and bifunctional compounds via disconnection approach. Umpolung synthesis.

2.5 Stereochemical control of products-selective aldol and Michael reactions.

Unit 3 **(13 hrs)**

Novel reagents in organic synthesis

Use of the following reagents in organic synthesis and functional group transformations:

3.1 Diborane, OsO_4, NBS, Phenylisothiocyanate, DCC, lead tetra acetate, PCC, Tosyl chloride, trifluoroacetic acid, DDQ, selenium dioxide, TMSI, Gilmann reagent.

3.2 Organometallic reagents-n-butyl lithium, LDA, LAH, tri-n-butyl tin hydride, Organo Aluminium, Copper, Cobalt, ,Znic, Palladium compounds

3.3 Wilkinson catalyst, Bakers yeast.

Unit 4 **(12 hrs)**

Alkaloids,Terpenoids and Steroids

4.1 General methods of Structure determination of alkaloids, terpenoids and steroids

4.2 Structure elucidation of zingiberine (terpenoid), papaverine (alkaloid),

Unit 5 **(10 hrs)**

Flavonoids

5.1 General methods of structure determination of flavonoids.

5.2 Structure elucidation of Apigenin (flavones), Quercetin (flavonols) and Daidzein (isoflavones).

5.3 Distinction of flavonoids by characteristic colour reactions and absorption spectra (UV-Visible).

Self study to be tested internally

- Occurrence and methods of extraction of natural products
- Spectral details of alkaloids and terpenoids
- Reactions of flavonoids
- Reactions of steroids

BOOKS FOR REFERENCE

Agarwal, O.P. Reactions and Reagents**,** Meerut: Goel Publishing House, 2003.

Ahluwalia V.K. & Parashar R.K. Organic Reaction Mechanisms, New Delhi : Narosa Publishing House, 2002.

Finar I.L. Organic Chemistry, Volume II, 5th ed. London: ELBS, 2000

Francis A. Cary and Richard J Sundburg. Advanced Organic Chemistry**,** New York: Plenum Press, 2004.

A.Gilbert,Norman S.Allen, Photochemistry**,** Vol 36, RSC Publishing, 2007.

Jerry March. Advanced Organic Chemistry, 3rd ed. New York: Wiley Interscience Publication, 1993.

Michael Harmata ,Strategies and tactics in organic synthesis,Vol 7, London, Academic Press, 2008.

Nicholas J.Turro, Modern Molecular Photochemistry , USA, University science books, 1991.

Reinhard Bruker. Advanced Organic Chemistry- Reaction Mechanisms, New York: Academic Press, 2003.

Sujata V. Bhat, Bhimsa A. Nagasampagi, Meenakshi Siva kumar, Chemistry of natural Products , India, Narosa, 2005.

Warren S. Designing of Organic Synsthesis- a programmed introduction to the Synthon approach, New York: Wiley, 1978.

Warren S. Organic Synthesis- the Disconnection Approach, New York: Wiley, 1978.

Warren S Workbook for Organic Synthesis, New York: Wiley, 1978.

END SEMESTER EXAMINATION:

Total Marks: 100 Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 20 x 1 = 20 Marks (All questions to be answered, questions to be of objective type: MCQ'S, fill in the blanks, T/F, Match and answer in a line or two)

Section B – 5 x 8 = 40 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 3 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086
M.Sc DEGREE: BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 - 2012)

NANOCHEMISTRY

CODE: 11CH/ PE/NC44 **CREDITS : 4**
L T P : 4 0 0
TOTAL TEACHING HOURS : 52

OBJECTIVES OF THE COURSE.

- To study the top-down and bottom-up approaches to nanochemistry
- To describe methods by which nanoscale manufacturing can be enabled..
- To discuss the concept and context of nanotechnology within society

Unit 1 **(10 hrs)**

Introduction

1.1 Concepts of Nanoscience and nanotechnology

1.2 Classification of nano materials, properties and applications

1.3 Self assembly – Materials and molecules, Self Assembled Monolayers, (SAM) and Soft lithography.

1.4 Nanowires and Nanomachines, Techniques used in nanochemistry and nanomanipulation.

Unit 2 **(13 hrs)**

Fabrication of Nanoparticles

2.1 Techniques for synthesis of nanophase materials - sol-gel synthesis , electrodeposition, inert gas condensation, CVD, PVD,mechanical alloying.

2.2 Properties of nanophase materials –Size effects-Kinetics and thermodynamic features of nano materials. applications of nanophase materials.

Unit 3 **(12 hrs)**

Nanocomposites and Metal atoms

3.1 Introduction, Polymer as matrix, Nylons, Polystyrene, Epoxyresins, Nanomaterials as fillers – Nanofibre and Nanoclays.

3.2 Fabrication and processing of composites, nanostructured materials, applications of nanocomposites.

3.3 Techniques used in the synthesis of pure metals – Gold, Silver and Cobalt. Characterisation- Surface plasmon resonance and its application.

Unit 4 **(12 hrs)**

Experimental techniques in nanochemistry

4.1 Experimental techniques- Instrumentation and structure determination studies: Transmission electron microscopy (TEM),Scanning electron

microscopy (SEM) Scanning tunneling microscope (STM), Atomic force microscopy (AFM)
X ray diffraction (XRD)

Unit 5 **(5 hrs)**

Interfaces of nanoscience

5.1 Nanomaterials interface with biological systems, environmental and health aspects.

5.2 Social implications of nanoscience and technology.

Self study to be tested internally

- *Examples of some nanosystems like carbon nanotubes, semiconductor quantum dots, core-shell nanoparticles etc and their applications could be included.*
- Application of biology and medical science.

BOOKS FOR REFERENCE

P.Atkins, T.Overton, J.Rourke, M.Weller and F.Armstrong, Shriver &Atkins Inorganic Chemistry. Chennai: Oxford University Press, 2006.

C. Brechigneae, P. Houdy, M. Lahmai, Nanomaterials and Nanochemistry. Berlin: Springer, 2007.

Kenneth J.Klabunde. Nanoscale materials in Chemistry. New York: John Wiley & Sons, 2001.

Pradeep T, Nano: The essentials - understanding Nanoscience and Nanotechnology. New Delhi: McGraw Hill Education, 2007.

C.P.Poole and F.J.Owens, Introduction to Nanotechnology. Hoboken: Wiley-Interscience 2003.

Rao,C.N.R Muller, Achim, Cheetham,K Anthony, The Chemistry of Nanomaterials-Synthesis,Properties and Applications. New York: Wiley-VCH, 2004.

M. Ratner and D.Ratner, Nanotechnology:The Next Big Idea, New York: Prentice Hall, 2003

J. W. Steed, D. R.Turner, K. Wallace, Core Concepts in Supramolecular Chemistry and Nanochemistry, Wiley, 2007.

H. Watarai, N. Teramae, Tsugo Sawada, Interfacial Nanochemistry. Springer, 2005.

Wilson, M. K. Kannangara, G. Smith, M. Simmons and B.Rague.
Nanotechnology: Basic Science and Emerging Technologies. CRS Press, 2002.

END SEMESTER EXAMINATION

Total Marks: 100 Duration : 3 Hours

QUESTION PAPER PATTERN

Section A – 20 x 1 = 20 Marks (All questions to be answered, questions to be of objective type: MCQ'S, fill in the blanks, T/F, Match and answer in a line or two)

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