STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086
B.Sc. DEGREE : BRANCH IV - CHEMISTRY
COURSES OF STUDY OFFERED
(Effective from the academic year 2011 - 2012)
CHOICE BASED CREDIT SYSTEM

Subject Code	Title of Course	Credits	Lecture Hours (L)	Tutorial Hours (T)	Practical Hours (P)	Exam Hours	Continuous Assessment	End Semester	Maximum
								Marks	
Semester - I									
11CH/MC/GC14	General Chemistry	4	4	1	0	3	50	50	100
11CH/MC/IC14	Inorganic Chemistry - I	4	4	1	0	3	50	50	100
11CH/MC/P111	Semi Micro Qualitative Analysis - I Practical	1	0	0	2	2	50	50	100
Semester - II									
11CH/MC/AC24	Analytical Chemistry	4	4	1	0	3	50	50	100
11CH/MC/P222	Semi Micro Qualitative Analysis - II Practical	2	0	0	3	3	50	50	100
11CH/ME/PH23	Pharmaceutical Chemistry	3	3	1	0	3	50	50	100
OR									
11CH/ME/PL23	Polymer Chemistry	3	3	1	0	3	50	50	100
11CH/GC/ES22	Environmental Studies	2	2	0	0	-	50	-	100
11CH/SL/PA22	Pollutants and Adulterants	2	2	0	0	-	50	-	100
Semester - III									
11CH/MC/OC34	Organic Chemistry - I	4	4	1	0	3	50	50	100
11CH/MC/IC34	Inorganic Chemistry - II	4	4	1	0	3	50	50	100
11CH/MC/P332	Organic Chemistry - Practical	2	0	0	3	3	50	50	100
Allied Core Offered to the Departments of Botany and Zoology									
11CH/AC/BC33	Biochemistry - I	3	3	0	0	3	50	50	100
11CH/AC/P131	Biochemistry - I Practical	1	0	0	2	2	50	50	100
Allied Core Offered to the Department of Physics									
11CH/AC/GC33	General Chemistry - I	3	3	0	0	3	50	50	100
11CH/AC/P231	Volumetric Anlaysis - Practical	1	0	0	2	2	50	50	100
Semester - IV									
11CH/MC/PC44	Physical Chemistry - I	4	4	1	0	3	50	50	100
11CH/MC/P442	Volumetric Analysis - Practical	2	0	0	3	3	50	50	100
Allied Core Offered to the Departments of Botany and Zoology									
11CH/AC/BC43	Biochemistry - II	3	3	0	0	3	50	50	100
11CH/AC/P241	Biochemistry - II Practical	1	0	0	2	2	50	50	100
Allied Core Offered to the Department of Physics									
11CH/AC/GC44	General Chemistry - II	4	3	0	2	3	50	50	100

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CHOICE BASED CREDIT SYSTEM

Subject Code	Title of Course	Credits	Lecture Hours (L)	Tutorial Hours (T)	Practical Hours (P)	Exam Hours	Continuous Assessment	End Semester	Maximum
			Total Hours				**Marks**		
Semester - V									
11CH/MC/OC54	Organic Chemistry - II	4	4	1	0	3	50	50	100
11CH/MC/PC54	Physical Chemistry - II	4	4	1	0	3	50	50	100
11CH/MC/BC54	Biochemistry	4	4	1	0	3	50	50	100
11CH/MC/P551	Biochemistry - Practical	1	0	0	2	2	50	50	100
11CH/MC/P652	Physical Chemistry - I Practical	2	0	0	3	3	50	50	100
11CH/ME/CC53	Computers in Chemistry (Skill Development Course)	3	3	1	3	3	50	50	100
OR									
11CH/ME/CB53	Clinical Biochemistry (Skill Development Course)	3	1	0	3	3	50	50	100
Semester - VI									
11CH/MC/OC64	Organic Chemistry - III	4	4	1	0	3	50	50	100
11CH/MC/PC64	Physical Chemistry - III	4	4	1	0	3	50	50	100
11CH/MC/IC64	Inorganic Chemistry - III	4	4	1	0	3	50	50	100
11CH/MC/SP64	Spectroscopy	4	4	1	0	3	50	50	100
11CH/MC/P762	Physical Chemistry - II Practcial	2	0	0	3	3	50	50	100
General Elective Courses									
11CH/GE/CE32	Chemistry in Everyday Life	2	2	0	0	-	50	-	100
11CH/GE/CP32	Cosmetics and Personal Care	2	2	0	0	-	50	-	100
11CH/GE/FA44	Detection of Food Adulteration	4	4	0	0	3	50	50	100
11CH/GE/DD44	Drugs and Diseases	4	4	0	0	3	50	50	100
11CH/GE/EI44	Developing Entrepreneurial Initiatives	4	4	0	0	3	50	50	100
Independent Elective Courses									
11CH/UI/FC23	Forensic Chemistry	3	-	-	-	3	-	50	100
11CH/UI/EC23	Environmental Chemistry	3	-	-	-	3	-	50	100

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SYLLABUS

(Effective from the academic year 2011- 2012)

GENERAL CHEMISTRY

CODE: 11CH/ MC/GC 14   **CREDITS: 4**
                                                                                    L T P: 4 1 0
                                                                                    TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To understand the fundamental aspects of Atomic Structure.
- To study acid–base concept,
- To expose the students to the field of nuclear chemistry.
- To equip the students with introductory Organic chemistry

Unit   1   (10 Hrs)

Atomic structure

1.1 Rutherford's nuclear model of the atom. Planck's quantum theory of radiation. Photoelectric effect. Bohr's model of the atom. Bohr's theory and the origin of hydrogen spectrum. Particle and wave character of electron, de Broglie's equation, Davisson - Germer experiment. Heisenberg's principle of uncertainty. Compton Effect.

Unit   2   (10 Hrs)

Introduction to Quantum Mechanics

2.1 Postulates of Quantum mechanics; operators- Hermitian operators, Laplacian and Hamiltonian operators, eigen functions and eigen values of operators. Conditions for a well behaved function, Schrodinger wave equation (no derivation). Significance of ψ and ψ^2. Radial and angular wave functions and their plots. Shapes of orbitals. Quantum numbers. Zeeman effect.

2.2 Pauli exclusion principle. Effective nuclear change,screening effect-Slater's rule- applications. Electronic configuration of elements –stability of half filled and completely filled orbitals. Hund's rule-its basis and applications.

Unit   3   (20 Hrs)
Nuclear Chemistry
3.1 Elementary particles - concept of nuclides, representation of isobars, isotones, isotopes with examples.
3.2 Yukawa's theory, Stability of the nucleus- liquid drop and shell model, n/p ratio, binding energy, mass defect and magic numbers.

3.3 Modes of decay – Neutron, positron theory of α, β and γ emission, characteristics of α, β and γ particles. K-capture and positron emission. half life period, Geiger –Nuttal rule, radioactive displacement laws –Soddy, Fajan and Russel, radioactive decay series 4n, 4n+1, 4n+2 and 4n+3 series.

3.4 Artificial Radioactivity - artificial transmutation of elements. Synthesis of artificial radio isotopes, nuclear fusion and fission reactions.

3.5 Principles of nuclear energy production. Radiation detection and measurement – Ionization chamber, Geiger- Muller counter and scintillation counters. Applications of isotopes in medicine and in the study of reaction mechanisms.

Unit 4

Acids and Bases, Non aqueous Solvents for inorganic reactions (5 Hrs)

4.1 Acids and bases: Bronsted-Lowry, Lux-Flood, Solvent System and Lewis concepts of acids and bases. Factors affecting strengths of Lewis acids and bases. HSAB principle and its applications

4.2. Non-aqueous solvents: Physical properties of a solvent for functioning as an effective reaction medium, types of solvents and their general characteristics. liquid ammonia and liquid sulphur dioxide as non aqueous solvents.

Unit 5

Introductory Organic Chemistry (20 Hrs)

5.1 Cleavage of bonds - homolytic and heterolytic cleavages.

5.2 Electrophiles, nucleophiles, types of reagents, reactants, intermediates- free radicals, carbocation, carbanion ,transition state, condition favouring their formation-stability and structure, their reactions with examples

5.2 Aromaticity and Huckel's rule.

5.3 Inductive, inductomeric, electromeric, mesomeric, resonance, hyperconjugation and steric effects. Tautomerism

5.4 Isomerism - Structural isomerism, Stereoisomerism – Geometrical (E,Z designation) and optical isomerism- D L, R S configurations. Sequence rules.

5.5 Conformational analysis of ethane, n-butane, conformers of cyclohexane (chair,boat and skew boat forms), conformers of mono substituted cyclohexanes.

Self Study to be tested internally

Evolution of atomic structure, Quantum mechanics

Power Reactors, Fast Breeder Test reactor, Nuclear reactors in India, Methods of Disposal of nuclear wastes, Nuclear reactor disaster in tsunami hit Japan - 2011

Radio diagnosis and radiotherapy.

Classifications of acids and bases as hard and soft

IUPAC nomenclature of organic compounds.

TEXT BOOKS

J.D. Lee, Concise Inorganic Chemistry, 5th Edition, New Delhi, Oxford University Press,2008

Puri,B.R., L.R. Sharma., Madan S. Pathania, Principles of Physical Chemistry, New Delhi. Vishal Publishing Company, 2008.

Soni P.L.,Textbook of Organic Chemistry, New Delhi ,Sultan Chand & Sons, 1992.

Puri B.R, Sharma L.R & Kalia K.C, Principles of Inorganic Chemistry, New Delhi, Milestone Publishers and Distributors, 2008.

BOOKS FOR REFERENCE

Chandra A.K., Introductory Quantum Chemistry, 4th Edition, New Delhi, Tata McGraw Hill Publishing Company, 2001.

Madan R.D., Satyaprakash's Modern Inorganic Chemistry, New Delhi, Sultan Chand & Company, 2004.

Morrison .R.T. & R.N. Boyd, Organic Chemistry, 6th Edition, New Delhi, Prentice Hall of India Pvt. Ltd.,. 1995.
Prasad R.K., Quantum Chemistry, 2nd Edition, New Delhi, Wiley Eastern Ltd., 2000.

H.J.Arinikar , Essentials of Nuclear Chemistry, 4th edition , New Delhi ,New Age International, 1995.

Solomons & Fryhle , Organic Chemistry, 7th edition, New Delhi , Wiley India Pvt. Ltd, 2004.

D.A. McQuarrie and J.D. Simon , Physical Chemistry-A Molecular Approach, New Delhi Viva Book Pvt Ltd., 2001.

END SEMESTER EXAMINATION:

Total Marks: 100   Duration: 3 Hours
QUESTION PAPER PATTERN
Section A – 30 x 1 = 30 Marks (All questions to be answered) Multiple choice - 10, Fill up - 10, T/F or Match - 5, single line answer - 5

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)
Section C – 2 x 20 = 40 Marks (2 out of 3 to be answered)

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SYLLABUS
(Effective from the academic year 2011- 2012)

INORGANIC CHEMISTRY - I

CODE: 11CH/MC/IC 14   **CREDITS : 4**
                                   L T P : 4 1 0
                        TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE

- To understand chemical bonding and periodicity of properties of elements.
- To introduce the students to the general methods of Metallurgy.
- To familiarize the students with the concept of redox reactions and to highlight its applications.

Unit   1

Periodicity of properties   (15 Hrs)

1.1 Periodic table, horizontal, vertical and diagonal relationships in the periodic table.
1.2 Periodicity of properties -atomic radii, ionic radii, covalent radii, ionization energy,
    electro negativity.
.   1.3 Scales of Electronegativity- Mulliken, Pauling and Allred Rowchow scales.
        Variation of electro negativity with Bond Order & oxidation states. Inert pair effect, standard electrode potentials and electrochemical series.
    1.4 Effective nuclear charge – screening effect – Slater rules

Unit 2   (10 Hrs)
    Ionic bond

2.1 Properties of ionic compounds. Factors favouring the formation of ionic compounds-ionisation energy, electron affinity and electronegativity. Radius ratio rules - limitations.
2.2 Lattice energy- Born -Lande equation (no derivation) factors affecting lattice energy, Born Haber Cycle- its applications, covalent character in ionic compounds-polarization and Fajan's rules.

Unit 3 (15 Hrs)
      Covalent bond

3.1 Valence shell electron pair repulsion (VSEPR) theory. Polarity of covalent
    bond - percentage of ionic character – dipole moment and molecular structure.
3.2 Valence bond theory (VBT) –hybridization, merits and demerits.
3.3 Molecular orbital theory (MOT) – bonding, antibonding and nonbonding
orbitals. Application of MOT to configuration of molecules and ions: He, N_2,
   O_2, CO, NO, HF, O_2^+, O_2^-. Comparison between VBT and MOT.
3.4 Hydrogen bond-consequences of hydrogen bonding.

Unit 4 (15 Hrs)

Principles of Metallurgy

4.1 General methods of extraction of metals.
4.2 Ore dressing - Froth floatation (Zn) Gravity separation (Au), Magnetic
separation (Sn) and Chemical separation (Al).
4.3 Isolation of metals - Electrolytic (Al), Chemical (Au), Auto-reduction (Pb, Hg),
   Metal displacement (Ag), Complex formation followed by metal displacement
(Ni), Carbothermal reduction (Mn), Alumino Thermit process (Cr), Smelting (Zn).
4.4 Refining of metals - Electrolysis (Cu), van Arkel's process (Ti, Zr), Zone
refining (Si,Ge), Mond's Process (Ni).
4.5 Thermodynamics of the oxidation of metals to metal oxides-The Ellingham
diagram.

Unit 5 (10 Hrs)
Redox Reactions

5.1 Redox reactions and partial equations.
5.2 Oxidizing and reducing agents. Determination of equivalent weight of oxidizing
   and reducing agents.
5.3 Balancing redox equations by oxidation number and ion- electron method-
Problems.

Self Study to be tested internally

  Evolution of periodic table.
  Mole concepts.
  Calculation of bond order and determining the stability of homo and hetero diatomic
  Molecules. Stability of ionic compounds in terms of lattice parameters.
  Furnaces used in metallurgical processes, Cupellation, Poling.
  Parke's process of extraction of lead -Nernst Distribution law.

TEXT BOOKS
Puri B.R, Sharma L.R & Kalia K.C. Principles of Inorganic Chemistry, New Delhi.
Milestone Publishers and Distributors, 2008

Madan R.D Satyaprakash's <u>Modern Inorganic Chemistry</u>, New Delhi. Sultan Chand & Company, 2008

Soni, P. L. & Mohan Katyal   <u>Text Book of Inorganic Chemistry</u>**,** New Delhi. Sultan Chand & Sons, 2008.

BOOKS FOR REFERENCE

Cotton F.A. and G.Wilkinson   <u>Advanced Inorganic Chemistry</u>, Wiley Indian   Pvt. Ltd. 2008

Garry L. Milessler and Donald A. Tarr <u>Inorganic Chemistry</u>. New Delhi. Prentice Hall Publishers, 2003.

Emeleus, H. J. & A. G. Sharpe   <u>Modern Aspects of Inorganic Chemistry</u>**,** London. ELBS, 1973.

James   E.Huheey,Okhil   K.Medhi,Ellen   A.Keiter   and   Richard   L.Keiter,   <u>Inorganic Chemistry, Principles of Structure   and Reactivity,</u> 4 th Edition, New Delhi. Pearson Publishers, 2006.

Lee, J.D.,   <u>Concise Inorganic Chemistry,</u> 5th Edition, New Delhi . Oxford University Press. 2008

Sundaram S & Vangalur S Srinivasan,   <u>Inorganic Chemistry</u>, Chennai. Margham Publications, 1995

Wahid U Malik, G.D.Tuli, R.D.Madan   <u>Selected Topics in Inorganic Chemistry.</u> New Delhi.
S Chand & Co. 2009.

R.Gopalan   <u>Inorganic Chemistry for undergraduates</u>. Hyderabad. Universities Press (India) Pvt Ltd. 2009.

END SEMESTER EXAMINATION:

Total Marks: 100   Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 30 x   1 = 30 Marks (All questions to be answered) Multiple choice - 10, Fill up - 10, T/F or Match - 5, single line answer - 5

Section B –   5 x   6 = 30 Marks (5 out of 7 to be answered)
Section C –   2 x 20 = 40 Marks (2 out of 3 to be answered)

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SYLLABUS

(Effective from the academic year 2011- 2012)

SEMI MICRO QUALITATIVE ANALYSIS – I PRACTICAL

CODE :11CH/MC/P111   CREDITS : 1
                                        L T P : 0 0 2
                                        TOTAL HOURS : 26

Unit 1

1.1 Reactions of the following acid radicals carbonate, sulfate, sulphide, nitrate, chloride, bromide, fluoride, oxalate, phosphate, arsenite, arsenate, chromate and borate.

1.2 Elimination of interfering radicals -oxalate, phosphate, chromate and borate.

1.3 Reactions of the following basic radicals and its group separations. Lead, copper, bismuth, cadmium, antimony, iron, aluminium, chromium, cobalt, nickel, zinc, manganese, calcium, barium, strontium, ammonium, magnesium.

Unit 2

Analysis of a given salt containing one cation and one anion (which will be an interfering ion.)

TEXT BOOKS

Jesurietta Sathian**,** Semimicro qualitative analysis. 2008

Sundaram. S., P. Krishnan. and P.S. Raghavan., Practical Chemistry. Madras. S.Viswanathan (Printers & Publishers) Pvt. Ltd., 1993.

Venkateswaran V. R., Veeraswamy, A.R. Kulandaivelu, Basic Principles of Practical Chemistry, New Delhi. Sultan Chand & Sons, 1993.

END SEMESTER EXAMINATION:

Total Marks: 50   Duration: 3 Hours

QUESTION PAPER PATTERN

General Procedure   15marks

Acid radical (1x15)   15 marks

Elimination procedure   5 marks

Basic radical (1x15)   15 marks

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086
B.A. / B.Sc. / B.Com / B.C.A. / B.V.A. / B.S.W. DEGREE

SYLLABUS

(Effective from the Academic Year 2011 – 2012)

ENVIRONMENTAL STUDIES

CODE : 11CH/GC/ES 12   **CREDIT : 2**

L T P : 2 0 0

TOTAL TEACHING HOUR : 26

OBJECTIVES OF THE COURSE

- To create an awareness about Current environmental issues
- To educate the students about conservation and management of natural resources
- To make the students ecosensitive and ecofriendly.

Unit   1   **(6 Hrs)**

Introduction

1.1 Components of the environment – Classification and characteristics of resources
    – Renewable and non – renewable resources.
1.2 Need for Public awareness in conservation of natural resources.
1.3 Energy Flow in ecosystems – aquatic and terrestirial – food chain and food web.

Unit   2   **(10 Hrs)**

Pollution and Socio Economic Aspects of the Environment

2.1. Types of pollution – Air, Water, Solid Waste, Noise.
2.2. Problems - green house effect – depletion of the ozone layer – climate change.
2.3. Bio diversity - Definition - Loss of bio diversity – Threats to biodiversity and
     Conservation of biodiversity.
2.4. Human behaviour: - Population – urbanization – poverty (as cause and result of
     pollution and degradation).
2.5. Technology: - Agriculture and industry – deforestation. Use, Misuse and Abuse
     of the resources.
2.6. Effects and consequences of environmental problems.

Unit   3   **(10 Hrs)**

Sustainable Development, Remedies and Policy Implications

3.1 Environmental disasters natural and human made – Bhopal gas Tragedy –
    Chernobyl Accident – Fukushima Nuclear Crisis - Gulf War – Love Canal
    Episode – Tsunami – Volcanic eruptions.

3.2 Methods evolved to measure and check environmental degradation and pollution – carbon footprint, carbon credit, ecological footprint, and ecological shadow.

3.3 Environmental movements in India – Chipko movement, Narmada bachao Andolan, Sethu Samudram Project.

3.4 Environmental Acts – Policy measures with respect to India.

3.5 International environmental agreement – Stockholm Conference – Montreal protocol – RIO Meet – Kyoto Conference – UN conference on Climate change (Copenhagen).

Field visit

Eco initiatives at the campus : Garbage segregation and Vermicomposting – Graywater recycling – Rainwater harvesting – Solar powered lights – Bio diversity.

TEXT BOOK

Bharucha, E., Textbook of Environmental Studies**,** (1st edition), Hyderabad, Universities Press, 2005.

BOOKS FOR REFERENCE

Ignacimuthu, S. Environmental Awareness and Protection**,** New Delhi., Phoenic Publishing House, 1997.

Jadhav, H and V. M. Bhosale. Environmental Protection and Laws, New Delhi, Himalaya Publication House, 1995.

Odum, E.P. Fundamentals of Ecology**,** W.B. Sauders Co., U.S.A. 1971.

Mies, M. and V. Shiva. Ecofeminism, London. Zed Books, 1989.

Singh, H.R., Environmental Biology**,** (1st edition), New Delhi, S.Chand and Co., Ltd., 2005.

PATTERN OF EVALUATION (Totally Internal)

CONTINUOUS ASSESSMENT (CA): One Hour Test – 25 Marks

One Component – 25 Marks

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B.Sc. DEGREE: BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 - 2012)

FORENSIC CHEMISTRY

(Independent Study Elective Course)

CODE: 11CH/UI/FC 23   **CREDITS : 3**

Objectives of the Course

- To acquaint the students to the field of Forensic chemistry.
- 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)   (13 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   (4   Hrs)
3.1 Poisons-classification. Symptoms and antidotes for some common poison

Unit   4
Tracking Forgery   (6 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.

Unit   5   (8 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,   Forensic Science its approach in Crime Investigation, Hyderabad., Paras Medical Pubication, 2006

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

REFERENCE BOOKS

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

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

QUESTION PAPER PATTERN

    Section A – 30 x   1 = 30 Marks (All questions to be answered) Multiple choice - 10,

    Fill up - 10, T/F or Match - 5, single line answer - 5

    Section B –   5 x   6 = 30 Marks (5 out of 7 to be answered)

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

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B.Sc. DEGREE : BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011- 2012)

ENVIRONMENTAL CHEMISTRY

CODE: 11CH/UI /EC 23   **CREDITS : 3**

OBJECTIVES OF THE COURSE

- To expose the students to current environmental realities.
- To create an awareness about the toxicity and health hazards of the pollutants.
- To educate the students about the chemistry involved in air, water and soil pollution, the methods of analysis and measures of control.

Unit   1   (9 Hrs)

Environment

1.1 Environmental segments - atmosphere, hydrosphere, lithosphere and biosphere, Definitions of Pollution, Pollutant, Contaminant, Source, Receptor, Sink, Speciation.
1.2 Atmosphere: Structure of the atmosphere - troposphere, stratosphere, mesosphere and thermosphere, Temperature inversion, lapse rate, Particles, ions and radicals in the atmosphere - Earth's radiation balance.
1.3 Hydrosphere: Different sources of water - surface waters (rivers, lakes and oceans), ground water - Hydrological cycle - Chemical aspects of public water supply system in Chennai.
1.4 Lithosphere: Composition of the Earth's crust, composition of the soil.

Unit   2   (9 Hrs)

Air Pollution

2.1 Chemical and photo chemical reactions in the atmosphere, photochemical smog.
2.2 Sources of air pollutants SO_2, CO_2, CO, NO_x particulates and their reactions in the atmosphere. Greenhouse effect - control of green house gases. CFCs - Consequences and alternatives, Acid rain and its effects.
2.3 Sampling and monitoring of air pollutants; CO, SO_2, NO_x (one method each)
2.4 Ambient air quality standards; Air Pollution Control; Control of CO, CO_2, SO_2, NO_x and particulates - Sources and prevention of indoor pollution.

Unit   3   (9 Hrs)

Water Pollution

3.1 Organic and inorganic pollutants with examples - Sources and characteristics of effluents from industries : tannery, textiles, distillery, paper and pulp industry, detergents and their pollution control.

3.2 Sampling and monitoring of water pollution : Estimation of BOD, COD, Hardness, Dissolved Oxygen, Fluoride and Chloride content.(Lab work for water quality monitoring)

3.3 Water quality standards - Treatment of domestic and industrial wastes - Primary, secondary and tertiary treatment (elementary discussion)

Unit   4   (5 Hrs)

Soil Pollution

4.1 Wastes and pollutants in soil

4.2 Soil analysis - TOC; pH, N, P and K

4.3 Landfills, solid waste management

Unit   5   (7Hrs)

Environmental Toxicology

5.1 Toxic chemicals in the environment, LD_{50}, Toxicity of mercury, cadmium, lead, chromium, selenium, fluoride, pesticides (DDT, Aldrin, Lindane, Simazine, Atrazine, Carbaryl, Baygon, Captan, Paraquat, Diquat) , integrated pest management.and Radiation Hazards.

5.2 Case Studies : Minamata disease, 'itai itai' disease, Love Canal episode, Chernobyl accident, Bhopal gas tragedy.

TEXT BOOK

Kothandaraman, H., and Geetha Swaminathan., Principles of Environmental Chemistry**,** Chennai, B.I. Publications Pvt., Ltd., 1997.

BOOKS FOR REFERENCE

De, A.K., A Text Book of Environmental Chemistry**,** New Delhi, Wiley Eastern Ltd., 2005.

Dara, S.S., A Text Book of Environmental Chemistry and Pollution Control**,** 7th Edition**,** New Delhi , S.Chand and Co., Ltd.,. 2004.

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

Khopkar.S.M., Environmental Pollution Analysis, New Delhi. , New Age International, 1997.

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B.Sc. DEGREE: BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011- 2012)

POLYMER CHEMISTRY

CODE :11CH/ME/PL 23   **CREDITS: 3**

                                                            L T P   : 31 0
                                          TOTAL TEACHING HOURS: 52

OBJECTIVES OF THE COURSE

- To appreciate the necessity of synthetic polymers
- To impart fundamental knowledge of the techniques and mechanisms of polymerisation
- To understand the chemistry of industrially important polymers with their manufacturing techniques
- To realise the need to reduce, reuse and recycle polymers.

Unit   1   (10Hrs)
Introduction to polymers
   1.1 Classification of polymers based on various factors
   1.2 Natural and Synthetic fibers : Types, Regenerated cellulose acetate fibers, Nylon.
   1.3 Industrial applications of PU, PVC, Poly acrylates, PMMA, Silicones, Plastics, Emulsions, Resins.

Unit   2   (16 Hrs)

Polymerization

   2.1 Types of polymerization (Free radical, ionic, co-polymerization and Graft polymerization).
   2.2 Mechanism of polymerization (Addition, condensation, free radical, ionic)
   2.3 Kinetics of Free Radical Polymerization
   2.4 Techniques of polymerization, synthesis of Graft and Block Co-polymers.
   2.5 Ziegler Natta Catalysts in polymerization.
   2.6 Stereospecificity in Polymers, Tacticity

Unit   3   (16 Hrs)

Molecular Weight and Properties of Polymers

   3.1 Molecular weight of polymers-Number average and weight average, Molecular weight distribution, Determination of Molecular weight

3.2 Glass transition temperature-state of aggregation and state of phase transitions, Factors influencing glass transition temperature, Importance of glass transition temperature , Heat distortion temperature

3.3 Crystallinity of Polymers: Crystalline Behaviour, Degree of Crystallinebility.

3.4 Reactions of polymers-Hydrolysis, Acidolysis, Aminolysis, Addition and substitution reactions (one example each)

3.5 Cyclisation, cross-linking and reactions of specific groups in the polymer.

Unit 4 (10 Hrs)

Polymer Degradation

4.1 Types of degradation - Thermal, Mechanical, Ultra sound, photo radiation and chemical degradation methods.

4.2 Rubber-natural and synthetic-structure, mechanism of vulcanization

4.3 Biodegradable polymers.

Self study to be tested internally

Need for recycling of polymers.

Development of polymers over the years.

Application of polymers in nanochemistry.

Industrial visit: Visit to polymer industry / CLRI

TEXT BOOK

Misra G.S., Introductory Polymer Chemistry, New Delhi.Wiley Eastern Ltd., 1998.

Gowariker V.R., N.V. Viswanthan and Jayadev Sreedhar, Polymer Science. New Delhi.

New Age International Ltd., 1996.

BOOKS FOR REFERENCES

Arora M.G., M. Singh, Polymer Chemistry, Anmol Publications Pvt., Ltd., 1996

Billmeyer, F.W., Polymer Science, New York. Wiley-Interscience, 1971.

END SEMESTER EXAMINATION:

Total Marks: 100 Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 30 x 1 = 30 Marks (All questions to be answered) Multiple choice - 10, Fill up - 10, T/F or Match - 5, single line answer - 5

Section B – 5 x 6 = 30 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.

B.Sc DEGREE: BRANCH   - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 - 2012)

PHARMACEUTICAL CHEMISTRY

CODE: 11CH/ ME /PH 23   **CREDITS : 3**

L T P : 3 1 0

TOTAL TEACHING HOURS: 52

OBJECTIVES OF THE COURSE
- To give an exposure to Pharmaceutical Chemistry- a field of eternal interest to the human race
- To enlighten students on the important application of chemistry

Unit   1   (**12 Hrs**)

Common Diseases and Their Treatment by Drugs

1.1 Definitions - Pharmacy, Pharmacology, Pharmacodynamics, Pharmacokinetics, Antimetabolites, Bacteria, Virus, Fungi, Mutation, Pharmacognosy,Toxicology, Pharmacotherapeutics, Chemotherapy - therepeutic index.

1.2 Diseases : insect borne - Malaria, plague; air borne -whooping cough, measles, common cold and TB; waterborne -Cholera, typhoid, dysentery-Cause, symptoms, treatment, precautions

1.3 Common disorders of the digestive system –Jaundice; respiratory system- Asthma; nervous system- Epilepsy; other common diseases- piles, leprosy- causes-prevention and treatment.

1.4 Biological role of trace elements-K, Ca, I_2, Cu , Zn .

Unit   2   (**15 Hrs**)

Blood and Hematological agents

2.1 Blood pressure, hypo and hypertension-cause, prevention and treatment. Antihypertensive agents - Aldomet, reserpine.

2.2 Clotting of blood- mechanism, haematological agents- anaemia –causes and Control- antianaemic drugs.

2.3 Cardivascular diseases: Cardiac glycosides-Digoxin; antiarrhythmic drugs- Quinidine-structure, dosage, therapeutic uses; Antagonists of Ca .

2.4 Antianginal agents- nitriles; vasodilators-Sodium Nitroprusside, Papaverine, nicotinic acid

Unit   3   **(15 Hrs)**

Drugs of importance

3.1 Analgesics, anti pyretic and anti-inflammatory agents- narcotic and non-narcotic drugs-morphine, source, structure-activity relationship and uses- (pethadine, asprin, paracetamol, pheny butazione, brufen.)

3.2 Anaesthetics- conditions of an ideal anesthetic agent, types-general (ether, $CHCl_3$, halothane, nitrousoxide), local (Cocaine) and intravenous (Barbiturates)

3.3 Hypoglycemic drugs: Types and control of diabetes, hypoglycemic agents, sugar substitutes

3.4 Antipsychotic drugs- tranquiliser (piperazine, benzamides), adverse effects; antidepressants-sedatives and hypnotics.

3.5 Antineoplastic drugs- common causes and treatments of cancer, antineoplastic agents, antimetabolites, plant products-hormone therapy and radioactive isotopes.

3.6 Antiviral agent – HIV – causes, prevention and treatment.

Unit   4   **(10 Hrs)**

Pharmacological Aids

4.1 Preservatives -sodium benzoate; Antioxidants-esters of gallic acid; Sequestrants-calcium complex of EDTA ; Emulsifying agents-sorbitan   monolaurate ; Colouring agents- caramel , Amaranth (permitted colours); Flavouring agents-vanillin,(permitted flavors); Sweetening agents-sucrose, sorbitol, saccharin; Stabilising and suspending agents-gelatin, pectin.

4.2 Ointment bases-hydrocarbon bases, absorption bases - emulsions; Solvents-ethanol, glycerol, acetone and chloroform.

4.3 Storage of drugs- factors affecting stability of drugs, storage requirements, encapsulation and sustained release of drugs.

Self study to be tested internally

Indian medicinal plants- Adathoda vasica, mangifera indica, ficus, solanum trilobatum, grasses and greens - occurrence, medicinal properties and uses.

Inorganic compounds-Compounds of Al (Aluminum Hydroxide gel), As (Glycobiarsol), P(dilute phosphoric acid), Fe (ferrous sulphate), Hg (Calomel)- preparation properties and uses; vaccines for viral infection, antibiotics for bacterial infections.

BOOKS FOR STUDY

Jayasree Ghosh, <u>A text book of Pharmaceutical Chemistry</u>, first edn, New Delhi. S.Chand & Co Ltd, 1997.

Chockalingam and Devadasan, "Pharmaceutical Chemistry",V.V. publications. 1990

BOOKS FOR REFERENCES

Craig, Robert, R. E. Stitzel, Modern Pharmacology, 4th edn., Boston. Little Brown and Co, 1994.

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

DiPalma, Drill's Pharmacology in Medicine, 4th edn., NewYork. Mc Graw Hill, 1969

END SEMESTER EXAMINATION:

Total Marks: 100   Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 30 x   1 = 30 Marks (All questions to be answered) Multiple choice - 10, Fill up - 10, T/F or Match - 5, single line answer - 5

Section B –   5 x   6 = 30 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

B.Sc. DEGREE: BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011- 2012)

ANALYTICAL CHEMISTRY

CODE: 11CH/MC/AC 24   **CREDITS： 4**
                                            L T P ： 4 1 0
                        TOTAL TEACHING HOURS： 65

OBJECTIVES OF THE COURSE

  To teach the techniques of data analysis

- The course is designed to give an insight to the key concepts of analytical chemistry with a special reference to practical applications.

Unit   1   (15 Hrs)

Data Analysis

1.1 Elementary statistics relevant to analytical chemistry – Precision and

   accuracy – Definition and comparison,   Mean Median, Average and

   Standard Variance

1.2 Types of error- sources and precautions to avoid errors, determination of

   gross errors, calibration of weights, burette and pipette.

 1.3 Methods of reporting computing data- Significant figures, Reporting

   data -tabulation - Scatter diagrams, Confidence limits, Q-test , F-test ,

   The least square method for deriving calibration plots, SI units

Unit   2   (16 Hrs)

Basic Analytical Operations

2.1 Sampling techniques, requirement for use in chemical analysis
2.2 Separation techniques - Filtration, solvent extraction, Soxhlet extraction, Rotovapour Extraction   Chromatography: Paper, TLC, column, GC,HPLC,Electrophoresis
2.3 Criteria and tests for purity - melting point, boiling point, refractive index, density,   TLC.

2.4 Colorimetric Analysis -Lambert's law, Beer's law, Beer - Lambert's law derivation and deviation from the law, significance of molar absorptivity.

 Colorimeter - Colorimetric estimations of selected ions Fe / CNS^- ; Mn^{7+}, Ni-DMG:

Principles. Determination of composition of complexes- Job's method of continuous variation, Ni-EDTA, Advantages and limitations of colorimetric analysis.

Unit   3   (12 Hrs)

Analytical Electrochemistry

3.1 Polarography - Basic principles - convection, migration and diffusion currents

   Dropping mercury electrode - advantages and disadvantages - Ilkovic equation (derivation not required) and its significance - experimental assembly, current – voltage curve, polarographic maxima, oxygen interference, polarography as an analytical tool in qualitative and quantitative analysis.

3.2 Amperometry - Basic principles and applications.

Unit   4   (10Hrs)

Thermoanalytical Methods

4.1 Principle - Thermal analysis of silver nitrate, calcium oxalate and calcium acetate
    - methods of obtaining Thermograms, factors affecting TGA/DTA and DSC
4.2 TGA and DTA - Instrumentation and application.
4.3 Thermometric titrations. Principle , Instrumentation and application

Unit   5   (12 Hrs)

Dipole Moment and Magnetic Susceptibility

5.1 Dipole moment - definition - units - significance - factors influencing dipole moment - Clausius - Mosotti Equation - determination of dipole moment by Temperature method.
5.2 Magnetic susceptibility - Origin of magnetic properties - types of magnetic properties - magnetic susceptibility - Definition - Curie Weiss law - Temperature and magnetic susceptibility - determination of magnetic moment by Guoy's and VSM method - applications of magnetic moment.

Self study to be tested internally

Applications of dipole moment

Applications of TGA/DTA

Problems using Data Analysis

Role of Analytical Chemistry in Industry and Research

TEXT BOOK

Gopalan, R., Subramanian, P.S. and Rengarajan, K., <u>Elements of Analytical Chemistry</u>**,** New Delhi, Sultan Chand and Sons. (1986),

BOOKS FOR REFERENCE

Sharma, B.K., <u>Instrumental Methods of Chemical Analysis</u>**,** Meerut, Goel Publishing House, (1997)

Day R.A.Jr. & A.L. Underwood, <u>Quantitative Analysis</u>, New Delhi, Prentice Hall of India Pvt. Ltd., (1988)

Douglas A. Skoog, James F. Holler & Timothy A. Nieman, <u>Principles of Instrumental Analysis</u>, Singapore ,Haracourt Asia. Pvt.Ltd.,. (2001)

Srivastava T.N. & P.C.Kamboj, <u>Systematic Analytical Chemistry</u>, New Delhi, Shobanlal Nagin Chand & Company,. (1999)

Usharani, S., <u>Analytical Chemistry</u>**,** New Delhi ,Macmillan Company of India Limited (2006)

END SEMESTER EXAMINATION:

Total Marks: 100   Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 30 x   1 = 30 Marks (All questions to be answered) Multiple choice - 10, Fill up - 10, T/F or Match - 5, single line answer - 5

Section B –   5 x   6 = 30 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

B.Sc. DEGREE: BRANCH IV - CHEMISTRY

SYLLABUS
(Effective from the academic year 2011- 2012)

SEMI MICRO QUALITATIVE ANALYSIS – II PRACTICAL

CODE: 11CH/MC/P 222   **CREDITS : 2**
                                           L T P   : 0 0 3
                                           TOTAL HOURS : 39

Unit   1

    1.1 Preparation of Inorganic Complexes
Tetraamminecopper(II)sulphatehydrate,
Tris(thiourea)copper(II)sulphate dIhydrate/Hexaamminecobalt(III)chloride.

Unit   2

  2.1 Analysis of a salt mixture containing two cations and two anions, of which
        one will be an interfering ion.
  2.2 Principles and techniques in semi micro analysis of acid and basic radicals: solubility
product principle, common ion effect, use of organic and inorganic reagents in spot tests
(Equations relating to reactions and confirmatory test).

    Theory, principles and equations involved behind the reactions. (To be tested
periodically & along with the CA tests and also end semester exam)

TEXT BOOKS
Jesurietta Sathian**, Semimicro qualitative analysis,** 2008.
Sundaram. S., P. Krishnan and P.S. Raghavan., **Practical Chemistry,** Madras,
S.Viswanathan (Printers & Publishers) Pvt. Ltd., 1993.
Venkateswaran V. R., Veeraswamy, A.R. Kulandaivelu, **Basic Principles of Practical
Chemistry,** New Delhi, Sultan Chand & Sons, 1993.

END SEMESTER EXAMINATION:
  Total Marks: 50   Duration: 3 Hours

QUESTION PAPER PATTERN
    General Procedure   6 marks
    Acid radicals (2x10)   20 marks
    Elimination procedure   3 marks
    Basic radicals (2x8)   16 marks

Two/three questions involved in analysis (10min) - 5 marks

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**General Elective Course Offered by Department of Chemistry for
B A. / B.Sc. / B.Com. B.S.W. / B.V.A Degree Programmes
SYLLABUS**

(Effective from the academic year 2011- 2012)

COSMETICS AND PERSONAL CARE

CODE: 11CH/GE/CP32   **CREDITS: 2**

L T P :2 0 0

TOTAL TEACHING HOURS : 26

OBJECTIVES OF THE COURSE

- To provide the students about cosmetology and human anatomy
- To develop in students theoretical and practical skills in cosmetology

Unit   1

Skin care   (8 Hrs)

1.1 Skin- structure and functions. pH and moisture balance, maintenance of skin
1.2 Types of skin: dry skin, oily skin, wrinkle skin
1.3 Cleansing of the skin, creams and lotions, astringent and skin tonics, skin
     lighteners, depilatories, food habits related to skin care.

Unit   2
Scalp and Hair Treatments   (6 Hrs)
2.1 Structure of hair, growth and type of hair,
2.2 Shampoos and conditioners, hair styling products, hair ironing and methods of
colouring /dyeing- Precautionary measures
2.3 Personal care and cleanliness of hair

Unit   3

Beauty Treatments   (8 Hrs)

3.1 Facials-types-advantages and disadvantages,

3.2 Lipstick, eyeliner, mascara, eye shadow - chemical composition

3.3 AHA exfoliation, Facial galvanic, high frequency, aroma therapy

Demonstration by experts in the field of cosmetology   (4 Hrs)

TEXT BOOKS

Thangamma Jacob, Textbook of Applied Chemistry, Mumbai, Macmillian India Ltd., 1990.

Wilkinson J B E and Moore R J, Harry's Cosmetology, 7th Ed, London, Chemical Publishers, 1997.

George Howard, Principles and Practice of Perfumes and Cosmetics, Chettenham, Stanley Therones, 1987

PATTERN OF EVALUATION (Totally Internal)

CONTINUOUS ASSESSMENT (CA):

One Hour Test – 25 Marks

One Testing Component – 25 Marks

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086.

**General Elective Course Offered by Department of Chemistry for
B A. / B.Sc. / B.Com. B.S.W. / B.V.A Degree Programmes**

SYLLABUS
(Effective from the academic year 2011 – 2012)

CHEMISTRY IN EVERYDAY LIFE

CODE :11CH/GE/CE 32   CREDITS : 2
                                                  L T P : 2 0 0

                            TOTAL TEACHING HOURS : 26

✓ *Chemistry students-not eligible.*
OBJECTIVES

▪ To impart basic knowledge of applications of Chemistry in everyday life.

Unit   1   *(10 Hrs)*

Introduction & Pharmaceutical Drugs

    1.1 General survey of chemicals used in every day life – (detergents, plastics, drugs, fuels, etc.

     1.2 Common diseases and their treatments by drugs -   Antimalarials, antipyretics, analgesics, antiseptics, antibiotics –Definition with an   example.

    1.3 Tranquillisers, sedatives, hypnotics- Definition with an example.

    1.4 Nutraceuticals : Vitamins-water and fat soluble, minerals and trace elements, Anti oxidants.

Unit   2   **(8 Hrs)**
Polymers

2.1 Natural Polymers : Rubber- Vulcanisation, applications.

2.2 Synthetic polymers : PE, PVC, PU, Teflon, Nylon, Polyester – applications.

Unit   3   **(8 Hrs)**

Industrial Chemistry

3.1 Cosmetics- perfumes and deodorants.

 3.2 Paints, Pigments, Varnishes.

3.3 Glass – Varieties of glass, coloured glass.

BOOKS FOR REFERENCE

Chakrabarty, B.N., Industrial Chemistry, New Delhi, Shiv Narain Publishers, 1996.

Thangamma Jacob, Textbook of Applied Chemistry, Mumbai, Macmillian India Ltd. 1990

Misra, G.S., Introductory Polymer Science, New Delhi, New Age International Publishers,   2001.

PATTERN OF EVALUATION (Totally Internal)

CONTINUOUS ASSESSMENT (CA):   One Hour Test   – 25 Marks

One Component – 25 Marks

This is will be converted to 100 Marks by Controller of Examination

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

Allied Core Offered by the Department of Chemistry to students of Physics

(Effective from the academic year 2011-2012)

GENERAL CHEMISTRY - I

CODE :11CH/AC/GC33   **CREDITS: 3**

L T P: 3 0 0
TOTAL TEACHING HOURS: 39

OBJECTIVES OF THE COURSE

- This course is intended to provide the students with the basic fundamental knowledge of the various aspects of chemistry supportive to their major subject

Unit   1

Crystalline State   **(10 Hrs)**

1.1 Geometry of crystals - space lattice, Unit cell, Miller Indices. (crystal structures of CsCl, NaCl, Diamond and Graphite.
1.2 Packing of crystals (hcp, fcc, bcc, simple cubic) and % void calculation
1.3 Liquid Crystals, definition, discovery of liquid crystal, mesomorphism, types of structures, texture and applications.
1.4 Representation of planes and crystal systems.

Unit   2   **(10 Hrs)**

Electrochemistry

2.1 Definition of specific, equivalent & molar conductance, their determination, effect of dilution on conductance
2.2 Ostwald dilution law, Debye-Huckel theory, Kohlrausch's law
2.3 Transport number, conductivity determination of acidity constant, conductometric titration
2.4 Reversible & irreversible cells, standard electrode potential & its application, Standard hydrogen electrode, calomel electrode, lead storage battery, corrosion and prevention.

Unit   3   **(14 Hrs)**
Chemistry in Living Systems

3.1 Carbohydrates – classification, Haworth structure of glucose, fructose, sucrose, starch, cellulose. Colour tests for the above. Hypo & hyper glycemia
3.2 Aminoacids - Zwitter ion, isoelectric point, Ninhydrin test
3.3 Proteins - formation of peptides, importance of aminoacid sequence, denaturation & renaturation of proteins.

3.4 Nucleic acids - DNA – structure (Watson & Crick model), functions, types of RNA – structure and functions.

3.5 pH & Calculation of pH, Buffers - their importance & maintenance in living systems (bicarbonate buffer system only) electro osmosis, temperature control in living systems.

Unit 4 (5 Hrs)

Coordination Chemistry

4.1 Coordinate bond, explanation with examples. Chelation & its importance with reference to EDTA.

4.2 Biological role of haemoglobin, Vitamin B_{12} & Chlorophyll with their structure.(figurative representation only)

TEXT BOOKS

Subramanian, P.S, R.Gopalan, K.Rengarajan, Elements of Analytical Chemistry, New Delhi, Sultan Chand & Sons.2007.

Puri. B.R., Sharma L.R, Madan, S.P , Principles of Physical Chemistry, New Delhi Shoban Lal Nagin Chand & Co. 2008.

Jain. J.L,Sunjay Jain,Nitin Jain, Fundamentals of Biochemistry, New Delhi ,S. Chand & Company Ltd, 2006.

BOOKS FOR REFERENCE

Furniss *et al*, Vogel's Text Book of Practical Organic Chemistry, London, ELBS, 2006.

Morrisson. R.T &. R.N.Boyd, Organic Chemistry, New Delhi, Prentice Hall of India Pvt.Ltd. 1991.

END SEMESTER EXAMINATION:

Total Marks: 100   Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 30 x   1 = 30 Marks (All questions to be answered) Multiple choice - 10, Fill up - 10, T/F or Match - 5, single line answer - 5

Section B –   5 x   6 = 30 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

Allied Core Offered by the Department of Chemistry to students of Plant Biology and Plant Biotechnology and Advanced Zoology and Biotechnology

SYLLABUS

(Effective from the academic year 2011- 2012)

BIOCHEMISTRY - I

CODE: 11CH/AC/BC 33   **CREDITS: 3**
                                                              L T P   :   3 0 0
                                                              TOTAL TEACHING HOURS: 39

OBJECTIVES OF THE COURSE
- To expose students to the basics of Biochemistry
- To introduce metabolic concepts and its disease conditions

Unit   1   (11 Hrs)

Introduction to Biochemistry

1.1   Biochemistry – The chemical basis of life
1.2   Water – The elixir of life – Biomedical importance. Maintenance of pH of blood, bicarbonate buffers, acidosis and alkalosis, buffers and electrolytes in the body.
1.3   Techniques used in Biochemistry- SDS-PAGE, sedimentation and dialysis.

Unit   2   (18 Hrs)
Carbohydrates

2.1   Classification of carbohydrates
2.2   Haworth's structure and Reactions of glucose, fructose, maltose and sucrose. Polysaccharides -Homopolysaccharides-cellulose, starch (amylose and amylopectin) (structural elucidation not necessary), Heteropolysaccharides – Chondroitin sulphate and Hyaluronic acid
2.3   Digestion of di and polysaccharides in the body. Maintenance of glucose level in blood.
2.4   Carbohydrate metabolism - metabolism of glucose - glycolysis, TCA cycle, glycogenesis, glycogenolysis, glyconeogenesis. Oxidative phosphorylation, electron transport chain

Unit   3   (5 Hrs)

Enzymes

3.1 Definition of enzymes, coenzymes and apoenzymes
3.2 Classification of enzymes (with an example each)
3.3 Enzyme specificity - factors affecting enzyme action
3.4 Mechanism of enzyme action - Michaelis - Menten theory

(no derivation) - Fischer's Lock and key model, Koshland's induced fit model.

Unit 4   (5 Hrs)

Bioenergetics

4.1 Free energy, enthalpy, entropy, standard free energy, spontaneous and non spontaneous exergonic and endergonic reactions, steady state principle.

4.2 High energy compounds ATP and ADP, Structural basis for the role of ATP as

the currency of the cell.

Self Study to be tested Internally

Relationship of biochemistry in living systems and medicine.

Techniques used in Biochemistry – TLC, paper, column and GC

energy transduction in biological systems and interconversion of nucleotides

TEXT BOOK

Yesodha Doraiswamy, Swaminathan Geetha and V. Radhakrishnan, <u>Allied Biochemistry</u>,, Chennai , Margham Publications. (1997)

Berry, A.K., <u>Textbook of Biochemistry</u>, Emkay Publications(2001)

BOOKS FOR REFERENCE

 Jain J.L., <u>Fundamentals of Biochemistry</u>**,** New Delhi, S. Chand & Co. 2007.

Lehninger A.L. ,<u>Principles of Biochemistry</u>**,** Delhi ,CBS Publishers, 2006.

Stryer Lubert, <u>Biochemistry</u>**,** New York ,W.H. Freeman and Co. 2007.

Rama Rao A.V.S.S, <u>Textbook of Biochemistry</u>, New Delhi, UBS Publications.1998.

Burton E. Tropp, <u>Biochemistry –Concepts and applications</u>, New York, Brooks-Cole Publishing Co. 1997.

END SEMESTER EXAMINATION:

Total Marks: 100   Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 30 x   1 = 30 Marks (All questions to be answered) Multiple choice - 10, Fill up - 10, T/F or Match - 5, single line answer - 5

Section B – 5 x   6 = 30 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

Allied Core Offered by the Department of Chemistry to students of Physics

SYLLABUS

(Effective from the academic year 2011 - 2012)

VOLUMETRIC ANALYSIS - PRACTICAL

CODE: 11CH/AC/P2 31   **CREDITS: 1**

L T P : 0 0 2
TOTAL HOURS :   26

Unit   1

Experiments in Volumetric Analysis Involving Double Titration.

1. Estimation of HCl (Acidimetry)

2. Estimation of Na_2CO_3(Acidimetry)

3. Estimation of Ferrous ion (Permanganimetry

4. Estimation of Oxalic acid (Permanganimetry)

5. Estimation of Ferrous Ammonium Sulphate (Permanganimetry)

6. Estimation of potassium dichromate (Iodometry)

7. Estimation of Ferrous ion (Dichrometry)

8. Estimation of Magnesium (Complexometry)

9. Estimation of Total Hardness of water (Complexometry)

TEXT BOOKS

Venkateswaran. V., R.Veeraswamy, A.R .Kulandaivelu,,   Basic Principles of Practical Chemistry**,** New Delhi , Sultan Chand & Sons. 1993.

Sundaram. S., P.Krishnan, and P.S. Rahavan, Practical Chemistry**,** Chennai, S.Viswanathan (Printers & Publishers) Pvt. Ltd, 1993.

Geetha Swaminathan, Mary George, Laboratory Chemical Methods in Analysis, Chennai Margham Publications, 2002.

BOOK FOR REFERENCE

Vogel, A.I., <u>A Text Book of Quantitative Inorganic Analysis Including Elementary Instrumental Analysis</u>**,** London, ELBS. 1989.

END SEMESTER EXAMINATION:

Total Marks: 50   Duration: 2 Hours

QUESTION PAPER PATTERN

Volumetric Analysis

Short Procedure (10 Minutes)   = 10 marks

ACCURACY OF RESULTS

UPTO 2%   = 40 marks

2.1 – 3%   = 35 marks

3.1 – 4%   = 25 marks

> 4 %   = 20 marks

NOTE: Wrong calculations subtract 5 marks of the marks awarded.

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

Allied Core Offered by the Department of Chemistry to students of Plant Biology and Plant Biotechnology and Advanced Zoology and Biotechnology

SYLLABUS

(Effective from the academic year 2011 - 2012)

BIOCHEMISTRY – I PRACTICAL

CODE: 11CH/AC/P1 31   **CREDITS: 1**

L T P : 0 0 2
TOTAL HOURS : 26

Unit   1
  1. Reactions of carbohydrates.
     Reactions of glucose, fructose, maltose, sucrose and starch.
  2. Reactions of amino acids - reactions of tryptophan, tyrosine, arginine and cysteine.
  3. Reactions of proteins - reactions of casein and egg albumin.
  4. Identification of unknown organic compound

TEXT BOOK
  Plummer David. T., <u>An Introduction to Practical Biochemistry</u>**,** New Delhi, Tata McGraw Hill Publishing Company limited. 1995.
  Geetha Swaminathan, Mary George, <u>Laboratory Chemical Methods in Analysis</u>, Chennai, Margham Publications. 2002

BOOK FOR REFERENCE
  Jayaraman. J., <u>Laboratory Manual in Biochemistry</u>**,** New Delhi, Wiley Eastern Limited, 1985.

END SEMESTER EXAMINATION:

  Total Marks: 50   Duration: 2 Hours

QUESTION PAPER PATTERN

Analysis   **- 50 marks**
Preliminary reaction   - 15
Confirmatory tests with all colour tests   - 30
Final report   5
NOTE:
If a reducing disaccharide is reported as monosaccharide, subtract 4 marks
If aldose is reported as ketose, reduce 4 marks
If Aliphatic Amino acid is reported as Aromatic subtract 6 marks

If reducing carbohydrate is reported as non-reducing subtract 6 marks

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE : BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011- 2012)

INORGANIC CHEMISTRY- II

CODE : 11CH/MC/IC 3 4   CREDITS : 4
                                                                                            L T P : 4 1 0
                                                                                   TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE

- To familiarise the students with concepts in comparative studies of s and p block elements.
- To understand the applications of industrially important compounds.

Unit   1   (18 Hrs)

Chemistry of s Block Elements

1.1 Hydrogen
Hydrides - Classification as saline, metallic, molecular and polymeric hydrides -One method of preparation and important properties. Reactions and industrial applications of heavy water.

1.2 Alkali metals
Discussion of alkali metal group with respect to the elements, oxides, halides, hydroxides. Extraction of Lithium from spodumene. Importance of cryptates and crown ethers.

1.3 Alkaline earth metals.
Similarities and gradations in physical and chemical properties with respect to elements, oxides, hydroxides, halides and sulphates. Extraction of Beryllium.

Unit   2   (15 Hrs)

Chemistry of p-Block Elements-III & IV groups

2.1 Boron Family
Periodicity in the properties of boron group with respect to the elements, oxides, hydroxides and halides. Preparation and bonding of B_2H_6.
Preparation, properties, structure and uses of boron nitride and borazole
.   Application of iodides, nitrates and acetates of Thallium

2.2 Carbon family
Comparison of carbon group elements - their hydrides, oxides and halides. .

Silicates: Classification and structure. Silicones- preparation, properties and uses.

Unit 3

Chemistry of p-Block Elements -V to VII groups   (20 Hrs)

3.1 **Nitrogen family**

Comparison of nitrogen group elements with respect to the elements, oxides, hydrides and halides.

Preparation, properties and structure of hydrazine, hydroxylamine, hydrazoic acid. Oxyacids of nitrogen and phosphorus-preparation, properties and structure.
Structure and applications of phosphonitrilic polymers
.

3.2 **Oxygen family**

Comparison of Oxygen group elements with respect to hydrides, halides, oxides.
Preparation, properties and structure of oxyacids and peracids of sulphur. Thionic acids.

3.3 **Halogen Family**

Comparison of halogens with respect to the elements, hydrides and oxides.
Preparation and structure of O F_2, Cl_2O, I_2O_5 and Cl_2O_7, $HClO_4$.
Interhalogen Compounds: Preparation and structure of ICl, BrF_3, IF_3, IF_5 and IF_7. Basic nature of Iodine, Pseudohalogens.

Unit 4

4.1 Chemistry of zero group elements   (6 Hrs)

Occurrence Position of noble gases in the periodic table. Preparation, properties and structure of compounds of Xenon - XeF_2, XeF_6, XeO_3, $XeOF_2$, as per VSEPR postulates. Clathrate compounds-applications.

Unit 5

5.1 Industrial Inorganic Chemistry   (6 Hrs)

Surface coatings-inorganic- electroplating and anodizing; organic - paints, varnish, enamels; Cement- composition and setting; Leather-vegetable and chrome tanning.
Refractory materials- Si and Al carbides, borides.

Self Study to be tested internally

Importance of alkali and alkaline earth metals and their compounds
Role of sodium and potassium in electrolyte balance.
Classification of Boranes.
Fuels- natural gas, liquid petroleum gas, biogas, coal gas- a comparison
Germanium as a semiconductor
Types of glass, annealing; Rubber- Vulcanisation
Pollution due to tanneries-control measures

TEXT BOOKS

Puri. B.R., L.R Shama, & C.I. Kalia Principles of Inorganic Chemistry**,** New Delhi. Milestone Publishers and Distributors, 2008.

Soni. P.L. and Katyal. Mohan, Text Book of Inorganic Chemistry**,** New Delhi Sultan Chand & Sons, 2008.

Gopalan. R, Inorganic Chemistry for Undergraduates**,** Hyderabad. Universities Press, 2009.

BOOKS FOR REFERENCE

Cotton, F.A. and G. Wilkinson, Advanced Inorganic Chemistry, New Delhi. Wiley Eastern Ltd., 2008.

Emeleus, H.J. & A.G. Sharpe Modern Aspects of Inorganic Chemistry**,** London. ELBS 1973,

Shriver and Atkins Inorganic Chemistry, San Francisco. W.H. Freeman & Company, 2006.

J.D. Lee, Concise Inorganic Chemistry 5th Edition, New Delhi. Oxford University Press,   2008.

Jayashree Ghosh Fundamental Concepts of Applied Chemistry, New Delhi. S.Chand & Company Ltd., 2008.

END SEMESTER EXAMINATION:

Total Marks: 100   Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 30 x   1 = 30 Marks (All questions to be answered) Multiple choice - 10, Fill up - 10, T/F or Match - 5, single line answer - 5

Section B –   5 x   6 = 30 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

B.Sc. DEGREE: BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 onwards)

ORGANIC CHEMISTRY - I

CODE: 11CH/MC/OC 34   **CREDITS: 4**
L T P : 4 1 0
TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE

- To develop in students an intellectual curiosity and a capacity to comprehensively understand the mechanisms of the various types of organic reactions.
- To enable the students to understand and appreciate the chemistry of oxygenated compounds with special emphasis on mechanisms.

Unit   1   (10 Hrs)

Nucleophilic Substitution Reactions
1.1 Nucleophilic Substitution in Aliphatic Systems
S_N1, S_N2 S_Ni mechanisms - Effect of solvent, structure of substrate, leaving group and the nucleophilicity of the attacking reagent.
1.2 **Nucleophilic Substitution in Mono substituted Aromatic Systems**
Mechanism for Benzyne intermediate formation and evidences.
 Kinetic and thermodynamic evidence for the product formation.

Unit   2   (15 Hrs)

Elimination and Addition Reactions
2.1 Elimination
E1 and E2 – Saytzeff's and Hofmann's rules – Reasons for Product preference. Cis elimination with example. Alpha elimination: Reactions of carbene.

2.2 Substitution vs Elimination
        Factors deciding the relative proportion of products formed.

2.3 Addition
Mechanisms of stereospecific additions across double and triple bonds (with propene and propyne as examples) with Br_2, HBr, B_2H_6, HOCl, cis hydroxylation, epoxidation - Reasons for Markownikoff and anti-Markownikoff addition, Ozonolysis.

2.4 Addition reactions of conjugated dienes – 1, 4 addition

Unit 3   (15 Hrs)

Aliphatic Carbonyl compounds

3.1 Structure of carbonyl group, Keto-enol tautomerism – proof for the two forms
3.2 A comparison of reactivity with aromatic carbonyls
3.3 Mechanism of nucleophilic addition with ROH, $NaHSO_3$, HCN, Grignard reagent, ammonia
     and its derivatives
3.4 Addition of carbanions: aldol condensation, Cannizaro, Crossed Cannizaro,
     Claisen- Schmidt reactions – their use in synthesis.
3.5 Wolff Kishner, Clemmenson, Oppaneur Baeyer Villeger reactions

Unit 4

 Aromatic and unsaturated Carbonyl compounds   (10 Hrs)
4.1. Houben - Hoesch synthesis of phenolic ketone.
4.2 Benzoin condensation, Reimer-Tiemann, Haloform, Knoevenegal, Reformatsky and Perkin
     reactions.
4.3 Reagents for oxidation and reduction of carbonyl compounds and their corresponding
     products
 4.3 **Unsaturated Carbonyls**
     Acrolein, Crotonaldehyde, Cinnamaldehyde – Methods of Preparation, special reactions.

Unit 5   (15 Hrs)

    Carbohydrates

5.1 Classification by various methods. Explanation of diastereomer, enantiomer, anomer,
     epimer, building of carbohydrates from D-Glyceraldehyde, D and L sugars

5.2 Monosaccharides :
HIO_4 oxidation, Mechanism of mutarotation, osazone formation. Haworth structure
Structural elucidation of glucose and fructose, determination of configuration and ring size.
interconversion of Glucose and Fructose. Ascending and descending the sugar series.

5.3 Disaccharides :
Formation of Glycosidic Bond: Haworth's structure of sucrose, maltose, lactose. Difference
between maltose and cellobiose.

5.4 Polysaccharides:
     Structure and reactions of starch and Cellulose.

Self study for internal testing

Methods of formation of aldehydes and ketones

Natural products containing aldehyde / ketone functional group

Applications of starch and the derivatives of cellulose

TEXT BOOKS

Morrison R.T. & R.N. Boyd, Organic Chemistry, New Delhi.Prentice Hall of India Pvt., Ltd., 1995.

Soni P.L. et al Text Book of Organic Chemistry, New Delhi. Sultan Chand & Sons, 1992.

Tewari K.S., N.K. Vishnoi, S.N. Mehrotra, A Textbook of Organic Chemistry, New Delhi. Vikas Publishing House Pvt., Ltd., 1996.

BOOKS FOR REFERENCE

Finar, I.L. Organic Chemistry Vol. I, London ELBS. 1991.

Graham Solomons T.W., Organic Chemistry, New York. John Wiley & Sons, 1996.

James B. Hendrickson, Donald J Cram & George S. Hammond , Organic Chemistry, New Delhi. McGraw Hill Inc. 1970

.Francis A. Carey, Organic Chemistry, New Delhi.McGraw Hill Inc., 1997

END SEMESTER EXAMINATION:

Total Marks: 100   Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 30 x   1 = 30 Marks (All questions to be answered) Multiple choice - 10, Fill up - 10, T/F or Match - 5, single line answer - 5

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

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE : BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 onwards)

ORGANIC CHEMISTRY – PRACTICAL

CODE :11CH/MC/P332   **CREDITS: 2**
                                                              L T P: 0 0 3
                                                              TOTAL HOURS : 39

ORGANIC ANALYSIS

Unit   1
Analysis of Organic Compounds :
Acids, phenols, carbohydrates, aldehydes, ketones, esters, amines, amides, nitro compounds, anilides, halo compounds, sulphur compounds (thiourea). Preparation of derivatives of Organic Compounds

Unit   2
Preparations involving Oxidation, Nitration, Hydrolysis, bromination

Unit   3
Determination of melting point and boiling point

TEXT BOOKS
Jesurietta Sathian, <u>Organic Evaluations</u> – Lab Manual. 2010

Sundaram. S, P.Krishnan. and P.S. Raghavan, , <u>Practical Chemistry</u>, Chennai. Viswanathan Publishers, 1993

BOOK FOR REFERENCE

Vogel, A.I., <u>A Text Book of Quantitative Inorganic Analysis including elementary instrumental analysis.</u> London. ELBS. 1989

Venkateswaran, V., R.Veeraswamy, A.R.Kulandaivelu, <u>Basic Principles of Practical Chemistry,</u> New Delhi. Sultan Chand & Sons, 1993.

Theory and principles behind the experiments concerned to be tested periodically (equations involved) and along with the CA tests and end semester exam for a maximum of five marks.

QUESTION PAPER PATTERN :

Aliphatic/Aromatic	: 6 marks
Saturated/Unsaturated	: 6 marks
Special Elements	: 8 marks
General Procedure	:10 marks
Derivative	: 5 marks
Functional Group test and relevant confirmatory test	: 10 marks
Report	: 5 marks
TOTAL	: 50 marks

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**General Elective Course Offered by Department of Chemistry for
B A. / B.Sc. / B.Com. B.V.A / B.S.W Degree Programmes
SYLLABUS**

(Effective from the academic year 2011 - 2012)

DEVELOPING ENTREPRENEURIAL INITIATIVES

CODE: 11CH/GE/EI 44   **CREDITS: 4**

L T P : 4 0 0

TOTAL HOURS   : 52

OBJECTIVES OF THE COURSE

- To instil the spirit of entrepreneurship among the youth.
- To enhance their self employment opportunities.
- To develop entrepreneurial initiative in students.
- To impart Skill Development Training to the students with inter disciplinary approach.

Unit   1   **(7 hrs)**

Introduction to Entrepreneurship

1.1. Need for Entrepreneurship Education
1.2. Entrepreneurship and Entrepreneur : Definition and Concept
1.3. Characteristics and importance of Entrepreneurship and Entrepreneur
1.4. Classification and Functions of Entrepreneurs
1.5. Studies on Indian Entrepreneurship Model.

Unit   2   **(6 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. Case Studies.

Unit   3   **(13 hrs)**

Women Entrepreneurship

3.1   Empowerment of Women through enterprise
3.2   Factors governing Women Entrepreneurship
3.3   Schemes for Women Entrepreneurs

Unit   4   **(13 hrs)**

Business Project Proposal

4.1   Market Analysis 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   **(13 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

TEXT BOOK

Sangram Keshari Mohanty, Fundamentals of Entrepreneurship**,** New Delhi

Prentice Hall of India Pvt., Ltd. 2005.

BOOKS FOR REFERENCE

Saini, J.S., and B.R. Gurjar,   Entrepreneurship and Education - Challenges and
Strategies**,** Jaipur, Rawat Publications, 2001.

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

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

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

David H. Holt, <u>Entrepreneurship – New Venture Creation</u>**,** New Delhi, Prentice Hall of India Pvt., Ltd. 2006.

Madhurima Lall and Shikha Sahai, <u>Entrepreneurship</u>**,** New Delhi, Excel Printers. 2006.

CONTINUOUS ASSESSMENT (CA): One Hour Test – 25 Marks

One Component – 25 Marks

END SEMESTER EXAMIANTION:

Total Marks: 50   Duration: 2 Hours

QUESTION PAPER PATTERN

Section A – 5 x 3 = 15 Marks (All questions to be answered)

Section B – 3 x 5 = 15 Marks (3 out of 5 to be answered)

Section C – 2 x 10 =20 Marks (2 out of 3 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086
**General Elective Course Offered by Department of Chemistry for
B A. / B.Sc. / B.Com. B.S.W. / B.V.A Degree Programmes**

SYLLABUS
(Effective from the academic year 2011- 2012)

DETECTION OF FOOD ADULTERATION

CODE: 11CH/GE/FA 44   **CREDITS：4**
                                                          L T P : 4 0 0
                                                          TOTAL TEACHING HOURS: 52

OBJECTIVES OF THE COURSE
The high percentage of adulteration prevalent in processed / unprocessed food items has necessitated the study of Detection and Prevention of Food Adulteration as an important tool in working towards eradication of this social evil. The course is aimed to educate the students on
- The common food adulterants and their health hazards
- The different methods used in detecting food adulteration.
- The legislative aspects and the role and functions of the regulatory agencies in India
- The different parameters of food acceptance through sensory analysis.

Unit   1   (7 Hrs)

Quality Control

1.1 Quality control and its importance, Quality assurance
1.2 Food Laws: Prevention of Food Adulteration Act, BIS Act, FPO Act, Essential Commodities Act, Consumer Protection Act, Agricultural Produce Act (AGMARK)
1.3 Salient Features of P.F.A., Misbranded Food, brief outline of labelling provisions under P.F.A.
1.4 Role and functions of implementing agencies with references to Indian scenario.
1.5 Tips to consumers for buying safety food.

Unit   2   `   (10 Hrs)

Food Adulteration and Food Toxins

2.1 Definition of food adulteration, Common food adulterants in various food commodities
2.2 Health hazards of adulterants and contaminants
2.3 Adulteration in fruits, vegetables, meat and dairy products
2.4 Food Toxins: Toxicology- naturally occurring toxins, substances added to foods- antioxidants, food colours, stabilizers and heavy metals.

Unit 3 (10 Hrs)

Detection of Food Adulteration

    3.1 Detection of adulteration in coffee, tea, milk , oil , food grains, dhals, sugar, ghee, supari, turmeric powder, kesari powder, chilli powder, spices, jaggery, sweets, jam, jelly, honey - laboratory tests only .

    3.2 Determination of ash content and moisture content in foods.

Unit 4 (12 Hrs)

Sensory Evaluation

    4.1 Sensory characteristics of food: Appearance, colour, flavour, odour, taste, mouth feel, factors affecting food acceptance- sensory and psychological

    4.2 Requirements for conducting sensory tests: Trained panel members, testing area, sample preparation and presentation. Testing time, temperature, design of the experiment

    4.3 Types of tests: Difference tests, Paired difference tests, Duo-Trio test, Triangle test, Rating test –Ranking, Hedonic rating test, Numerical scoring test. Sensitivity tests- Threshold test, Dilution test Descriptive tests – Flavour profile

    4.4 Objective method of sensory evaluation : Basic guidelines, tests for objective evaluation – chemical, physico chemical, physical methods and microscopic examination.

Unit 5 (13 Hrs)

PRACTICALS (to be tested internally)

Sensory Evaluation:

    Assessment of food quality – Dilution test/colour comparison
    Appearance, flavour, odour, colour, taste, texture – Scoring Test
    Difference test – Paired difference test, Duo-trio test, Triangle test
    Rating test – Hedonic, Numerical scoring test
    Sensory test – Threshold, dilution test
    Descriptive test – Flavour profile

Detection of

     Chicory and tamarind seed powder in Coffee Powder
    Non permitted colours in Tea and dhals
    Metanil yellow in Turmeric powder and Kesari Powder
    Kesari dhal in dhals
    Castor Oil, Pungam Oil in Edible Oils
    Papaya seeds and rotten pepper in Pepper
    Brick powder in Chilli Powder

Washing soda in Jaggery, Bura Sugar
Vanspathi in Ghee
Chalk Powder in salt
Non permitted colours in Jams, Jelly, Juices
Saccharin in Supari

TEXT BOOKS

Geetha Swaminathan, Mary George, <u>Laboratory Chemical Methods in Food Analysis</u>**,** Chennai, Margham Publication, 2002.

Harold Egan, Ronald S. Kirk, Ronald Sawyer, <u>Pearson's Chemical Analysis of Food</u>**,** New York, Churchill Livingstone Publishers, 1981.

Jacobs, M.B., <u>The Chemical Analysis of Foods and Food Products</u>**,** Third edition, New York, D.Van Nostrand Company Inc. 1965.

BOOKS FOR REFERENCE

<u>PFA Act of India</u>, (2000).

Manay, Shakuntala N., M.Shadaksharswamy, <u>Food – Facts and principles</u>**,** Chennai, NewAge international, 1987.

<u>Food Laws in India</u>, New Delhi, The Society of Indian Bakers, 1987.

CONTINUOUS ASSESSMENT (CA): One Hour Test – 25 Marks
One Component – 25 Marks

END SEMESTER EXAMINATION:

Total Marks: 50   Duration: 2 Hours

QUESTION PAPER PATTERN

Section A – 5 x 3 = 15 Marks (All questions to be answered)

Section B – 3 x 5 = 15 Marks (3 out of 5 to be answered)

Section C – 2 x 10 =20 Marks (2 out of 3 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS). CHENNAI-600 086.

**General Elective Course Offered by Department of Chemistry for
B A. / B.Sc. / B.Com. B.S.W. / B.V.A Degree Programmes**

SYLLABUS

(Effective from the Academic Year 2011-2012)

DRUGS AND DISEASES

CODE: 11CH/ GE/DD 44
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 Definitions: Pharmacy, Pharmacology, Pharmacodynamics, Pharmacokinetics, Antimetabolites, Bacteria, Virus, Fungi, Mutation, Pharmacognosy, Toxicology, Pharmacotherapeutics, Chemotherapy, therapeutic index.

1.2 Classification of Drugs-Biological, chemical and commercial classification, Prescribed drugs and over- the counter-drugs. Side effects and contra indications.

Unit   2   **(10 Hrs)**

Common diseases and their treatment by drugs

2.1 Some common diseases: insect borne –Malaria; air borne diseases-   whooping cough, measles, common cold and TB; Waterborne diseases-Cholera, typhoid, dysentery-etiology, symptoms, prevention and remedy.

2.2 Some common disorders of the digestive system –Jaundice; respiratory system-Asthma; nervous system- Epilepsy - prevention and treatment.

2.3 AIDs – causes, prevention and treatment.

Unit   3   **(10 Hrs)**

Blood and Hematological agents

3.1 Blood pressure, hypertension-cause, prevention and treatment, 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 (27 Hrs)

Drugs of Importance

4.1 Anesthetics : types-general – nitrous oxide, ether, $CHCl_3$, halothane; local - Cocaine, intravenous - advantages and disadvantages.

4.2 Antiseptics and Disinfectants- (Phenols, chloramines, bleaching powder, boric acid, iodine, zinc oxide, 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 butazone, ibubrofen).

4.4 Sulpha Drugs - History and discovery - action of sulpha drugs & limitations- (trimethoprim and sulphamethoxazole).

4.5 Antibiotics-Classification - therapeutic uses of Chloramphenicol, Penicillin - Streptomycin, tetracyclines, Erythromycin, Amoxycillin,ciproflaxin.

4.6 Antipsychotic drugs- tranquiliser (piperazine, benzamides), adverse effects; antidepressants-sedatives and hypnotics- (barbiturates).

4.7 Hypoglycemic drugs: Types of Diabetes, hypoglycemic agents, sugar substitutes.

4.8 Antineoplastic drugs- types, common causes & treatment of cancer - antineoplastic agents, antimetabolites and plant products; hormone therapy and radioactive isotopes.

4.9 Antihistamines.

BOOKS FOR REFERENCE

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

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

Craig R., Robert. E., Stitzel, Modern Pharmacology, Boston, 4th edn., Little Brown and Co. 1994.

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

DiPalma, Drill's Pharmacology in Medicine, 4th edn., New York , Mc Graw Hill. 1969.

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

Jayasree Ghosh, A text book of Pharmacetical Chemistry, 1st edn , New Delhi , S.Chand & Co Ltd, 1997.

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

CONTINUOUS ASSESSMENT (CA): One Hour Test − 25 Marks

One Component − 25 Marks

END SEMESTER EXAMINATION:

Total Marks: 50   Duration: 2 Hours

QUESTION PAPER PATTERN

Section A − 5 x 3 = 15 Marks (All questions to be answered)

Section B − 3 x 5 = 15 Marks (3 out of 5 to be answered)

Section C − 2 x 10 =20 Marks (2 out of 3 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

Allied Core Offered by the Department of Chemistry to students of Physics

SYLLABUS

(Effective from the academic year 2011 - 2012)

GENERAL CHEMISTRY - II

CODE: 11CH/AC/GC 44   **CREDITS: 4**

L T P: 3 0 2
TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- This course is designed to provide a foundation needed for the understanding of material science.
- To equip the student with knowledge of chemistry needed to support Core Physics.

Unit 1 **(15 Hrs)**

Material Science

1.1. Polymer – Introduction, classification of polymers, polymerization reactions- addition & condensation, preparation and applications of polyethylene, PVC, Teflon, Nylon, Polyester.

1.2 Conducting polymers- Principle, process of doping and applications.

1.3 Elastomers: Natural rubber-processing and need for vulcanization, synthetic rubber –types and applications.

1.4 Ceramics-Requirements of a refractory, classification, properties of refractories ; special refractories –alumina, beryllia, zirconia, zircon and silicon carbide.

Unit 2 **(7 Hrs)**

Phase Rule

2.1 Definition of Phase, component, degree of freedom derivation of phase rule.
2.2 Application of phase rule to one component systems (water and sulphur)
2.3 Two component systems: simple eutectic (Ag, Pb) solid solution (Ni, Cu).
2.4 Effect of carbon in steel, role of alloying elements in steel and Fe-C phase diagram.

Unit 3 (12 Hrs)

Chemical Kinetics

3.1 Definition of rate, order, molecularity, and time for half change.
3.2 Derivation of rate constant for Zero, first and second order. Problems to calculate rate constant.

3.3 Methods to calculate order of reactions.
3.4 Effect of temperature on reaction rate, activation energy. Calculation of frequency factors from molecular parameters. Lindemann's hypothesis.

Unit 4

Catalysis (5 Hrs)

4.1 Catalysis - types, theories of catalytic action,

4.2 Enzyme catalysis, industrial application of catalysis.

Unit 5

 Group Experiments (Practicals to be tested internally) (26 Hrs)

 1. **Reactions of glucose, fructose, maltose, sucrose and starch**.

2. Reactions of amino acids tryptophan, tyrosine, arginine and cysteine

3. Determination of equivalent conductance and equivalent conductance at infinite

   dilution for strong electrolyte conductometrically..

4. Phase equilibria (cooling curve)

 5. Kinetics- Determination of rate constant for acid catalysed ester hydrolysis

6. Determination of coefficient of viscosity.

7. Determination of Cu / Ni by photocolorimetry.

Self sudy to be tested internally

   Pollution by synthetic polymers, recycling of polymers & bio-degradable

   polymers, serendipity in polymer discovery

TEXT BOOKS

  Misra G.S, Introductory Polymer Chemistry**,** New Delhi. Wiley Eastern Ltd.1998.

  Puri B.R. , Sharma, L.R &.Madan S. Pathania, , Principles of Physical Chemistry**,** Jalander, India , Vishal Publishing Co, 2009.

Kurikose J. C., Rajaram J <u>Chemistry in Engineering and technology</u>, <u>Vol 2,</u> New Delhi , Tata McGraw Hill Publishing Company Ltd, 1984.

BOOKS FOR REFERENCES

Raghavan. V. <u>Materials Science and Engineering</u>**,** New Delhi, Prentice - Hall of India Pvt. Ltd. 1993.

Gowariker V.R., Viswanthan N.V. and Jayadev Sreedhar, <u>Polymer Science</u>**,** New Delhi, New Age International Ltd.,1996.

Soni, P.L, <u>Text Book of Physical Chemistry</u>**,** New Delhi, S.Chand & Co. 1985.

Bagavathi Sundari.K, <u>Applied chemistry</u>, Chennai, MJP Publishers, 2006.

END SEMESTER EXAMINATION:

Total Marks: 100   Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 30 x   1 = 30 Marks (All questions to be answered) Multiple choice - 10, Fill up - 10, T/F or Match - 5, single line answer - 5

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

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

Allied Core Offered by the Department of Chemistry to students of Plant Biology and Plant Biotechnology and Advanced Zoology and Biotechnology

SYLLABUS

(Effective from the academic year 2011 - 2012)

BIOCHEMISTRY - II

CODE: 11CH/AC/BC 43   **CREDITS: 3**

L T P: 3 0 0
TOTAL TEACHING HOURS : 39

OBJECTIVES OF THE COURSE

- To clarify the various concepts of biological activities.
- To impart the students with the knowledge of lipids, proteins, hormones and nucleic acids.

Unit 1   (10 Hrs)

Lipids

1.1   Classification of lipids and fats
1.2   Characterisation of fat – Definitions of Iodine value, Acid value, Saponification value and R.M.Value
1.3   Digestion and absorption of lipids.
1.4   Lipid metabolism - β - oxidation of fatty acids, biosynthesis of fatty acids, ketone bodies, ketosis

Unit 2   (15 Hrs)
Proteins

2.1   Amino acids - classification based on R groups and based on their metabolism
2.2   Chemical reactions of amino acids - with mineral acid, formaldehyde, FDNB, and CO_2, color reactions of amino acids.(Ninhydrin test)
2.3   Peptide bond, Primary secondary and tertiary structure of proteins. Properties of proteins - denaturation, amphoteric nature, ion binding capacity, solubility
2.4   Classification of proteins based on shape, composition and solubility.
2.5   Digestion and absorption of proteins and protein metabolism, transamination, oxidative deamination and urea cycle.

Unit 3   (5 Hrs)

Hormones

3.1   Definition, classification of hormones (steroid and non steroid only)
3.2   Mechanism of hormone action.

Unit 4 (9 Hrs)

Nucleic Acids

4.1 Nucleosides, nucleotides, DNA – structure (Watson & Crick model) and functions
4.2 RNA – Structure, types and functions
4.3 DNA as genetic material, DNA replication and protein synthesis.
4.4 Comparison of DNA and RNA with reference to occurrence, composition, structure and functions.

Self study to be tested internally

Source and functions of insulin, thyroxin and sex hormones.

Gene cloning and Gene therapy, Lipid profile-Total Cholesterol, HDL ,LDL, Triglycerides

TEXT BOOK

Yesodha Doraiswamy, Swaminathan Geetha and V. Radhakrishnan, Allied Biochemistry, Chennai, Margham Publications, (1997)

Berry, A.K., Textbook of Biochemistry, Emkay Publications (2001)

BOOKS FOR REFERENCE

Jain J.L., Fundamentals of Biochemistry, New Delhi, S. Chand & Co., (2007)

Lehninger A.L., Principles of Biochemistry, New Delhi, CBS Publishers, (2006)

Stryer Lubert, Biochemistry, New York, W.H. Freeman and Co., (2007)

Ambika Shanmugam, Fundamentals of Biochemistry for Medical Students, Chennai, Published by the author, (1990)

END SEMESTER EXAMINATION:

Total Marks: 100   Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 30 x   1 = 30 Marks (All questions to be answered) Multiple choice - 10, Fill up - 10, T/F or Match - 5, single line answer - 5

Section B –   5 x   6 = 30 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

B.Sc. DEGREE : BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011- 2012)

VOLUMETRIC ANALYSIS - PRACTICAL

CODE :11CH/MC/P442   CREDITS: 2
                                                                             L T P : 0 0 3
                                                                             TOTAL HOURS: 39

Unit 1

1. Estimation of oxalic acid   (acidimetry and permanganimetry)
2. Estimation of copper (iodometry)
3. Estimation of dichromate (iodometry)
4. Estimation of Iron (dichrometry, Permanganimetry)
5. Estimation of Magnesium / Zinc (Complexometry)
6. Estimation of Chloride (Argentometry)
7. Estimation of harness of the given water sample

   Combination of two types of titration may be tried out

Unit 2

   Estimation of phenol /aniline

Unit 3

   Theory and principles behind the experiments, equivalent weight calculations to be tested in every class.

Note: 10 ml pipettes, 50 and 100 ml standard flasks to be used.

Testing of Principles in the CA tests and also end semester exam for a maximum of five marks.

TEXT BOOKS

Jesurietta Sathian, Volumetric Estimations – Lab Manual. 2010

Sundaram. S, P. Krishnan. and P.S.Raghavan, Practical Chemistry, Chennai. Viswanathan Publishers, 1993.

Venkateswaran, V. R.Veeraswamy, A.R.Kulandaivelu, Basic Principles of Practical Chemistry, New Delhi. Sultan Chand & Sons, 1993.

END SEMESTER EXAMINATION:

   Total Marks: 50   Duration: 3 Hours

QUESTION PAPER PATTERN

        Equations and short Procedure (10 minutes)   10 marks

Accuracy of Results

Upto 2%	40 marks
2.1 – 3%	35 marks
3.1 – 4%	25 marks
4.1 – 5%	10 marks
>5%	10 marks

Note: Wrong calculation subtract 5 marks of the marks awarded.

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE : BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 - 2012)

PHYSICAL CHEMISTRY - I

CODE :11CH/MC/PC 44   **CREDITS : 4**

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

OBJECTIVES OF THE COURSE

- To provide the Mathematical forms of the laws of Thermodynamics.
- To build the Mathematical superstructure to give the power of Thermodynamic concepts to reactions.
- To enable students to understand and appreciate of the physical aspects of thermodynamics and their applications in real life.

Unit   1   (7 Hrs)

Thermodynamics - First Law

1.1 Types of systems - Extensive and intensive properties, different forms of energy. First law - statements. Internal Energy and Enthalpy, state and path functions. Complete differentials.

Unit   2

 Thermodynamics of Ideal & Real Gases   (18 Hrs)

2.1 Isothermal and adiabatic changes, work done, internal energy changes, difference between heat capacities of ideal gases.

2.2 Thermodynamics of real gases obeying van der Waal's equation of state, significance of 'a' and 'b', Joule-Thomson effect, inversion temperature. Work done in isothermal and adiabatic changes, internal energy changes, difference between heat capacities at constant pressure and volume.

Unit   3   (12 Hrs)

Thermochemistry

3.1 Heats of reaction at constant temperature, constant pressure, constant volume. Enthalpies of formation, combustion and neutralisation. Hess' Law and its applications.

3.2 Integral and differential heats of solution, calorimetric determination of integral heat of solution. Integral and differential heats of dilution. Exergonic and endergonic reactions, heat capacity. Kirchoff's equation.

Unit   4   (20 Hrs)

Second Law of Thermodynamics

4.1 Need for second law, different forms of stating the law, Carnot's cycle and Carnot's theorem (proof not necessary), thermodynamic scale of temperature, refrigeration engine.

4.2 Concept of entropy, S as a function of T and P, E as a function of T and V. Entropy changes in physical state, entropy of mixing.

4.3 Helmholtz and Gibb's energies, maximum and net work done. Maxwell's relations, general conditions for equilibrium and spontaneity. Partial molal properties. Gibb's Duhem equation. Activity and Fugacity. Determination of fugacity of a gas in a gaseous mixture. Determination of activity coefficient.

4.4 Application of thermodynamics to chemical equilibrium, thermodynamic derivation of law of mass action. Thermodynamic interpretation of Le Chatelier principle, equilibrium constant, reaction isotherm, Vant Hoff's isochore, Clapeyron-Clausius equation, applications.

Unit   5

Third & Zeroth Laws   of Thermodynamics   (8 Hrs)

5.1 Statement and evaluation of absolute entropies from thermal data of Third Law.

5.2 Testing the Third law.

5.3 Zeroth Law of Thermodynamics

TEXT BOOK

Rajaram, J. & Kuriakose, J. C., <u>Thermodynamics for Students of Chemistry</u>**,** New Delhi, Shoban Lal Nagin Chand & Co., 1986.

BOOKS FOR REFERENCE

Samuel Glasstone, <u>Thermodynamics for Chemists</u>, New Delhi, Affiliated East West Press Pvt Ltd.,. 1975.

Rastogi, R.P. & R.R. Misra., <u>An Introduction to Chemical Thermodynamics</u>**,** New Delhi, Vikas Publishing House Pvt. Ltd., 1990.

Klotz, I.M., <u>Introduction to Chemical Thermodynamics,</u> New York, W.A. Benjamin Inc., 1964.

END SEMESTER EXAMINATION:

Total Marks: 100   Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 30 x   1 = 30 Marks (All questions to be answered)

Section B –   5 x   6 = 30 Marks (5 out of 7 to be answered)

Section C –   2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

Allied Core Offered by the Department of Chemistry to students of Plant Biology and Plant Biotechnology and Advanced Zoology and Biotechnology

SYLLABUS

(Effective from the academic year 2011 - 2012)

BIOCHEMISTRY – II PRACTICAL

CODE: 11CH/AC/P2 41   **CREDITS: 1**

                                                            L T P: 0 0 2
                                                            TOTAL HOURS : 26

Unit   1

Estimations

1. Estimation of oxalic acid / Fe^{2+} (permanganimetry)

2. Estimation of Glucose

3. Estimation of Glycine by Sorrensen's titration

4. Estimation of Ascorbic acid

5. Estimation of Acid value /saponification value /iodine value of edible oil
6. Estimation of the enzyme catalase in cucumber / chowchow/ radish.

Unit   2

Group Experiments
1. Estimation of Phosphorus by colorimetry.
2. Estimation of DNA/RNA by colorimetry

 3. Separation of amino acids by paper chromatography.

END SEMESTER EXAMINATION:

   Total Marks: 50   Duration: 2 Hours

QUESTION PAPER PATTERN:
 Volumetric Analysis
 Procedure   = 10 marks
ACCURACY OF RESULTS
       UPTO 2%   = 40 marks
       2.1 – 3%   = 35 marks
       3.1 – 4%   = 20 marks
       > 4 %   = 10 marks
NOTE: Wrong calculations subtract 5 marks of the marks awarded.

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE: BRANCH IV - CHEMISTRY

SYLLABUS
(Effective from the academic year 2011 - 2012)

CLINICAL BIOCHEMISTRY

(Skill Development Course)

CODE: 11CH/ME/CB 53
CREDITS : 3

L T P: 1 0 3

TOTAL TEACHING HOURS: 52

Objectives of the Course
- To acquaint the students to the field of clinical chemistry
- To give an insight into diagnostic testing and to encourage the students to work in the field of Clinical Biochemistry and to pursue Clinical Research.

Unit   1   (8 Hrs)

Specimen Collection
1.1   Types of specimen-Blood, urine, sputum, faeces, cerebrospinalfluid.
1.2   Specimen collection, processing and preservation
1.3   Factors affecting composition

Unit   2   (10 Hrs)

Enzyme Analytes

2.1 Enzymes as analytical reagents, Principles of enzymatic analysis-End-point methods,

   kinetic methods, immunoassays-ELISA,EMIT,RIA, units of measurement.

2.2 Isoenzymes – differences in their properties and diagnostic value

2.3 Clinical significance of Amylase, AST, ALT, Creatine kinase, LDH, Alkaline

   phosphatase, Acid phosphatase, Glutamyl transferase, Lipase and Choline esterase.

Unit   3   **(8 Hrs)**

Hormone Analytes

3.1   Mechanism of action of hormones

3.2   Measurement of hormones –competitive, non-competitive & lateral flow immunoassay

3.3   Estimation of T_3, T_4, TSH.

3.4   Clinical significance of Thyroxine, androgens and estrogens.

Unit   4

Determination and Clinical significance of metabolites - Practicals   (15 Hrs)

4.1   Standardisation of Dextrose and estimation of Blood Glucose by o-Toluidine method.

4.2   Renal function tests:

    - Standardisation and estimation of blood urea by DAM-PSC method

    - Standardisation and estimation of serum creatinine by Jaffe reaction

4.3   Liver function test:

    - Standardisation and estimation of serum cholesterol by Zak's method.

4.4   Estimation of serum total proteins by Biuret method.

Unit   5

Assay of Enzymes   - Practicals   **(11 Hrs)**

5.1 Pancreatic function test- Estimation of serum amylase activity by Caraway method.

5.2 Cardiac function test - Standardisation of pyruvate and estimation of SGOT activity.

5.3 Liver function test -Standardisation of pyruvate and estimation of SGPT activity.

TEXT BOOK

Harold Varley, Allan H Gowenlock,Maurice Bell. Practical Clinical Biochemistry, Vol.1, General topics and common tests, 5th Edition, London. William Heinemann Medical books Ltd,
1984.

Harold Varley, Allan H Gowenlock, Maurice Bell, Practical Clinical Biochemistry, Vol.2, Hormones, Vitamins, Drugs and Poisons, 5th Edition, London.William Heinemann Medical books Ltd, 1984.

Luxton R .Clinical Biochemistry, 2nd Edition, Uk. Viva Books Pvt.Ltd. 2010

BOOKS FOR REFERENCE

Carl. A. Burtis and Edward R Ashwood, Teitz, Fundamentals of Clinical Chemistry, Philadelphia. 5th Edition, Saunders. 2006

Lehninger A.L. Principles of Biochemistry, Delhi.CBS Publishers, 2007.

Stryer Lubert Biochemistry, New York. W.H. Freeman and Co., 2006.

Burton E. Tropp, Biochemistry –Concepts and applications, New York. Brooks-Cole Publishing
Co., 1997.

Keith Wilson and John Walker, Practical Biochemistry Principles and techniques, 5th Edition, Cambridge University Press. 2000

Trevor Palmer, Philip Bonner, Enzymes – Biochemistry, Biotechnology, Clinical Chemistry, 2nd Edition, affiliated East –West Press Pvt.Ltd. 2008

END SEMESTER EXAMINATION:

Total Marks: 100   Duration: 3 Hours
Theory   - 1½ hours – 50 marks
Practical - 1½ hours – 50 marks

QUESTION PAPER PATTERN
Theory   50 marks
Section A – 10 x   1 = 10 Marks (All questions to be answered)
Section B –   4 x   10 = 40 Marks (4 out of 6 to be answered)
Practicals   50 marks
Procedure - 10 Marks
Estimation – 40 Marks

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE : BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 onwards)

COMPUTERS IN CHEMISTRY

(Skill Development Course)

CODE : 11CH/ME/CC53   **CREDITS : 3**

L T P: 1 0 3
TOTAL TEACHING HOURS: 52

OBJECTIVES OF THE COURSE

- To enable the students to understand the computing techniques used in solving problems in quantitative chemical analysis.
- To make the students analyse data by plotting graphs.
- To make the students visualize and draw models of molecules, correlate structure and properties.

Unit   1   (6 Hrs)

Fundamentals of Computers and Problem Solving with computers

1.1 Introduction: Computer Vs Calculator, Advantages and disadvantages of

    computers, Computer System Organisation, Classification of Computers, Operating

    Systems, Computer viruses

1.2 Steps in problem solving-Algorithm-Flow Chart with examples from Chemical

    equations, Computer based arithmetic Instructions, Order of preference for operators,

    logical relational operators, constants and variables, Constructing string constants.

1.3 Converting algebraic expressions to computer based expressions.

Unit   2 (10 Hrs)

Data Processing and Analysis

2.1 Elements of computer architecture - creating , editing, naming, renaming and locating files, folders, directory

2.2 Components of Excel - spreadsheets, database, chart & building workbooks

2.3 Building formulae user made and statistical functions, formatting cells

2.4 Managing and organizing data - creating link, analyzing data

2.5   Solving problems from Physical and analytical chemistry (precision and accuracy),standard   deviation, using computers

Unit   3 (12Hrs)

Introduction to Graphs

3.1 Introduction to charts-types, creating charts from a table, reviewing graphs

3.3 Solving problems from Physical chemistry chapters like chemical kinetics, phase rule,

Lother Meyer Graph of atomic volume, entropy , heat capacity calculations

3.4 Finding the trend line for graphs, equation, slope, intercept, graph series in a single graph   Scale, calculations from graphical problems from Chemistry text books.

Unit   4 (12 Hrs)

Introduction to Matlab

4.1 Eigen values and Eigen vectors of matrices.

4.2 Differential and integral calculus ,

4.3 Histograms, extrapolation and interpolation in graphs, Curve cutting integration

methods

4.4 Regression analysis of experimental data and its related techniques

4.5 Solutions for simultaneous equations by matrix methods.

Unit   5 (12 Hrs)

Molecular Modeling

5.1 Writing chemical equations, schemes using software, editing, transporting as picture to   word document.

5.2 Building molecules, measurement of bond angles, bond energy, torsion

Energy minimization techniques , use of force fields

5.3. Use of Internet in chemical research- XRD, IR , NMR data, simulated

results from web sources

Self study –to be tested internally

1. History of Computers , Computer Generations
2. Assignment in Chemistry – using web search and downloads on specific topics

TEXT BOOK

 Ramesh Kumari, Computers and applications to Chemistry ,Second Edition, New Delhi Narosa Publishing House, 2005.

BOOKS FOR REFERENCE

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

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

Raman K.V., Computers in Chemistry, Tata McGraw-Hill Company. 2002

END SEMESTER EXAMINATION:

Total Marks: 100   Duration: 3 Hours

Theory   - 1½ hours – 50 marks

Practical   - 1½ hours – 50 marks

QUESTION PAPER PATTERN

Section A – 10 x   5 = 50 Marks (10 out of 12 questions)

Section B –   5 x   10 = 50 Marks (5 out of 7 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE: BRANCH IV - CHEMISTRY

SYLLABUS
(Effective from the academic year 2011 - 2012)

CLINICAL BIOCHEMISTRY
(Skill Development Course)

CODE: 11CH/ME/CB 53   CREDITS : 3
                                                       L T P: 1 0 3
                              TOTAL TEACHING HOURS: 52

Objectives of the Course
- To acquaint the students to the field of clinical chemistry
- To give an insight into diagnostic testing and to encourage the students to work in the field of Clinical Biochemistry and to pursue Clinical Research.

Unit 1   **(8 Hrs)**
   Specimen Collection
   1.1   Types of specimen-Blood, urine, sputum, faeces, cerebrospinalfluid.
   1.2   Specimen collection, processing and preservation
   1.3   Factors affecting composition

Unit 2   **(10 Hrs)**
   Enzyme Analytes
   2.1 Enzymes as analytical reagents, Principles of enzymatic analysis-End-point methods, kinetic methods, immunoassays-ELISA,EMIT,RIA, units of measurement.
   2.2 Isoenzymes – differences in their properties and diagnostic value
   2.3 Clinical significance of Amylase, AST, ALT, Creatine kinase, LDH, Alkaline phosphatase, Acid phosphatase, Glutamyl transferase, Lipase and Choline esterase.

Unit 3   **(8 Hrs)**
   Hormone Analytes
   3.1   Mechanism of action of hormones
   3.2   Measurement of hormones –competitive, non-competitive & lateral flow immunoassay
   3.3   Estimation of T_3, T_4, TSH.
   3.4   Clinical significance of Thyroxine, androgens and estrogens.

Unit 4
   Determination and Clinical significance of metabolites - Practicals   **(15 Hrs)**
   4.1   Standardisation of Dextrose and estimation of Blood Glucose by o-Toluidine method.
   4.2   Renal function tests:
            - Standardisation and estimation of blood urea by DAM-PSC method
            - Standardisation and estimation of serum creatinine by Jaffe reaction
   4.3   Liver function test:
            - Standardisation and estimation of serum cholesterol by Zak's method.
   4.4   Estimation of serum total proteins by Biuret method.

Unit 5
Assay of Enzymes - Practicals   (11 Hrs)

5.1 Pancreatic function test- Estimation of serum amylase activity by Caraway method.
5.2 Cardiac function test - Standardisation of pyruvate and estimation of SGOT activity.
5.3 Liver function test -Standardisation of pyruvate and estimation of SGPT activity.

TEXT BOOK

Harold Varley, Allan H Gowenlock,Maurice Bell. Practical Clinical Biochemistry, Vol.1, General topics and common tests, 5th Edition, London. William Heinemann Medical books Ltd, 1984.
Harold Varley, Allan H Gowenlock, Maurice Bell, Practical Clinical Biochemistry, Vol.2, Hormones, Vitamins, Drugs and Poisons, 5th Edition, London.William Heinemann Medical books Ltd, 1984.
Luxton R .Clinical Biochemistry, 2nd Edition, Uk. Viva Books Pvt.Ltd. 2010

BOOKS FOR REFERENCE
Carl. A. Burtis and Edward R Ashwood, Teitz, Fundamentals of Clinical Chemistry, Philadelphia. 5th Edition, Saunders. 2006

Lehninger A.L. Principles of Biochemistry, Delhi.CBS Publishers, 2007.

Stryer Lubert Biochemistry, New York. W.H. Freeman and Co., 2006.

Burton E. Tropp, Biochemistry –Concepts and applications, New York. Brooks-Cole Publishing Co., 1997.

Keith Wilson and John Walker, Practical Biochemistry Principles and techniques, 5th Edition, Cambridge University Press. 2000

Trevor Palmer, Philip Bonner, Enzymes – Biochemistry, Biotechnology, Clinical Chemistry, 2nd Edition, affiliated East –West Press Pvt.Ltd. 2008

END SEMESTER EXAMINATION:

Total Marks: 100   Duration: 3 Hours

Theory   - 1½ hours – 50 marks
Practical - 1½ hours – 50 marks

QUESTION PAPER PATTERN
Theory   **50 marks**
Section A – 10 x   1 = 10 Marks (All questions to be answered)
Section B –   4 x   10 = 40 Marks (4 out of 6 to be answered)
Practicals   **50 marks**
Procedure - 10 Marks
Estimation – 40 Marks

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE : BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 onwards)

ORGANIC CHEMISTRY - II

CODE :11CH/MC/OC 54	**CREDITS** **: 4**
	L T P **: 4 1 0**
	TOTAL TEACHING HOURS **: 65**

OBJECTIVES OF THE COURSE

- To give an orientation towards synthesis of nitrogen containing organic compounds.
- To introduce structure, synthesis , properties of heterocyclic compounds and their application as intermediates of industrial importance
- To sensitize the students about the importance of dyes and drugs

Unit 1 (15 Hrs)
 Nitro and Amino Compounds
  1.1 Nitro alkanes - tautomerism, reactions, distinction from alkyl nitrite.
  1.2 Aromatic nitro compounds - mechanism of nitration, justification of nitro group as a meta director, Reduction of nitro benzene.
  1.3 Basicity of amines – a comparison based on substitution
  1.4 Separation of a mixture of amines by Hinsberg and Hofmann Method.
  1.5 Distinguishing primary, secondary and tertiary amines.
  1.6 Ascent and descent of series in aliphatic amines.
  1.7 Aromatic amino compounds – preparation & properties of aniline, Liebermann's test.

Unit 2
 Diazo compounds (12 Hrs)
2.1 Aliphatic diazo compounds – reactions. Importance as a synthetic agent.
2.2 Benzene diazonium chloride – structure & formation. Coupling and replacement reactions. Importance as a synthetic agent.
2.3 Rearrangements involving Nitrogen intermediates - Wolff, Hoffmann, Beckmann, Benzidine rearrangements

Unit 3 (13 Hrs)
 Heterocyclic Compounds
  3.1 Aromatic nature of furan, thiophene, pyrrole, pyridine : comparison of important properties, electrophilic substitution reactions and justification of attack positions.
  3.2 Prophyrin and Corrin ring structure as in haemoglobin, Vit B_{12}, Chlorophyll.

3.3 Condensed ring systems: Indole, Quinoline, isoquinoline - Comparison of reactions. Preparation of quinoline by Skraup's synthesis and isoquinoline by Bischler Napieralsky synthesis. Structural determination and synthesis of quinoline
3.4 Relationship among Indole, Isatin and Indigo.

Unit   4   (10 Hrs)
   Color and Dyes
4.1 Complementary colors and Photochemistry of vision
4.2 Classification of dyes based on chemical structure and application
4.3 Triphenylmethane dyes: Preparation of Malachite green, Para rosaniline, Crystal Violet
4.4 Azo dyes: Preparation of Methyl orange.
4.5 Phthalein dyes: Preparation of Phenolphthalein, Natural dyes: Alizarin and Indigo, Preparation of Indigo.

Unit   5   (15 Hrs)
   Pharmaceuticals
5.1 Classification of drugs – Biological and Chemical, definition for each with example
5.2 Sulpha drugs - preparation and therapeutic uses of sulphadiazine, sulpha guanidine, Mode of action of sulpha drugs.
5.3 Analgesics and antipyretics – preparation and therapeutic uses of aspirin, paracetamol
5.4 Antibiotics – Penicillin, Streptomycin, Chloromycetin, Tetracycline - structures only.
5.5 Antimalarials - quinine derivatives.
5.6 Hypnotics, Sedatives and Psychedelic drugs - LSD – Structure(Structural elucidation for pharmaceutical drugs is not necessary)

   Self study for internal testing

   Application of dyes in leather, cosmetics, textile and food industries.
   Alizarin and Indigo – methods of extraction from source
   Wald's visual cycle, coating and functioning of sunglasses
   Composition of commonly used drugs

TEXT BOOKS

Morrison R.T. & R.N. Boyd, Organic <u>Chemistry</u>, New Delhi. Prentice Hall of India Pvt. Ltd. 1995.P. L Soni and H.M. Chawla, <u>Text Book of Organic Chemistry,</u> New Delhi.Sultan Chand & Sons, 1992.

Tewari K.S., N.K. Vishnoi, S.N. Mehrotra, <u>A Textbook of Organic Chemistry,</u> New Delhi. Vikas publishing House Pvt., 1996.

BOOKS FOR REFERENCE

Finar I.L. <u>Organic Chemistry Vol. I & II,</u> London. ELBS, 1991.

END SEMESTER EXAMINATION:
Total Marks: 100   Duration: 3 Hours

QUESTION PAPER PATTERN
Section A – 30 x   1 = 30 Marks (All questions to be answered) Multiple choice - 10,
Fill up - 10, T/F or Match - 5, single line answer - 5
Section B –   5 x   6 = 30 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
B.Sc. DEGREE: BRANCH IV - CHEMISTRY
SYLLABUS
(Effective from the academic year 2011 - 2012)
BIOCHEMISTRY

CODE : 11CH/MC/BC 54   **CREDITS : 4**
                                                                    L T P : 4 1 0
                                          TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE
- A study of Biochemistry is the need of the hour, considering the emergence of inter and multidisciplinary areas of study and research.
- This course is designed to focus biochemistry with a special emphasis on metabolism and their diseases.

Unit   1   **(13 Hrs)**
Introductory Biochemistry

1.1   Biochemistry – The chemical basis of life
1.2   Relationship of biochemistry and medicine
1.3   Blood - Composition of blood, Blood coagulation – mechanism. Disease conditions – Hemophilia
1.4   Maintenance of pH of blood – Bicarbonate buffer, acidosis, alkalosis.

Unit   2

Structure of Biomolecules   **(15 Hrs)**

2.1   Proteins - Primary, secondary and tertiary structures. Sequencing of proteins

      - N terminal and C terminal determination

2.2   Lipids – Classification of lipids as saponifiable and non-saponifiable Characterisation of fat – Definitions and significance of Iodine value, Acid value, Saponification value.

2.3   Nucleic acids – Structure and functions. Nucleosides, Nucleotides, Structure of DNA, RNA - types and their differences. DNA replication and Protein synthesis.

Unit   3   **(15 Hrs)**
 Metabolism:
 3.1   Carbohydrate metabolism - glycolysis, TCA cycle, glycogenesis, glycogenolysis, gluconeogenesis, oxidative phosphorylation, electron transport chain.
 3.2   Proteins - transamination, oxidative deamination and urea cycle. Inborn errors of amino acid catabolism – Albinism, Alkaptonuria and Phenyl Ketonuria .
 3.3   Lipids - β - oxidation of fatty acids, biosynthesis of fatty acids, ketone bodies.

Unit 4 (12 Hrs)

Enzymes

4.1 Definition of enzymes and coenzymes
4.2 Classification of enzymes (with examples)
4.3 Enzyme specificity - factors affecting enzyme action
4.4 General mechanism of enzyme catalysis - Michaelis - Menten theory - Fischer's Lock and Key model, Koshland's Induced fit model.
4.5 Mechanism of inhibition (competitive, non-competitive, allosteric)

Unit 5 (10 Hrs)

Hormones
5.1 Definition, classification of hormones (steroid and non steroid only)
5.2 Source and functions of insulin, thyroxin and sex hormones.
5.3 Mechanism of hormone action.

Self study to be tested internally

Disease conditions – glycogen storage disease, Hypercholesteremia and hyper triglyceridemia; Diabetes, hyper and hypothyroidism.
Vitamins and Nutraceuticals

TEXT BOOK
Jain J.L., Fundamentals of Biochemistry, New Delhi ,S. Chand & Co. 2001.

BOOKS FOR REFERENCE
Ambika Shanmugam, Fundamentals of Biochemistry for Medical Students, Chennai, Published by the author, 1990.
Berry, A.K., Textbook of Biochemistry, Emkay Publications. 2001.
Lehninger A.L., Principles of Biochemistry, New Delhi, CBS Publishers, 1990.
Rama Rao, AVSS, Text Book of Biochemistry, India, OBS Publishing Distributors Ltd., 2006.
Satyanarayana, U., U. Chakrapani, Biochemistry, Delhi, New Central Book Agency, 2006.
Stryer Lubert, Biochemistry, New York, W.H. Freeman and Co. 1981.

WEBSITE
url: www.whfreeman.com

END SEMESTER EXAMINATION:
Total Marks: 100   Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 30 x 1 = 30 Marks (All questions to be answered) Multiple choice - 10, Fill up - 10, T/F or Match - 5, single line answer - 5
Section B – 5 x 6 = 30 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

B.Sc. DEGREE: BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 - 2012)

PHYSICAL CHEMISTRY – I PRACTICAL

CODE: 11CH/MC/P652   CREDITS: 2
                                                                           L T P : 0 0 3
                                                                           TOTAL HOURS: 39

Unit 1
   Distribution law
   Distribution coefficient of I_2 between CCl_4 & H_2O

Unit 2
   Chemical Kinetics
   Determination of rate constant of the reaction acid catalyzed hydrolysis of ester.

Unit 3
   Phase Equilibria
   Determination of Molecular weight by Rast Method.
    Determination of critical solution temperature (CST) for phenol-water system
       (a) Tracing the phase diagram, CST, CSC
        (b) Given the phase diagram, determine the concentration of the unknown mixture
   of phenol and water..

Unit 4   Conductivity   (for each person question given can be different)
       (a)   Determination of equivalent conductance at infinite dilution for strong
electrolytes.
       (b)   To verify Oswald's dilution law/ Determination of α, Ka , pH, pKa, for a weak
            acid /Kb, pOH, pK_b for a weak base
      (c). Determination of Solubility product of the given sparingly soluble salt
            condctometrically (Example. AgCl, Ag_2 CrO_4, $CaCO_3$ $PbSO_4$, Pb CrO_4).

Unit 5
   Potentiometry
    (a) Determination of Fe^{2+} in the given sample potentiometrically.
    (b)   Determination of Solubility product of the given sparingly soluble salt
            potentiometrically (Example. AgCl , Ag_2 CrO_4, $CaCO_3$ $PbSO_4$, Pb CrO_4).

Unit 6
    Colorimetry
     Determination of phosphorous/ manganese using photoelectric colorimeter.
Theory and principles behind the experiments concerned to be tested periodically and
along with the CA tests for a maximum of five marks.

TEXT BOOK

Venkateswaran. V., R. Veeraswamy., A.R.Kulandaivelu, <u>Basic Principles of Practical Chemistry</u>**,** New Delhi, Sultan Chand & Sons, 1993.

Viswanathan, B. and Raghavan, P.S., <u>Practical Physical Chemistry</u>, New Delhi, Viva Books Pvt.Ltd, 2005.
Rajbhoj, S.W., and T.K.Chondhekar, <u>systematic Experimental Physical Chemistry</u>, Aurangabad, Anjali Publication, 1998.

END SEMESTER EXAMINATION:

Total Marks: 50   Duration: 3 Hours

QUESTION PAPER PATTERN

Procedure with principle	**10 marks**
Practical work	**40 marks**

Experiments	25 Marks
Procedure	10 Marks
Execution	15 Marks (includes tabulation, attestation, calculation and graph)

Note:

No Calculations	5 marks
Incomplete calculation	3 marks
Wrong calculation	2 marks
No attestation	2 marks
Units missing	1 mark

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE: BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011- 2012)

BIOCHEMISTRY - PRACTICAL

DE: 11CH/MC/P551   **CREDITS : 1**

L T P : 0 0 2
TOTAL HOURS   : 26

Unit   1

Organic Analysis

1.1   Reactions of amino acids - reactions of tryptophan, tyrosine, arginine and cysteine.

1.2   Reactions of proteins - reactions of casein and egg albumin.

1.3   Analysis of an unknown (from the above)

Unit   2

Estimations

2.1   Extraction and estimation of DNA.
2.2   Extraction and estimation of RNA
2.3   Estimation of glucose
2.4   Estimation of Glycine by Sorrensen's titration
2.5   Estimation of Ascorbic acid
2.6   Estimation of Saponification /Iodine value of an edible oil
2.7   Estimation of the enzyme alkaline phosphatase.

Unit   3

Gravimetric Analysis (to be tested internally)

 3.1 Estimation of Barium as Barium Sulphate

 3.2 Estimation of Lead as Lead Chromate

     Theory and principles behind the experiments concerned to be tested periodically and along with the CA tests and end semester exam for a maximum of ten marks.

END SEMESTER EXAMINATION:

Total Marks: 50   Duration: 3 Hours

QUESTION PAPER PATTERN

Answers to Questions based on Organic and Volumetric Practicals   10 marks

I.   **Estimation   20 marks**

Accuracy of Results

Upto 2%   20 marks

2.1 – 3%   15 marks

3.1 – 4%   10 marks

4.1 – 5%   5 marks

>5%   5 marks

II.   **Organic Analysis   20 marks**

Preliminary reaction   5 marks

Final report with all tests   15 marks

Note:

1. If a reducing disaccharide is reported as monosaccharide, subtract 2 marks.
2. If aldose is reported as Ketose, subtract 2 marks
3. If Aliphatic Amino acid is reported as Aromatic subtract 3 marks
4. If reducing carbohydrate is reported as non-reducing subtract 3 marks

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE : BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 onwards)

PHYSICAL CHEMISTRY - II

CODE : 11CH/MC/PC 54   CREDITS: 4

                                                                L T P   : 4 1 0
                                                  TEACHING HOURS   : 65

OBJECTIVES OF THE COURSE

- To provide a understanding of the principles of solid state chemistry
- To provide a logical and rigorous approach to study of Phase equilibria in solids, liquids and solutions.

Unit   1   (**12** Hrs)

Solid State

1.1 Types of solids, Isotropy and Anisotropy-Laws of crystallography- Introduction to elements of symmetry and symmetry operations with examples of simple molecules.

1.2 Miller Indices, representation of planes, space lattice, reciprocal lattice, crystal systems, unit cell (cubic & hexagonal close packing), radius ratio rules and its limitations - packing of ions in crystals

Unit   2   (**15** Hrs)

X ray and Neutron Diffraction studies

2.1 **X**-ray diffraction, Bragg's equation – derivation of structure of NaCl by single

crystal method, structures of KCl, CsCl, diamond, graphite, ZnS & CaF_2 (with

respect to lattice type & coordination number), percentage void space &

Avagadro number. Polymorphism.

2.2 Liquid crystals – types, structures and textures & applications.

2.3 Neutron diffraction studies – basic theory and applications

Unit   3   (**15** Hrs)

Phase Rule

3.1 Definition of phase, component, degrees of freedom, thermodynamic derivation of phase rule. Construction of phase diagram. Application of phase rule to one component system (H_2O & S)

3.2 Two component systems - Thermal analysis, cooling curve, simple eutectic (Ag, Pb) solid solution (Ni, Cu) compound formation with congruent melting point (Zn, Mg) Lever rule, Peritectic change (NaCl - H_2O), Salt hydrates ($FeCl_3$ - H_2O, $CuSO_4$ - H_2O) freezing mixture, efflorescence, deliquescence,.

Unit   4   (**10** Hrs)

Solutions

4.1 Dilute solutions – Colligative properties, Dilute solutions of one or more non volatile solutes. Thermodynamic derivation of colligative properties. Reverse Osmosis, van't Hoff factor, abnormal molar mass, degree of dissociation and association.

4.2 Solutions of gases in liquids, Henry's law

4.3 Nernst distribution law, conditions, derivation, applications.

Unit   5   (**13** Hrs)

Binary Liquids

5.1 Binary liquids, ideal solutions, (benzene & toluene) Raoult's law, Fractional distillation, Non-ideal systems, Azeotropes (HCl-H_2O& alcohol-H_2O)

5.2 Partially miscible liquids. (Phenol - H_2O, triethylamine-H_2O, Nicotine- H_2O)

   Critical solution temperature, Effect of impurities (ionic and organic) on CST.

5.3 Immisicible liquids, Steam distillation, theory of Steam distillation.

Self study for internal testing

1. Separation of organic mixtures in synthesis and choice of distillation procedures
2. Solvent extraction for separation and purification in organic synthesis as an application of Nernst distribution law
3. Swimmers' oxygen and Henry's law
4. Application of Binary liquids-Phase rule-in cooking.
5. Importance of X-ray in medical diagnosis

TEXT BOOKS

Puri, B.R & L.R. Sharma , Principles of Physical Chemistry**,** New Delhi. Shobanlal Nagin Chand Co.,

Soni, P.L., Text Book of Physical Chemistry**,** New Delhi. S.Chand & Co. 1985.

BOOKS FOR REFERENCE

Glasstone Samuel, <u>Principles of Physical Chemistry</u>**,** New Delhi. Amarind Publishing Co., Pvt., Ltd., 1976.

Barrow Gardon, M., <u>Physical Chemistry</u>**,** New York. McGraw Hill International. 1988

Moore, Walter, J., <u>Physical Chemistry</u>**,** New Delhi. Orient Longman Ltd., 1976.

Samuel H. Maron & Carl F.Prutton, <u>Principles of Physical Chemistry</u>, New Delhi. Oxford-IBH Publishing Company Pvt.Ltd.,. 1972

Samuel H. Maron & Jerome B.Lando , <u>Fundamentals of Physical Chemistry</u>, New York. Macmillan Publishing Co. Inc., 1974.

END SEMESTER EXAMINATION:

Total Marks: 100   Duration: 3 Hours

QUESTION PAPER PATTERN

Section A (All questions to be answered) – 30 x   1 = 30 Marks.

(Multiple choice - 10, Fill up - 10, T/F or Match - 5, Brief Q. answer – 5)

Section B –   5 x   6 = 30 Marks (5 out of 7 to be answered)

Section C –   2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE: BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 - 2012)

PHYSICAL CHEMISTRY – II PRACTICAL

CODE: 11CH/MC/P7 62   **CREDITS: 2**
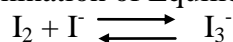   **L T P : 0 0 3**
                                                           TOTAL HOURS: 39

Unit   1   Distribution Law
   1. **(a)** Determination of Equilibrium constant of the reaction.
       $$I_2 + I^- \rightleftharpoons I_3^-$$
       (b) Determination of concentration of the given KI.
Unit   2   Chemical kinetics
   2.   Determination of rate constant of Iodide - Persulphate reaction
        (a) Titrimetric method or   (b) Clock method
Unit   3   Phase Equilibria
   . 3. To study the effect of added impurity on UCST and determination of the unknown
        concentration of the impurity   (a) NaCl or   (b) Succinic acid..
   4. Simple Eutectic systems   (a) Phase diagram (b) determination of the
concentration
        of an unknown composition

Unit   5   Conductivity (for each student, question given can be different)
   5. Conductometric acid-base titration (weak acid vs strong base or strong acid vs
weak
      base or strong acid vs strong base. or weak acid vs weak base)
   6. Determination of % composition of mixture of acids conductometrically.
Comparison
        of strengths of acids

Unit 6   pH metry
   7. (a) Verification of Henderson's equation
      (b) Analyse pH of food, water, soil.

Unit 7   Spectrophotometry
   8.(a) Calibration of concentration vs absorbance is drawn and determine unknown
          concentration of NO_2^- using spectrophotometer.
      (b) Analyse pH of water, soil.
Unit 8   Flame Photometry
   9. **(a)** Determination of concentrations of Na/K using flame photometer.
      (b) Analyse pH of food, water, soil.

NB : Theory and principles behind the experiments concerned to be tested periodically and

along with the CA tests for a maximum of five marks.

TEXT BOOK

Venkateswaran. V., R. Veeraswamy., A.R.Kulandaivelu, Basic Principles of Practical Chemistry, New Delhi. Sultan Chand & Sons, 1993.

Viswanathan, B. and Raghavan, P.S, Practical Physical Chemistry, , New Delhi.
Viva
Books Pvt. Ltd. 2005.
Rajbhoj, S.W., and T.K.Chondhekar. Systematic Experimental Physical Chemistry, Aurangabad. Anjali Publication. 1998.

END SEMESTER EXAMINATION:

Total Marks: 50   Duration: 3 Hours

QUESTION PAPER PATTERN

Procedure with principle   **10 marks**
Practical work   **40 marks**

Experimental value   25 marks
Execution   15 marks (includes tabulation, attestation, calculation, and graph)

Note:

No Calculations	5 marks
Incomplete calculation	3 marks
Wrong calculation	2 marks
No attestation	2 marks
Units missing	1 mark

SYLLABUS
(Effective from the academic year 2011 - 2012)

INORGANIC CHEMISTRY - III

CODE: 11CH/MC/IC 64   CREDITS: 4
           L T P: 4 1 0
           TOTAL TEACHING HOURS   : 65

OBJECTIVES OF THE COURSE

- To understand the nature of bonding in coordination compounds.
- To appreciate the active role played by metal ions and coordination compounds in biological system
- To understand the application of coordination compounds in industry.
- To know the occurrence of lanthanides and actinides in nature and their uses.

Unit 1   (15 Hrs)
Transition elements
1.1 General properties of Transition metals.
1.2 Ti, V, Cr, Mn groups, Fe, Co, Ni groups - A comparative study with respect to the oxidation states, oxides and complexes.
1.3 Biological importance of transition metals-biological roles of Mo,Fe,Co,Cu,Zn (metal containing proteins and enzymes and their biological roles).
1.4. Application of transition metals in nanochemistry.

Unit 2   (10 Hrs)
Inner Transition elements
2.1 Lanthanides – lanthanide series, their position in the periodic table, properties of lanthanides, lanthanide contraction and its consequences.
2.2 Isolation of lanthanides - ion exchange chromatography,
2.3 Actinide – actinide series, position in the periodic table, properties of actinides.
  . Comparison between lanthanides and actinides.
2.4 Extraction of Thorium from Monazite and Uranium from Pitch blende.

Unit 3   (10 Hrs)
Nomenclature, Stereochemistry and Isomerism
3.1 Introduction –ligands- monodentate, bidentate and polydentate ligands, coordination sphere, coordination number, nomenclature of coordination compounds. Chelate effect - applications
3.2 Isomerism –linkage, ionization, hydrate, coordination, coordination position isomerism geometrical and optical isomerism

Unit 4

(20 Hrs)

Theories of coordination compounds

4.1 Valence bond theory (VBT)-hybridization, geometry and magnetic properties of coordination compounds. Drawbacks of VBT.

4.2 Crystal Field Theory - crystal field splitting in octahedral complexes, tetrahedral and

square planar complexes, factors influencing the magnitude of crystal field splitting. Crystal Field Stabilization Energy. Spectrochemical series, low and high spin

complexes, Jahn Teller effect. Ligand Field Theory (elementary treatment only)

4.3 Applications of coordination compounds in qualitative and quantitative analyses- potassium ferrocyanide, potassium ferricyanide, alizarin, ferroin indicator, DMG, oxine, cupferron and EDTA.

Unit 5

(10 Hrs)

Organometallic compounds

5.1 Metal Carbonyls - preparation, properties and structure of Ni and Fe carbonyls.

5.2 Preparation and structure of Metal alkyls and aryls of Li,Al,Hg,Sn and Ti. Metal alkene complexes – structures.

5.3 Ferrocene- preparation, properties and structure.

5.5 Organometallic compounds as catalysts – Ziegler-Natta catalyst, Wilkinson catalyst.

Self Study to be tested Internally

The natural occurrence and ores of transition metals.

Importance of transition and Inner transition metals and their compounds.

The minerals of lanthanides and actinides and their occurrence in india.

Sidgwick's effective atomic number rule (EAN), 18 electron rule; illustration of the failure of EAN rule and the limitations of VBT with examples

Synthesis of super heavy elements.

Applications of metal nitrosyls.

TEXT BOOKS

Puri. B.R., L.R. Sharma., & C.I. Kalia Principles of Inorganic Chemistry, New Delhi Milestone Publishers and Distributors, 2008.

Lee J.D., Concise Inorganic Chemistry, London. ELBS, 2008.

Cotton, F.A., and G. Wilkinson, Advanced Inorganic Chemistry, New Delhi. Wiley Eastern Ltd., 2008.

BOOKS FOR REFERENCE

James, E., Huheey & Ellen A.Keiter Principles of Structure and Reactivity, New York. Addisson - Wesley Publishing Company, 1993.

Keith, F., Purcell & John C.Kotz., An Introduction to Inorganic Chemistry, Saunders College, Philadelphia.Saunders Golden Sunburst Series, 1982.

Emeleus, H.J. & A.G.Sharpe, Modern Aspects of Inorganic Chemistry, London. ELBS, 1973

Gopalan R, V. Ramalingam, Concise Coordination Chemistry, New Delhi. Vikas Publishing House Pvt.Ltd, 2001.

Gopalan. R Inorganic Chemistry, Hyderabad. Universities Press, 2009.

END SEMESTER EXAMINATION:

Total Marks: 100   Duration: 3 Hours

QUESTION PAPER PATTERN
Section A – 30 x   1 = 30 Marks (All questions to be answered) Multiple choice - 10, Fill up - 10, T/F or Match - 5, single line answer - 5

Section B –   5 x   6 = 30 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

B.Sc. DEGREE : BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2010 - 2011)

ORGANIC CHEMISTRY - III

CODE :11CH/MC/OC 64   **CREDITS: 4**
                                                        L T P: 4 1 0
                                    TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To understand the chemistry of phenols and acids.
- To expose the students to structural determination of natural products.
- To provide a better understanding of the mechanisms involved in various rearrangements and organic syntheses.

Unit   1   (12 Hrs)

Alcohols and Phenols

1.1 Monohydric alcohols: Hydrogen bonding. Methods of separating and differentiating isomeric alcohols
1.2 Di and Trihydric alcohols: action of HIO_4, Uses
1.3 Acidity of Phenols, effect of substitution on acidity
1.4 Kolbe and Riemer Tiemann reactions, Fries rearrangement
1.5 Dihydric Phenols: condensation reactions
1.6 Rearrangements involving carbonium ion intermediates - Pinacol – Pinacolone and Benzilic acid rearrangements

Unit   2   (13Hrs)

Saturated and unsaturated Monocarboxylic acids

2.1 Monocarboxylic acids: comparison of acid strengths, effect of substituents on acidity.
2.2 Hydroxy acids: Action of heat on α, β, γ - hydroxy acids.
2.3 Halogen Substituted acids: HVZ reaction, action of KOH on α, β, γ - halogen substituted acids.
2.4 Amino acids: Reactions of amino acids, zwitterions, isoelectric point, peptide bond formation. Action of heat, reaction with HNO_2, HCHO, Cu^{2+} and ninhydrin. Gabriel's synthesis, Strecker's synthesis. Preparation of tryptophan from Indole.
2.5 Unsaturated acids
Aliphatic : Methods of differentiating Fumaric and maleic acids. Diels Alder reaction

Aromatic : Cinnamic acid - Preparation, properties.

Unit   3   (10Hrs)

Acid derivatives and DiCarboxylic Acids

3.1   Formation and Reactivity of amides, acyl chlorides, esters, anhydrides.

3.2   Esterification reaction, Claisen condensation, and Hydrolysis of esters by $A_{AC}2$, $B_{AC}2$ mechanisms.

3.3   Synthetic applications of malonic and acetoacetic ester.

3.4 Hofmann's degradation of acid amide

3.5 Rosenmund's reduction and Schotten - Baumann reaction of acid chlorides.

3.6   **Dicarboxylic acids**

Blanc's rule applied to Aliphatic and Aromatic acids.

3.7 Fatty acids and their reaction with triacyl glycerols

Unit   4   (20 Hrs)

Natural products

4.1 Occurrence of various terpenoids, carotenoids, steroids and alkaloids in nature and methods of extraction.

4.2 General principles of structural determination of natural products.

4.3 Terpenoids - classification, isoprene rule, structural determination of the following monoterpenoids - citral, α-Terpeneol, α- pinene.

4.4 Alkaloids - classification - with one example for each type along with structure, structural elucidation of piperine, nicotine.

Unit 5   (10 Hrs)

Functional group interconversion and Designing Organic Syntheses

5.1 Protection of functional groups – Need for and methods of protection of –NH_2, -OH,   >C=O, >C=C, COOH groups.

5.2 Functional group modifications by reduction, oxidation, addition, elimination, displacement and addition – elimination processes.

Self study for internal testing

Aliphatic and aromatic acids -general properties
Saponification of triacyl glycerols and action of soap
Importance of PUFA

TEXT BOOKS

Tewari K.S., N.K. Vishnoi, S.N. Mehrotra, <u>A Textbook of Organic Chemistry</u>**,** New Delhi. Vikas publishing House Pvt., 1996

BOOKS FOR REFERENCE

Mukherji S.M., S.P.Singh, <u>Reaction Mechanism in Organic Chemistry</u>**,** New Delhi Macmillan Company of India Lt.

Morrison R.T. & R.N. Boyd, <u>Organic Chemistry,</u> New Delhi. Prentice Hall of India Pvt.Ltd. 1995

Finar, I.L., <u>Organic Chemistry</u>**,** Vol. II, London. ELBS, .1991

END SEMESTER EXAMINATION:

Total Marks: 100   Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 30 x   1 = 30 Marks (All questions to be answered) Multiple choice - 10, Fill up - 10, T/F or Match - 5, single line answer - 5

Section B –   5 x   6 = 30 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

B.Sc. DEGREE : BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 - 2012)

PHYSICAL CHEMISTRY - III

CODE: 11CH/MC/PC 64   **CREDITS   : 4**

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

OBJECTIVES OF THE COURSE

- To familiarise the students with the relevance of concepts of kinetics of reactions with special reference to derivation & applications.
- To equip the students with fundamentals of Electro Chemistry.

Unit   1   (20 Hrs)

Chemical Kinetics

1.1 Order and molecularity of reactions with examples. Derivation of rate constants for I, II (equimolar and non equimolar reactant concentrations) and nth order. characteristics of Zero, fractional order reactions, half life time.

1.2 Experimental methods in the study of kinetics – Dilatometry, volumetry, manometry, polarimetry & spectrophotometry. Methods of determination of order.

1.3 Effect of temperature on reaction rate, Arrhenius equation, calculation of Arrhenius parameters.

1.4 Theories of reaction rates, collision theory derivation of rate constant of bimolecular reaction (HI formation) from collision theory, limitations of collision theory. Lindemanns theory of unimolecular reactions. Eyring's Transition State Theory Thermodynamic derivation of rate constant for TS Comparison between CT & ARRT- significance of $\Delta G^{\neq}$ & $\Delta S^{\neq}$

1.5 Kinetics of photochemical reactions (H_2 - X_2), compare kinetics of HCl, HBr, HI photolysis of of aldehydes & ketones, photosensitisation, Fluorescence, phosphorescence & chemi luminescence.

Unit   2   (5 Hrs)

Adsorption

2.1 Physisorption & Chemisorption.
2.2 Adsorption Isotherm of Freundlich-limitations. Derivation of Langmiur adsorption isotherm; BET adsorption isotherm - postulates & Equation.
2.3 Determination of surface area, applications.

Unit 3 (12 Hrs)

Electrochemistry-conductivity

3.1 Electrical conductance, electrodic & electrolytic conduction. Measurement of conductance, true & potential electrolytes .

3.2 Variation of conductance with dilution, Kohlrausch's law – applications. Migration of ions, Ionic mobility & ionic conductance, transport number - determination by Hittorf's & moving boundary methods.

3.3 Theory of electrolytic conduction. – limitations of Arrhenius theory, Debye Huckel Theory of strong electrolytes. Onsagar equation, Wien effect, Debye-Falkenhagen effect

3.4 Application of conductance measurement, activity coefficient, ionic strength. Solibility of sparingly soluble salt, degree of ionisation of weak electrolytes, conductomeric titration.

Unit 4

 Ionic equilibria (8 Hrs)

4.1 Ionic equilibria, Ostwald dilution law, K_a , K_b , K_w derivations-Calculation and determination of pH, p OH, pKa , pK_b , pKw

4.2 Hydrolysis of salts. Expression for hydrolysis constant & pH of salt solution of different type of salts. Determination of degree of hydrolysis – conductance method.Buffers, Henderson & Henderson – Hasselbach equations. Solubility, Solubility product of sparingly soluble salts-Determination by conductivity

Unit 5 (20 Hrs)

EMF Of Cells

4.1 Galvanic cells, reversible & irreversible cells, half cells, electrode and cell reactions, Nernst single electrode potential, Cell representation, terminology and Conventions

4.2 Types of reversible electrodes, Standard Hydrogen electrode, calomel electrode, and equation of emf of cells- Standard Electrode Potentials sign convention, electrochemical series, significance, applications.

4.3 Weston Cadmium Cell, emf – measurement Poggendorff's compensation method. measurement of redox potential.

4.4 Applications of emf measurements: Application of Gibbs - Helmholtz equation in the calculation of ΔG, ΔH, ΔS, temperature coefficient of EMF of galvanic cells, Equilibrium constant, determination of pH using glass, hydrogen & quinhydrone electrodes, potentiometric titration.

4.5 Types of reversible cells, Concentration cells with & without transference. Liquid Junction Potential derivation- salt bridge.

4.5 Application of concentration cells - valency of ions, transport number, Ksp, activity coefficient.

Self study - to be assessed Internally

1. Lead storage battery, Alkaline battery, Rechargeable battery and fuel cells mechanism of charging and discharging.
2. Corrosion - electrochemical method of prevention of corrosion of metals- Corrosion in Industries – precautions and strategies
3. Application of solubility product and pH in semimicro analysis
4. Importance of pH in biosystems.
5. Importance of Kinetics of reactions in Industries
6. Importance of adsorption in Natural and Biosystems (digestion-role of gelucil, antacids, purifying natural water sources like well water etc)

TEXT BOOKS

Puri, B.R & L.R. Sharma, Principles of Physical Chemistry**,** New Delhi. Shobanlal Nagin Chand Co., 1989.

Soni, P.L., Text Book of Physical Chemistry**,** New Delhi. S.Chand & Co., 1985.

BOOKS FOR REFERENCE

Glasstone Samuel, Introduction to Electrochemistry**,** New Delhi. Affiliated East West Press (P), Ltd., 1975.

Laidler Keith J., Chemical Kinetics, New Delhi.Tata McGraw Publishing Co.Ltd,. 1976

Viswanathan, B. & R.Narayan, Chemical and Electrochemical Energy Systems, Hyderabad. Universities Press (India) Limited, 1998

Rajaram J. & J.C. Kuriakose., Kinetics and Mechanisms of Chemical Transformations**,** New Delhi .Macmillan India Ltd.. 1993

Viswanathan .B., Sundram.S., Venkataraman.R., Rengarajan.K., Raghavan.P.S Electrochemistry- Principles and Applications , Chennai, S. Viswanathan Pvt. Ltd., 2007.

END SEMESTER EXAMINATION:

Total Marks: 100   Duration: 3 Hours

QUESTION PAPER PATTERN

Section A (All questions to be answered) – 30 x   1 = 30 Marks

(Multiple choice - 10, Fill up - 10, T/F or Match - 5, Brief Q. answer – 5)

Section B –   5 x   6 = 30 Marks (5 out of 7 to be answered)

Section C –   2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE : BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2011 - 2012)

SPECTROSCOPY

CODE :11CH/MC/SP 64   **CREDITS: 4**

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

OBJECTIVES OF THE COURSE

- To enable the students to grasp the basics of spectroscopy and to gain a clear picture of the principles and importance in characterization of compounds.
- To gain a sound knowledge of the various spectral techniques and instrumentation.

Unit   1
Electronic Transitions: UV Visible Spectroscopy   (10 Hrs)

1.1 Absorption spectroscopy, Electromagnetic spectrum - its regions
1.2 Principles of UV - VIS spectroscopy : Franck Condon Principle
1.3 Factors affecting UV absorption
1.4 Solvents, parameters of UV plot – their significance
1.5 UV spectra of simple organic compounds

Unit   2

Vibrational Transitions: FTIR and Raman Spectroscopy   (15 Hrs)

2.1 Principle, modes of vibration, conditions of sensitivity to IR
2.2 Characteristic frequencies of functional groups and aromatic compounds.
2.3 External factors affecting spectral absorption
2.4 IR pattern of simple organic compounds.
2.5 Theory of Raman spectroscopy, Comparison with IR

Unit   3

Nuclear Magnetic Resonance Spectroscopy   (20 Hrs)

3.1 Theory of PMR absorption
3.2 Ring currents in mlecules

3.3 Shielded and deshielded protons, principles of chemical shift
3.4 Factors influencing spin coupling constants, vicinal and geminal coupling.
   Pascal's diagram
3.5 C13 NMR spectra
3.6 Spin decoupling techniques - advantages.
3.7 NMR spectra of simple organic compounds

Unit   4

Mass Spectrometry   (15 Hrs)

4.1 Theory and rules of fragmentation
4.2 Nitrogen rule - Significance
4.3 Isotope peaks and metastable peaks - Significance
4.4 Rearrangements – McLafferty, Retero Diel's
4.5 Fragmentation patterns of various functional groups in simple organic
   compounds

Unit   5

Structure Identification   (5 Hrs)

Systematic analysis of spectral data and confirmation of the structure of simple
molecules ($<C_{10}$ systems) using a combination of all the above spectral data - Problems

Visit to R&D labs

TEXT BOOK

Banwell, C.N., <u>Fundamentals in Molecular Spectroscopy</u>**,** New Delhi, Tata McGraw Hill
Pub. Co., Ltd. 1972.

BOOKS FOR REFERENCE

Scheinmann, F.,   <u>An Introduction to Spectroscopic Methods for the Identification of</u>
<u>Organic Compounds</u>**,** Vol.II edited, New York, Pergaman Press, 1993.

Silverstein, Morril Bassler, <u>Spectrometric Identification of Organic Compounds</u>**,** New
York, John Wiley & Sons, Inc., 1991.

Kemp W., <u>Organic Spectroscopy</u>, New York, Macmillan Publishing Co., Inc. 1989.

Manas Chanda, <u>Atomic Structure and Chemical Bond</u>, New Delhi, Tata McGraw Hill
Publishing Co. 1992.

END SEMESTER EXAMINATION:

Total Marks: 100   Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 30 x   1 = 30 Marks (All questions to be answered) Multiple choice - 10,

Fill up - 10, T/F or Match - 5, single line answer - 5

Section B –   5 x   6 = 30 Marks (5 out of 7 to be answered)

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