STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600086
M.Sc. DEGREE: BRANCH IV- CHEMISTRY

SYLLABUS
(Effective from the academic year 2015 – 2016)

RESEARCH METHODOLOGY

CODE: 15CH/PE/RM14 **CREDITS: 4**

L T P: 2 0 2

TOTAL TEACHING HOURS: 52

OBJECTIVES OF THE COURSE

- To provide an awareness about the developing avenues in Chemistry
- To give training in seminars, group work, communication and thesis writing
- To equip the students in using computing techniques in solving problems, to visualise and draw the molecules
- To enable the students to simulate spectral data for the given molecules using online data

Unit 1

Chemical Literature (7 hrs.)

1.1 Sources of Chemical Information – Primary, Secondary and Tertiary Sources
1.2 Indexes and Abstracts in Science and Technology. Chemical Abstracts, Chemical Titles, Current Chemical Reactions, Current Chemical Contents Science Citation Index and Impact Factor.
1.3 Online Literature Search- Sci Finder and Science Direct

Unit 2

Research Reports and Thesis Writing (8 hrs.)

2.1 The Art of Scientific Writing – Forms of Scientific Writing, Research Reports, Theses, Journals Articles and Books
2.2 Format of Research Report- Chemical Nomenclature, Quantities, Figures, Tables, Footnotes / Notes, Heading, Pagination, Citations& Bibliography, Proof Reading
2.3 Plagiarism, Copyright and Patent Laws

Unit 3*

Topics on New Frontiers in Chemistry (15 hrs.)

3.1 Chemistry and Nature **-** Green Chemistry, Astrochemistry, Herbal Chemistry, Phytochemistry
3.2 Synthetic Chemistry - Medicinal Chemistry, Supra Molecular Chemistry, Macrocyclic Chemistry
3.3 Material Science - Nanotechnology, Nano Clusters, Nano Dendrimers, Photo Electronics, Cheminformatics

Unit 4 **(12**

hrs.)

MS Excel and Mathematical Concepts in Chemistry

4.1 Components of Excel – Spreadsheets, Database, Chart and Building up Workbooks

4.2 Building Formulae User Mode and Statistical Functions, Formatting Cells

4.3 Managing and Organizing Data - Creating Link, Analyzing Data

4.4 Plotting Data - Evaluation of Analytical Functions, Transferring Data and Graph Interpretation

4.5 Solving Problems from Physical and Analytical Chemistry (Statistical Problems)

4.6 Simple Functions and Graphs, Plotting Exercises on Most Useful Functions in Chemistry-The Exponential, The Gaussian, Polynomial Functions used in Chemistry

Unit 5 (10 hrs.)

Computational Techniques in Chemistry

5.1 Chemdraw -Writing Chemical Equation Schemes using Software, Editing, Transporting Picture to Word Document

5.2 Building Molecules, Measurement of Bond Angles, Bond Energy and Bond Length

5.3 Energy Minimization Techniques- Basic Concepts and Simple Applications to Geometry and Molecular Properties such as Dipole Moments and Thermochemical Properties

5.4 Use of Internet in Chemical Research-Spectral, Data Simulated Results from Web Sources

*Unit 3- Seminar Presentation – tested internally

TEXT BOOKS

Gopalan, R. *Thesis Writing***.** Chennai: Vijay Nicole Imprints, 2005.

BOOKS FOR REFERENCE

Christopher J. Cramer. *Essentials of Computational Chemistry Theories and Models,* New York: Wiley,2004.

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

Leach A. R. *Molecular Modeling Principles and Practice*, New York: Prentice-Hall, 2001.

Lewars, Errol. *Computational Chemistry-Introduction to the Theory and Applications of Molecular and Quantum Chemistr*y**,** New York: First Education Springer, 2006.

Janet C. Dodds, *The ACS Style Guide – A Manual for Authors and Editors,* American Chemical Society, 2006.

March Jerry, *Advanced Organic Chemistry*, New York: Wiley Interscience, 2007.

Softwares

Drawing and Nomenclature**-**ChemDraw Net Plugin, ChemInnovation

JOURNALS

Journal of American Chemical Society

Journal of Catalysis
Macromolecules
Nanoletters
Nature
Journal of Physical Chemistry (A,B& C)
Journal of Organic Chemistry

WEB RESOURCES

http://www.ndsu.nodak.edu/qsar_soc/resource/software.htm
http://www.sciencedirect.com/
http://ww42.scifinder.com/

PATTERN OF EVALUATION

CONTINUOUS ASSESSMENT:

Total Marks: 50 **Duration: 90 mins.**

Theory - 45 minutes – 25 marks (Units 1 & 2)

Section A –5 x 2 = 10 Marks
(5 out of 7 to be answered)
Section B – 3 x 5 = 15 Marks
(3 out of 4 to be answered)

Practical - 45 minutes - 25 marks (Units 4 & 5)

Third Component:
List of evaluation modes:
Quiz
Seminars
Problem Solving
Assignments

END SEMESTER EXAMINATION:

Total Marks: 100 **Duration: 3 hours**

QUESTION PAPER PATTERN

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

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

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

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600086
M.Sc. DEGREE: BRANCH IV- CHEMISTRY

SYLLABUS
(Effective from the academic year 2015 – 2016)

INDUSTRIAL WASTE MANAGEMENT

CODE: 15CH/PE/IM14 **CREDITS : 4**
L T P : 4 0 0
TOTAL TEACHING HOURS : 52

OBJECTIVES OF THE COURSE

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

Unit 1

Air Pollution Control
(10 hrs.)

1.1 Air Quality Standards, Classification of Air Pollutants, Sources of Air Pollution, Ozone Depletion, Green House Effect – Causes and Consequences

1.2 Pollution Control of Particulates – Gravity Settling Chamber, Cyclone Collector, Filters, Wet Scrubbers, Electrostatic Filters, Electrostatic Precipitator

1.3 Control of CO, Oxides of Nitrogen, Oxides of Sulphur, Hydrocarbons, Photochemical Pollutants, Green House Gases

Unit 2

Treatment and Disposal of Industrial Effluents (12 hrs.)

2.1 Water Quality Standards, Sources of Water Pollution, Characterization of Waste Water by Physical and Chemical Characteristics

2.2 Primary Treatment - Sedimentation, Neutralization, Coagulation, Equalization, Grid Removal Secondary Treatment: Aerobic Treatment, Oxidation Ponds, Oxidation Ditches, Trickling Filters, Activated Sludge Process, Aerated Lagoons, Anaerobic Treatment Tertiary Treatment: Reverse Osmosis, Electro Dialysis, Desalination

2.3 Industrial Effluents: Characteristics and Treatment Options for Effluents from various Industries: Textiles and Dyes, Paper and Pulp , Leather , Food and Dairy, Fertilizers, Electroplating Industries, Distilleries

2.4 Sewage Treatment

2.5 Water Conservation, Recycling of Waste Water and Rain Water Harvesting

Unit 3

Solid Waste Management (10 hrs.)

3.1 Solid Wastes- Types, Characteristics

3.2 Solid Waste Disposal – Sanitary Landfills, Vermi Composting, Incineration

3.3 Waste Minimization and Recycling

Unit 4

Environmental Toxicology (6 hrs.)

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

4.2 Toxic Effects of Pb, As, Cd, Hg, PCBs, Pesticides, Heavy Metals

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

Unit 5

Environmental Management (14 hrs.)

5.1 Sustainable Development: Definition, Sustainability Cycle, Biodiversity, Problems of Urbanization and Steps towards Sustainable Development

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

5.3 Industrial Safety and Health: EPA, OSHA – Regulations, Polluter Pays Principle

5.4 Global and National Efforts: Steps taken towards Green Future at the National and Global Level

5.5 Coastal Management

TEXT BOOKS

Sharma B.K. and Kaur H. *Environmental Chemistry*, Meerut: Goel, 1998.

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

BOOKS FOR REFERENCE

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

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

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

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

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

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

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

JOURNALS

Energy and Environmental Science

Environmental Toxicology & Chemistry

Environmental Science: An Indian Journal

Journal of Pollution Research

Journal of Environmental Chemistry

WEB RESOURCES

http://environmentalchemistry.com/

http://www.niehs.nih.gov/health/topics/agents/

PATTERN OF EVALUATION

CONTINUOUS ASSESSMENT:

Total Marks: 50 **Duration: 90 mins.**

Section A – 11 x 1 = 11 Marks
(All questions to be answered, questions to be of objective type: MCQ, fill in the blanks, T/F, Match the following and answer in a line or two)
Section B – 3 x 8 = 24 Marks (3 out of 4 to be answered)
Section C – 1 x 15 = 15 Marks (1 out of 2 to be answered)

Third Component:
List of evaluation modes:
Quiz
Seminars
Assignments

END SEMESTER EXAMINATION:

Total Marks: 100 **Duration: 3 hours**

Section A – 20 x 1 = 20 Marks
(All questions to be answered, questions to be of objective type: MCQ, fill in the blanks, T/F, Match the following and answer in a line or two)
Section B – 5 x 8 = 40 Marks (5 out of 7 to be answered)
Section C – 2 x 20 = 40 Marks (2 out of 3 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600086

M.Sc. . DEGREE: BRANCH IV- CHEMISTRY

SYLLABUS

(Effective from the academic year 2015 – 2016)

POLYMER MATERIALS AND APPLICATIONS

CODE: 15CH/PE/PM14
CREDITS: 4

L T P:

4 0 0

TOTAL TEACHING

HOURS: 52

OBJECTIVES OF THE COURSE

- To introduce the main concepts and modern developments in polymer chemistry
- To facilitate the understanding of the techniques of polymer analysis
- To motivate the students to pursue research in polymer chemistry

Unit 1

Introduction to Polymer Materials
(10 hrs.)

1.1 Polymer Chain Structure and Configuration: Nomenclature, Functionality, Method of Linking
1.2 Natural Polymers and Synthetic Polymers (PU, PMMA, Silicone Polymers) - Structure, Properties and Application
1.3 Types of Degradation (Thermal, Mechanical, Ultrasound, Photo , Bio and Non-Biodegradation)
1.4 Specialty Polymers-Conducting, IPN, Thermally Stable, Hydrogels-Structure, Properties and Application

Unit 2

Mechanism and Kinetics of Polymerization
(8 hrs.)

2.1 Types of Polymerization- Homo Polymerization, Co Polymerization, Addition and Condensation Polymerization
2.2 Mechanism- Free Radical and Ionic Polymerization
2.3 Co-Ordination Polymerization with special reference to Ziegler-Natta and Aluminoxide
2.4 Kinetics of Free Radical Polymerization
2.5 Polymerization Techniques (Bulk, Emulsion, Solution and Suspension)

Unit 3

Molecular Weight Distribution
(10 hrs.)

3.1 Significance of Degree of Polymerization and Molecular Weight of Polymers
3.2 Number Average and Weight Average Molecular Weight

3.3 Methods of Determination of Absolute Molecular Weight- Light Scattering Method, GPC, Viscometry and End Group Analysis
3.4 Intrinsic Viscosity-Mark Houwnik Equation

Unit 4

Physical Chemistry of Polymers

(12 hrs.)

4.1 Amorphous and Crystalline Polymers, Conformation of the Polymer Chain, Single Crystal Spherulites, Liquid Crystal Polymers- Terminology, Properties of Mesogens
4.2 Glass Transition Temperature- Factors Influencing, Heat Distortion and Crystallisability
4.3 Thermodynamics of Polymer Solution, Flory Higgins Theory (Derivation not required) Phase Equilibrium, Solubility Parameter
4.4 Basic Processing Operations (Extrusion, Mastication, Molding and Calendaring)
4.5 Melt Rheology of Polymers (PVC, PU, and PS), Stress-Strain Properties and Visco Elastic Behavior of Polymers, Newtonian and Non-Newtonian Behavior of Polymers, Flow Properties of Polymer Melts and Solutions

Unit 5

Characterization and Testing of Polymers (12 hrs.)

5.1 Spectroscopic Characterization of Polymers (FTIR, NMR)
5.2 Thermal Properties, Thermal Conductivity, Thermal Expansion, TGA, DTA, DSC and
DMA (special reference to PET and PMMA)
5.3 Mechanical Properties of Polymers- Hardness, Impact Strength Stress Relaxation, Aberration Testing –IS, ASTM Methods

TEXT BOOKS

Gowariker, V.R., N.V Viswanathan, Jaydev Sreedhar.*Polymer Science*, New Delhi: New Age International, 2004.

Bhatnagar, M.S.*Text book of Polymers*.New Delhi: S.Chand, 2004.

Billmeyer, F.W.*Text Book of Polymer Science*.New York :Wiley Interscience,2006.

BOOKS FOR REFERENCE

Brandolini, J. Anita and Deborah D. Hills.*NMR Spectra of Polymers and Polymer Additives*. New York : Marcel Decker, 2000.

Flory, P.J .*Principles of Polymer Chemistry.* Ithaca: Cornell University Press,1953.

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

Joel ,Fried.*Polymer Science and Technology*. New Delhi: Prentice Hall, 2005.

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

Munk, P. *Introduction to Macro Molecular Science*. New York: John Wiley, 2002.

Stuart ,H. Barbara. *Polymer Analysis*. New Delhi: Narosa, 2002.

Young R.P., Lovell. *Introduction to Polymers*. London: Chapman & Hall, 2011.

JOURNALS

Langmuir
Macromolecules
Journal of Polymer Science

WEB RESOURCES

http://www.mpikg.mpg.de/886863/Liquid_Crystals.pdf
http://www.perkinelmer.com/CMSResources/Images/44-74546GDE_IntroductionToDMA.pdf

PATTERN OF EVALUATION

CONTINUOUS ASSESSMENT:

Total Marks: 50 **Duration: 90 mins.**

Section A – 11 x 1 = 11 Marks(All questions to be answered, questions to be of objective type: MCQ, fill in the blanks, T/F, Match and answer in a line or two)

Section B – 3 x 8 = 24 Marks (3 out of 4 to be answered)

Section C – 1 x 15 = 15 Marks (1 out of 2 to be answered)

Third Component Tests:

List of evaluation modes:
Quiz,
Seminars
Assignments

END SEMESTER EXAMINATION:

Total Marks: 100 **Duration: 3 hours**

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

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

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STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600086

M.Sc. DEGREE: BRANCH IV- CHEMISTRY

SYLLABUS

(Effective from the academic year 2015 – 2016)

BIOCHEMISTRY

CODE: 15CH/PE/BC14
CREDITS : 4

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

OBJECTIVES OF THE COURSE

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

Unit 1

Introduction to biochemistry (10 hrs.)

1.1 Scope of Biochemistry, Relationship between Biochemistry and Medicine; Normal Biochemical Process – Basis of Health
1.2 Water as a Biological Solvent and its Importance in Maintaining the Structure of Biomolecules
1.3 Acid Base Balance, Biological Buffers - Bi-Carbonate, Phosphate, Protein and Haemoglobin - Acidosis and Alkalosis

Unit 2

Bioenergetics (8 hrs.)

2.1 Bioenergetics: Conventions in Biochemical Energetics
2.2 ATP as the Universal Currency for Free Energy in Biological Systems
2.3 Free Energy of Hydrolysis of ATP and other Organophosphates
2.4 Structural Basis for the High Group Transfer Potential of ATP
2.5 Standard Free Energy Changes for Representative Chemical Reactions
2.6 Inter-Conversion of Adenine Nucleotides

Unit 3

Biomolecules (12 hrs.)

3.1 Biomolecules: Elementary Structure of Proteins, Nucleic Acids and Membrane Bilipids (Fluid Mosaic Structure)
3.2 Relationship between the Structure and Function of Proteins and the Consequences of Deviation from Normal

Unit 4

Biocatalysts – Enzymes (10 hrs.)

4.1 Enzymes, Definition, Co-Factor, Apoenzyme
4.2 General Properties, Active Site, Factors affecting Enzyme Action
4.3 Enzyme Regulation; Allosteric, Feedback Regulation, Product Inhibition

4.4 Immobilization of Enzymes, Methods and Applications

Unit 5

Metabolism (12 hrs.)

5.1 Definition, Terminology and Functions of Metabolism
5.2 Metabolism of Carbohydrates – Glycolysis, Gluconeogenesis, Glycogen Metabolism, and TCA Cycle
5.3 Proteins – Oxidative Deamination, Transamination and Urea Cycle
5.4 Lipids – Beta Oxidation of Fatty Acids and Biosynthesis of Fatty Acids, Triglycerides and Cholesterol
5.5 Xenobiotics - General Methods of Detoxification

TEXT BOOKS

Albert, Lehninger. *Biochemistry.*New York :Worth , 2008.

Jain, J.L. *Fundamentals of Biochemistry.*New Delhi: S.Chand, 2008.

BOOKS FOR REFERENCE

Brandon and Tooze. *Introduction to Protein Structure*. New York: Garland, 2000.

Conn, E.E. and Stumpf. *Biochemistry*. New York :Wiley Eastern,1976.

Glick, R. Bernard and Pasternak J. Jack. *Molecular Biotechnology-Principles and Applications of Recombinant DNA.* Washington: ASM Press, 2005.

Lubert, Stryer. *Biochemistry*. New York: W.H. Freeman, 2009.

Jain, J.L. *Fundamentals of Biochemistry***.** New Delhi : S.Chand , 2008.

Jeremy, M. Berg. *Biochemistry.*New York : W.H. Freeman, 2001.

Voet, D. and Voet. G. *Biochemistry***.** New York: John Wiley, 2007.

JOURNALS

Journal of Biochemistry

Journal of Clinical Biochemistry

Nature

WEB RESOURCES

http://www.csun.edu/~hcchm001/biosites.htm

http://themedicalbiochemistrypage.org/

PATTERN OF EVALUATION

CONTINUOUS ASSESSMENT:

Total Marks: 50 **Duration: 90 mins.**

Section A – 11 x 1 = 11 Marks(All questions to be answered, questions to be of objective type: MCQ, fill in the blanks, T/F, Match and answer in a line or two)

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Section C – 1 x 15 = 15 Marks (1 out of 2 to be answered)

Third Component Tests:
List of evaluation modes:

Quiz
Seminars
Assignments

END SEMESTER EXAMINATION:

Total Marks: 100 **Duration: 3 hours**

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

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

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

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600086

M.Sc. DEGREE: BRANCH IV- CHEMISTRY

SYLLABUS

(Effective from the academic year 2015 – 2016)

NANOCHEMISTRY

CODE: 15CH/ PE/NC14 **CREDITS: 4**

L T P: 4 0 0

TOTAL TEACHING HOURS: 52

OBJECTIVES OF THE COURSE

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

Unit 1

Introduction **(10 hrs.)**

1.1 Concepts of Nanoscience and Nanotechnology

1.2 Classification of Nano materials, Properties and Applications

1.3 Self assembly – Materials and Molecules, Self Assembled Monolayers, (SAM) and

1.4 Soft lithography

1.5 Nanowires and Nanomachines, Techniques used in Nanochemistry and Nanomanipulation

Unit 2

Fabrication of Nanoparticles **(13 hrs.)**

2.1 Techniques for Synthesis of Nanophase Materials - sol-gel synthesis , Electrodeposition, Inert gas condensation, CVD, PVD, mechanical alloying

2.2 Properties of Nanophase materials –Size effects-Kinetics and Thermodynamic Features of Nano materials

Unit 3

Nanocomposites and Metal Atoms **(12 hrs.)**

3.1 Introduction, Polymer as Matrix, Nylons, Polystyrene, Epoxyresins, Nanomaterials as Fillers – Nanofibre and Nanoclays

3.2 Fabrication and Processing of Composites, Nanostructured Materials, Applications of Nanocomposites

3.3 Techniques used in the Synthesis of Pure Metals – Gold, Silver and Cobalt. Characterisation- Surface Plasmon Resonance and its Application

Unit 4

Characterization of Nanophase Materials **(12 hrs.)**

4.1 Fundamentals of the Techniques – Experimental Approaches and Data Interpretation

4.2 Applications/limitations of X-ray Characterization: – X-ray sources – Wide angle, Extended X-ray absorption technique

4.3 Electron Microscopy: SEM/TEM – High Resolution Imaging – Defects in Nanomaterials, Electron Spectroscopy – XPS/UPS, AES

4.4 Prospects of Scanning Probe Microscopes (AFM, STM)

Unit 5

Application of Nanomaterials (5 hrs.)

Applications of nanomaterials in electronics and sensors, Nanosensors based on optical properties and quantum size effects. Interaction between biomolecules and nanoparticle surfaces

TEXT BOOKS

Pradeep,T.*Nano: The Essentials - Understanding Nanoscience and Nanotechnology*.New Delhi:Tata McGraw Hill, 2007.

Rao , Ramachandra, SubraSingh. *Nanoscience and Nanotechnology-Fundamentals to Frontiers*, New Delhi:John Wiley,2013.

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

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

BOOKS FOR REFERENCE

Atkins, Peter, T.Overton, J.Rourke, M.Weller and F.Armstrong, *Shriver and Atkins' Inorganic Chemistry*. Chennai: Oxford University Press, 2006.

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

Kenneth, J.Klabunde. *Nanoscale Materials in Chemistry*. New York: John Wiley, 2001.

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

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

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

JOURNALS

Nanoletters
Journal of composite Materials
Surface science
ACS Nano
Nature Nanotechnology
Advanced Materials
Nanoscale
Nanotechnology

WEB RESOURCES

http://sphinxsai.com/vol3.no2/chem/chempdf/CT=03(534-538)AJ11.pdf
http://www.ijsce.org/attachments/File/Vol-1_Issue-6/F0342121611.pdf

PATTERN OF EVALUATION

CONTINUOUS ASSESSMENT:

Total Marks: 50 **Duration: 90 mins.**

Section A – 11 x 1 = 11 Marks (All questions to be answered, questions to be of objective type: MCQ, fill in the blanks, T/F, Match the following and answer in a line or two)

Section B – 3 x 8 = 24 Marks (3 out of 4 to be answered)

Section C – 1 x 15 = 15 Marks (1 out of 2 to be answered)

Third component tests:

List of evaluation modes:
Quiz,
Seminars
Assignments

END SEMESTER EXAMINATION:

Total Marks: 100 **Duration: 3 hours**

Section A – 20 x 1 = 20 Marks (All questions to be answered, questions to be of objective type: MCQ, fill in the blanks, T/F, Match the following and answer in a line or two)

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M.Sc. DEGREE: BRANCH IV- CHEMISTRY

SYLLABUS

(Effective from the academic year 2015 – 2016)

PHYTOCHEMISTRY

CODE: 15CH/PE/PY14

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

OBJECTIVES OF THE COURSE

- To introduce the concepts of phytochemistry
- To enable the students to gain knowledge about the various methods involved in the extraction and isolation of plant products

Unit 1

Overview of Natural Product Isolation (10 hrs.)

1.1 Extraction Techniques-Counter Current Extraction, Supercritical Fluid Extraction, Solid Phase Extraction, Microwave Assisted Extraction, Ultrasound Extraction (Sonication), Phytonics Process, Parameters for Selecting Appropriate Extraction Method, Steps in Extraction Process (Size Reduction, Extraction, Filtration, Concentration and Drying)

1.2 Essential Oil Extraction: Distillation (Mechanism and Types), Expression Methods, Enfleurage and Defleurage. Modern Methods of Essential Oil Extraction, SCF

1.3 Non-Chromatographic Separation Techniques: Fractional Distillation, Fractional Liberation, Sublimation, Chemical Derivatization, Fractional Crystallization, Centrifugation, Froth Floatation Techniques

1.4 Chromatographic Techniques: Use of HPLC and Column in Isolation of Natural Products

Unit 2

Phytochemical Screening of Crude Drugs (13 hrs.)

2.1 Solvent Extraction: Extraction, Isolation, Purification of Alkaloids: Piperine, Ergometrine, Glycosides: Rhein, Flavonoids: Green Tea Flavonoids, Terpenoids: Taxol, Saponins: Diosgenin

2.2 Supercritical Fluid Extraction: Capsaicinoids, Flavonoids, Resveratrol (Vitis Vinifefera), Astaxanthin (Red Yeast) and Mycotoxins

Unit 3

Structural Elucidation of Phyto Constituents (10 hrs.)

Glycerrhizinic Acid, Morphine, Pilocarpine, Ergometrine- Structural Elucidation by Physical, Chromatographic and Spectroscopic Methods of Characterization

Unit 4

Standardization of Herbal Drugs (9 hrs.)

4.1 Sources of Variation in Chemical Make-Up of Plant Derived Drugs: Genotypic, Ecotypic and Biotypic Variations and variations resulting during Processing and Storage

4.2 Conventional Methods used in Herbal Drug Standardization and their Limitations. WHO Parameters used in Herbal Drug Standardization;

4.3 Overview of New Approaches (System Biology Approach; Phytometabolomics, DNA Micro-Array)

Unit 5

Pharmacological Screening Methods (10 hrs.)

Brief Introduction to Pharmacological Screening Methods with Examples of following Category of Medicinal Herbs: Hepatoprotectives, Anti-diabetics, Anti-asthmatic, Hypolipidemics, Antioxidants, Antiinflammatory, Analgesics and Anti-cancer

TEXT BOOKS

Chatwal, G.R. *Organic Chemistry of Natural Products -Vol. I and II*. New Delhi:

Himalaya, 2010.

Finar, I.L.*Organic Chemistry: Stereochemistry and the Chemistry of Natural Products*,

London: Pearson, 2005.

BOOKS FOR REFERENCE

Evans, W. C., G. E.Trease.*Trease and Evan's Pharmacognosy*. USA: W.B. Saunders, 2002.

Rangari,V.D. *Pharmacognosy & Phytochemistry (Vol I).* Nashik: Career Publications, 2009.

Rangari, V.D.*Pharmacognosy & Phytochemistry (Vol II).* Nashik: Career Publications, 2009.

Satyajit, D. Sarker, Zahid Latif, Alexander I. Gray. *Natural Products Isolation*. New Jersey: Humana Press, 2006.

JOURNALS

Biological and Pharmaceutical Bulletin
Indian Drugs
Indian Journal of Pharmacology
Journal of Chromatography
Journal of Ethno pharmacology

WEB RESOURCES

http://www.ga-online.org/links_en.html
http://www.britannica.com/EBchecked/topic/458909/phytochemistry

PATTERN OF EVALUATION

CONTINUOUS ASSESSMENT:

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Third Component Tests:

List of evaluation modes:
Quiz
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Assignments

END SEMESTER EXAMINATION:

Total Marks: 100 **Duration: 3 hours**

Section A – 20 x 1 = 20 Marks (All questions to be answered, questions to be of objective type: MCQ, fill in the blanks, T/F, Match the following and answer in a line or two)

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

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

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI-600086.

Post Graduate Elective Course Offered by the Department of Chemistry for

M.A. / M.Sc. / M.Com Degree Programme

SYLLABUS

(Effective from the Academic Year 2015- 2016)

MEDICINES AND HEALTH CARE

CODE: 15CH/PE/MH24

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 different types of drugs used for the treatment of various diseases

Unit 1

General Introduction to Drugs (5 hrs.)

1.1 Terminology- Pharmacy, Pharmacology, Pharmacodynamics, Pharmacokinetics, Antimetabolites, Mutation, Pharmacognosy, Toxicology, Pharmacotherapeutics, Chemotherapy, therapeutic index

1.2 Chemical Classification of Drugs

1.3 Diseases – Communicable and Non Communicable, Pathogens – Bacteria, Virus, Fungi, Protozoans

Unit 2

Common Diseases and their Treatment by Drugs (10 hrs.)

2.1 Common Diseases: Insect borne -Malaria, Air Borne - Whooping Cough, measles, common cold and TB. Waterborne -Cholera, Typhoid, Dysentery- Etiology, Symptoms, Prevention and Remedy

2.2 Common Disorders of the Digestive System –Hepatitis A and B; Respiratory system- Asthma; Nervous system- Epilepsy. Prevention and Treatment.

2.3 AIDs, HIV1, HIV 2 – Awareness, Prevention and Treatment

2.4 Fungal Dermatitis – Anti fungal Drugs

Unit 3

Blood and Hematological Agents (10 hrs.)

3.1 Blood Pressure, Hypertension-Cause, Diet, Prevention. Antihypertensive Agents - Aldomet, Reserpine

3.2 Clotting of Blood- Mechanism, Haematological Agents, Anaemia –Causes and Control- Antianaemic Drugs

3.3 Cardiovascular Diseases- Cardiac Glycosides-Digoxin, Antiarrhythmic Drugs-Quinidine- Dosage, Therapeutic uses-Calcium Blockers

3.4 Antianginal Agents- Nitriles, Vasodilators-Sodium Nitroprusside, Papaverine, Nicotinic Acid

Unit 4

Drugs in Daily Life (10 hrs.)

4.1 Anaesthetics- Types-General, Local, Intravenous – (Ether, $CHCl_3$, Halothane, Nitrous Oxide, Cocaine), - Advantages and Disadvantages

4.2 Antiseptics and Disinfectants- (Phenols, Chloramines, Bleaching Powder, Dyes-Crystal Violet)

4.3 Analgesics, Antipyretic and Anti-Inflammatory Agents- Narcotic and Non-Narcotic Drugs-Morphine, Source, Activity and uses – (Pethadine, Aspirin, Paracetamol, Phenyl Butazione, Brufen)

Unit 5

Drugs of Importance (17 hrs.)

5.1 Sulpha Drugs – Use of Sulpha Drugs-Limitations-(Sulphapyridine and Sulphadiazine)

5.2 Antibiotics-Classification - Therapeutic uses of Chloramphenicol, Penicillin-Potency of the Drug, (Streptomycin, Tetracyclines, Erythromycin)

5.3 Antipsychotic Drugs- Tranquiliser (Piperazine, Benzamides), Adverse effects; Antidepressants-Sedatives and Hypnotics- (Barbiturates)

5.4 Diabetes – Types – Hypoglycemic Agents, Sugar Substitutes. Cancer - Causes - Types – Treatments - Antineoplastic Drugs - Antimetabolites and Plant Products; Hormone Therapy and Adreno Corticosteroids, Radioactive Isotopes

TEXTBOOKS

Craig, R., Robert. E., Stitzel. *Modern Pharmacology*.USA: Little Brown, 2004.

Ghosh , Jayashree. *A Text book of Pharmaceutical Chemistry*. New Delhi: S.Chand ,1997.

BOOKS FOR REFERENCE

Sundari, K. Bagavathi. *Applied Chemistry.* Chennai: MJP, 2006.

David, A. Williams, Thomas L. Lemke. *Foye's Principles of Medicinal Chemistry*.USA: Lippincott Williams & Wilkins, 2005.

Graham, Patrick. *An Introduction to Medicinal Chemistry***.** Oxford : Oxford University Press, 2001.

John, H. Block, John M. Beale, Jr. *Organic Medicinal and Pharmaceutical Chemistry***.** USA: Lippincott Williams & Wilkins, 2004.

Sujatha, V. Bhat. *Biomaterials*.Chennai :Narosa, 2005.

JOURNALS

Journal of Drug Issues
Journal of Medicinal Chemistry
Journal of Medicinal Chemistry Research

WEB RESOURCES

http://chem2.sis.nlm.nih.gov/chemidplus/chemidlite.jsp

PATTERN OF EVALUATION

CONTINUOUS ASSESSMENT:

Total Marks: 50 **Duration: 90 mins.**

Section A – 11 x 1 = 11 Marks (All questions to be answered, questions to be of objective type: MCQ, fill in the blanks, T/F, Match the following and answer in a line or two)

Section B – 3 x 8 = 24 Marks(3 out of 4 to be answered)

Section C – 1 x 15 = 15 Marks (1 out of 2 to be answered)

Third Component Tests:

List of evaluation modes:
Quiz
Seminars
Assignments

END SEMESTER EXAMINATION:

Total Marks: 100 **Duration: 3 hours**

Section A – 20 x 1 = 20 Marks (All questions to be answered, questions to be of objective type: MCQ, fill in the blanks, T/F, Match the following and answer in a line or two)

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

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STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI-600086.

Post Graduate Elective Course Offered by the Department of Chemistry for

M.A. / M.Sc. / M.Com Degree Programme

SYLLABUS

(Effective from the Academic Year 2015- 2016)

FOOD CHEMISTRY AND NUTRITION

CODE: 15CH/PE/FN34

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

OBJECTIVES OF THE COURSE

- To equip the students on the effective usage of the food guide
- To educate on the chemistry of different constituents of food like carbohydrates, proteins and vitamins
- To give an introduction about the various nutrients, their nutritional value, functions and storage

Unit 1

Introduction to Food Chemistry and Nutrition (12 hrs.)

1.1 Food Guide- Basic Five Food Groups, Usage of the Food Guide

1.2 Water-Sources and Functions, Water Activity and Water Balance , Moisture Content in Foods

1.3 Introduction to Nutrition –Definition of Nutrition and Nutrients, Interrelationship between Nutrition and Health, Malnutrition. Basal Metabolism and Determination of BMR

1.4 Recommended Dietary Allowances (RDA) - Factors affecting RDA, General Principles of Deriving RDA, Determination of RDA of Different Nutrients, Practical Applications of RDA

Unit 2

Carbohydrates and Lipids (10 hrs.)

2.1 Sources, Classification, Functions and Recommended Dietary Allowance of Carbohydrates. Glycemic index. Artificial Sweetening Agents

2.2 Effect of Cooking on Carbohydrates and Storage of Carbohydrates

2.3 Lipids: Sources, Chemical Classification, Functions and Recommended Dietary Allowance of Fats. Fats in the Body and Food, Essential Fatty Acids, Dietary Fat and Coronary Heart Disease

Unit 3

Minerals and Vitamins (10 hrs.)

3.1 Sources, Functions, Deficiency and Recommended Dietary Allowance of following Minerals: Calcium, Iron, Iodine and Phosphorous

3.2 Vitamins- Classification, Sources, Functions and Deficiency (Elementary Treatment) of the following Vitamins: Fat Soluble Vitamins- A, D, E and K , Water Soluble Vitamins- Ascorbic Acid, Thiamine, Riboflavin, Niacin, other members of B-Complex such as B_6, Folic Acid and B_{12}

3.3 Effect of Cooking on Vitamins and Minerals

Unit 4

Proteins (10 hrs.)

4.1 Sources, Classification, Chemical Composition, Functions, Nutritional Classification and Recommended Dietary Allowance of Proteins

4.2 Amino Acids: Specific Functions and Nutritional Classification of Amino Acids

4.3 Protein Energy Malnutrition (PEM) –Marasmus and Kwashiorkor. Steps that can be taken to aid in the Prevention of PEM

Unit 5

Role of International and National Agencies in Combating Malnutrition (10 hrs.)

5.1 International Agencies- World Health Organisation, Food and Agriculture Organization, United Nations Children's Fund, CARE

5.2 National Agencies-Indian Council of Agricultural Research (ICAR), Indian Council of Medical Research (ICMR), National Institute of Nutrition, Food and Nutrition Board, Central Food Technological Research Institute

5.3 Nutrition Education- Methods used in Nutrition Education

TEXTBOOKS

Fennema , R .Owen. *Food Chemistry*. New York: Marcel Decker, 2007.

Srilaksmi, B. *Nutrition Science*. New Delhi: New Age International, 2012.

BOOKS FOR REFERENCE

Potter, N. Norman. *Food Science*. New Delhi: CBS, 2007.

Mayer, William Hogoland. *Food Chemistry*. New Delhi: CBS, 2009.

Manay, Shankunthala N., Shadaksharswamy, M. *Food –Facts and Principles*. Chennai : New Age International, 2001.

JOURNALS

Journal of Nutrition

Journal of Food Science

Proceedings of Nutrition Society of India

WEB RESOURCES

www.wadsworth.com/nutrition/prod/allprod.html

www.ninindia.org

http:/www.nalusda.gov/fnic.html

www.who.org

PATTERN OF EVALUATION

CONTINUOUS ASSESSMENT:

Total Marks: 50 **Duration: 90 mins.**

Section A – 11 x 1 = 11 Marks (All questions to be answered, questions to be of objective type: MCQ, fill in the blanks, T/F, Match the following and answer in a line or two)

Section B – 3 x 8 = 24 Marks(3 out of 4 to be answered)

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Third Component Tests:

List of evaluation modes:
Quiz
Seminars
Assignments

END SEMESTER EXAMINATION:

Total Marks: 100 **Duration: 3 hours**

Section A – 20 x 1 = 20 Marks (All questions to be answered, questions to be of objective type: MCQ, fill in the blanks, T/F, Match the following and answer in a line or two)

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STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. DEGREE: BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2015- 2016)

INTRODUCTION TO FORENSIC SCIENCE

CODE: 15/CH/PI/IF24

CREDITS: 4

OBJECTIVES OF THE COURSE

- To equip the students with the knowledge of forensic science
- To give an insight into diagnostic testing and to encourage the students to work and pursue research in Forensic Science.

Unit 1

Forensic Science

1.1 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)

2.1 Physical Evidence –Classification. Significance of Finger Prints and Palm Prints, Foot Prints, Shoe and Tyre Impression

2.2 Trace Evidence-Soil, Glass, Paint

2.3 Biological Material-Blood, Hair, Bones, Teeth-Application of DNA Profiling

Unit 3

Toxicology and Analysis Techniques

3.1.Radioactive Decay Reactions and Neutron Activation Analysis

3.2 Atomic Absorption Spectroscopy and X-Ray Analysis to detect Samples

3.3 Poisons-Classification. Symptoms and Antidotes for some common Poisons

Unit 4

Tracking Forgery

4.1 Disputed Documents-Types-Document Examination. Use of UV Rays in Detection of Counterfeit Currency and Stamp Paper

4.2 Identification of Forgery in Hand Written and Typed Document

4.3 Paper Chromatography of ink

Unit 5

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, 2006.

Sharma, B.R. *Forensic Science in Criminal Investigation and Trials*. New Delhi: Universal, 2006.

BOOKS FOR REFERENCE

Russel, Max, M.Houck, Jay A Siegel.*Fundamentals of Forensic Science*. Amsterdam: Elsevier, 2006.

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

JOURNALS

Journal of Forensic Science
Journal of Forensic Research
Forensic Science Communication
Journal of Forensic Psychology

WEB RESOURCES

http://www.all-about-forensic-science.com/
http://dci.sd.gov/ForensicLab/ForensicWebsites.aspx

END SEMESTER EXAMINATION:

Total Marks: 100 **Duration: 3 hours**

Section A – 20 x 1 = 20 Marks (All questions to be answered, questions to be of objective type: MCQ, fill in the blanks, T/F, Match the following and answer in a line or two)

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STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

M.Sc. . DEGREE: BRANCH IV - CHEMISTRY

SYLLABUS

(Effective from the academic year 2015- 2016)

CHEMISTRY OF NATURAL PRODUCTS

CODE: 15CH/PI/NP24 **CREDITS: 4**

OBJECTIVES OF THE COURSE

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

Unit 1

Amino Acids Peptides and Proteins

1.1 Introduction to Amino Acids
1.2 General Methods of Preparation and Properties of Amino Acids
1.3 Naturally Occurring Peptides and Nomenclature of Poly Peptides
1.4 General Principle of Poly Peptide Synthesis
1.5 Representation of Poly Peptides. Determination of Structure of Peptides
1.6 Classification of Proteins. Primary , Secondary and Tertiary Structure of Proteins

Unit 2

Steroids

2.1 Nomenclature and Stereochemistry(Configuration of Substituent, Ring and Side Chain)
2.2 Classification of Sterols and Related Colour Reactions
2.3 Cholesterol- Occurrence, Isolation, Clinical Significance, Structure Elucidation and Total Synthesis
2.4 Steroid Hormones- Synthesis of Estrogen and Progesterone

Unit 3

Terpenoids

Source and Extraction
3.1 Classification and Isolation
3.2 General Methods of Structure Determination of Terpenoids
3.3 Structure Elucidation of Carvone-D, Longifolene, Abetic Acid and β-Carotene

Unit 4

Alkaloids

4.1 Occurrence and Functions

4.2 Classification and Nomenclature

4.3 General Methods of Structure Determination and Pharmaceutical Applications

4.4 Structure Elucidation of Conine, Nicotine and Caffeine

Unit 5

Plant Pigments

5.1 Representation of Flavonoids,Flavones,Flavonols,and Isoflavones

5.2 Glycosides of Flavones and Flavonols

5.3 General Methods of Structure Determination of Flavonoids

5.4 Structure Elucidation of Apigenin and Quercetin

5.5 Anthocyanidins and Anthocyanins- General Methods of Structure Determination

5.6 Structure Elucidation of Cyanidin and Hirsutidin

5.7 Structural Relationship between Flavonols(Quercetin), Anthocyanidin(Cyanidin) and Catechins (Epicatechin)

TEXT BOOKS

Bhat, S.V., B.A.Nagasampagi, M.Siva Kumar. *Chemistry of Natural Products.*New Delhi :Narosa, 2006.

Ahluwalia, V.K., Sanjiv Kumar, Lalita S. Kumar. *Chemistry of Natural Products.* New Delhi :CRC Press, 2007.

BOOKS FOR REFERENCE

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

JOURNALS

Journal of Natural Products

Natural Product Research

Journal of Asian Natural Products

Indian Journal of Natural Products and Resources

WEB RESOURCES

https://www2.chemistry.msu.edu/faculty/reusch/virttxtjml/biomol.htm

http://dnp.chemnetbase.com/intro/

END SEMESTER EXAMINATION:

Total Marks: 100 **Duration: 3 hours**

Section A – 20 x 1 = 20 Marks (All questions to be answered, questions to be of objective type: MCQ, fill in the blanks, T/F, Match the following and answer in a line or two)

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STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600086

M.Sc. DEGREE: BRANCH IV- CHEMISTRY

SYLLABUS

(Effective from the academic year 2015 – 2016)

SOFT SKILLS

CODE: 15CH/PK/SS22
CREDITS : 2

L T P : 2 0 0
TOTAL TEACHING HOURS : 26

OBJECTIVES OF THE COURSE

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

Unit 1

Behavioral Traits
(6 hrs.)

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

Unit 2

Team Work
(5 hrs.)

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

Unit 3

Time Management
(5 hrs.)

3.1 Importance of Time Management
3.2 Planning and Prioritizing
3.3 Organizing Skills
3.4 Action Plan
3.5 Experiential Learning – Based on Activities

Unit 4

Conflict Resolution
(5 hrs.)

4.1 Reasons for Conflict

4.2 Consequences of Conflict
4.3 Managing Emotions
4.4 Methods of Resolving Conflicts
4.5 Experiential Learning – Based on Activities

Unit 5 **(5 hrs)**

Career Mapping

5.1 Goal Setting and Decision Making
5.2 Career Planning
5.3 Resume Writing
5.4 Handling Interviews
5.5 Experiential Learning – Based on activities

Workshop on Societal Analysis

BOOKS FOR REFERENCE

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

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

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

PATTERN OF EVALUATION (Totally Internal)