C. U. SHAH UNIVERSITY

WADHWAN CITY

FACULTY OF SCIENCES

M.Sc.

CHEMISTRY

SEM-III

Syllabi (CBCS) of Chemistry WEF June-2016 (Specialization: Organic Chemistry)

C. U. SHAH UNIVERSITY

FACULTY OF SCIENCES

DEPARTMENT OF CHEMISTRY

COURSE: M.Sc. **SEMESTER: III**

SUBJECT NAME: Disconnection Approach **SUBJECT CODE: 5SC03DAC1**

Teaching & Evaluation Scheme:-

Teaching hours/week				Credit	Evaluation Scheme/semester							
					Theory				Practical			Total Marks
Th	Tu	Pr	Total		Sessional Exam		University Exam		Internal		University	
					Marks	Hrs	Marks	Hrs	Pr	TW		
4	0	0	4	4	30	1.5	70	3	--	--	--	100

Objectives:-

- Understand disconnection concept of organic chemistry
- Pericyclic, cycloaddition reaction based disconnection etc.

Prerequisites:-

- Before studying Disconnection approach, all students have basic knowledge of organic chemistry, reaction mechanism and knowledge related to UG level chemistry.

Course outline:-

Sr. No.	Course Contents
1	**A Disconnection Approach:** Introduction to disconnection, concept of synthon, synthetic equivalent, functional group inter conversion, Criteria of good disconnection. **One group disconnection:** Disconnection and synthesis of alcohols, ethers, alkyl halides, sulphides, olefins, simple ketones, acids and its derivatives.
2	**Two group disconnection:** Disconnections in 1, 3-dioxygenated skeletons, preparation of 8-hydroxy carbonyl compounds, α, β-unsaturated carbonyl compounds, 1, 3-dicarbonyls, 1,5-dicarbonyls and use of Mannich Reaction.
3	**Two group disconnections:** Disconnection and synthesis of 2-hydroxycarbonyl compounds, 1, 2-diols, 1,4 and 1,6-dicarbonyl compounds. **Pericyclic reactions:** Disconnections based on Diels-Alder reaction and its use in organic synthesis.

4	**Disconnection and Synthesis of acyclic and cyclic heterocompounds:** Synthesis of ethers, amines, nitrogen and oxygen containing five and six membered heterocycles. **Protecting groups:** Protection of organic functional groups, protecting reagents and removal of protecting groups.

Learning Outcomes:-

After the successful completion of the course, students will be able to understand,

- Organic reaction pathways.
- Retrosyntetic approach of planning of organic synthesis.
- Disconnecting organic molecules to obtain possible starting molecules.

Books Recommended:-

1. **'**Designing organic synthesis', **S. Warren**, *Wiley*.
2. **'**Some modern methods for organic synthesis', **W. Carruthers**.
3. **'**Principles of organic synthesis', **R. Norman & J. M. Coxon**.
4. **'**Advanced Organic chemistry Part B', **F.A. Carey & R. J. Sundberg**.
5. **'**Organic synthesis - concept, methods & starting materials', **J. Fuhrhop**.
6. **'**Modern synthetic reactions', **W.A. Benjamin**, *H.O. House.*
7. **'**Disconnection approach', **Warren.**

E-Resources:-

1. http://as.wiley.com/WileyCDA/WileyTitle/productCd-0470712368.html
2. http://en.wikipedia.org/wiki/Retrosynthetic_analysis
3. http://www.slideshare.net/SAMARRRR/organic-synthesis-the-disconnection-approach-by-stuart-warren
4. http://www.amazon.in/Organic-Synthesis-The-Disconnection-Approach/dp/0470712368

C. U. SHAH UNIVERSITY

FACULTY OF SCIENCES

DEPARTMENT OF CHEMISTRY

COURSE: M.Sc. **SEMESTER: III**

SUBJECT NAME: Medicinal Chemistry-I **SUBJECT CODE: 5SC03MDC1**

Teaching & Evaluation Scheme:-

Teaching hours/week				Credit	Evaluation Scheme/semester							
					Theory				Practical			Total Marks
Th	Tu	Pr	Total		Sessional Exam		University Exam		Internal		University	
					Marks	Hrs	Marks	Hrs	Pr	TW		
4	0	0	4	4	30	1.5	70	3	--	--	--	100

Objectives:-

- To understand medicinal and pharmaceutical chemistry.
- To learn theories and principles SAR and QSAR.
- To learn various drugs and medicines.

Prerequisites:-

- Before studying Medicinal Chemistry, all students have basic knowledge of organic chemistry, drugs, SAR, reaction mechanism and knowledge related to UG level chemistry.

Course outline:-

Sr. No.	Course Contents
1	**Introduction to Medicinal Chemistry:** History of Medicinal Chemistry, Classification of drugs. **Medicine:** Overview, Medicinal use of nano materials-Drug delivery, Protein and peptide delivery –cancer, surgery, visualization, nano particle targeting, Medical application of molecular, nanotechnology-nano robots, cell repair machines, nano nephrology.
2	**Pharmaco dynamics**: Introduction, principles of drug action, mechanisms of drug action, introduction to the concept of receptors and drug receptor interactions, Dose-response relationships, drug potency and efficacy, combined effect of drugs.

3	**Pharmacokinetics:** Introduction to drug absorption, disposition, drug metabolism, elimination , important pharmacokinetic parameters in defining drug disposition and in therapeutics, mention of uses of pharmacokinetics in drug development process, concept of pro drug and soft drug.
4	**Drug design:** I Development of new drugs, procedures followed in drug design, concepts of lead identification and lead modification, structure-activity relationship (SAR), and bio-isosterism. ii) History and development of QSAR. Physicochemical parameters: Lipophilicity, electronic parameters, steric parameters, Free Wilson analysis, Hansch analysis, Relationship between Free-Wilson and Hansch analysis.

Learning Outcomes:-

After the successful completion of the course, students will be able to understand,

- Drug design and development.
- Pharmacodynamics and pharmacokinetics of drug.
- Medicinal use of nano materials, drug delivery system and drug development process.

Books Recommended:-

1. 'Introduction to Medicinal Chemistry', **A Gringuage**, *Wiley-VCH.*

2. 'Wilson and Gisvold's Text Book of Organic Medicinal and Pharmaceutical Chemistry', **Robert F. Dorge,** *Ed.*

3. 'An Introduction to Drug Design', **S.S. Pandey and J.R. Dimmock**, *New Age International*.

4. 'Burger's Medicinal Chemistry and Drug Discovery', **Ed. M. E. v Wolff**, *John Wiley.*

5. 'Goodman and Gilman's Pharmacological Basis of Therapeutics', **Goodman and Gilman's**, *McGraw- Hill*.

6. 'The Organic Chemistry of Drug Design and Drug Action', **R.B. Silverman,** *Academic Press.*

7. 'Strategies for Organic Drug Synthesis and Design', **D. Lednicer,** *John Wiley.*

8. 'Pharmaceutical Substances', **Kleemann Thieme.**

9. 'Principles of Medicinal Chemistry', **William Foye**, *Lippincott, William and Wilkins*.

10. 'Analytical Profile of Drug Substances (Series)', **Florey.**

11. 'Merck Index', *Merck & Co*.

12. 'Principles of Medicinal Chemistry', **S.S. Kadam, Mahadik, Bothera**, *Nirali Publication.*

13. 'Pharmacology and Pharmacotherapeutics', **R.S. Satoskar, Bhandarkar**, *Popular Prakeshan*.

14. 'Bio Pharmaceutics and Pharmacokinetics', **Bhramankar**, *Valabhprakashan.*

E-Resources:-

- http://en.wikipedia.org/wiki/Medicinal_chemistry
- http://pubs.acs.org/journal/jmcmar
- http://benthamscience.com/journal/index.php?journalID=mc
- http://omicsonline.org/medicinal-chemistry.php
- http://www.e-booksdirectory.com/details.php?ebook=7521
- http://books.google.co.in/books/about/Medicinal_Chemistry.html?id=C9qtuHZcrYEC&redir_esc=y

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DEPARTMENT OF CHEMISTRY

COURSE: M.Sc. **SEMESTER: III**

SUBJECT NAME: Heterocyclic Chemistry **SUBJE CT CODE: 5SC03HTC1**

Teaching & Evaluation Scheme:-

Teaching hours/week				Credit	Evaluation Scheme/semester							
					Theory				Practical			Total Marks
Th	Tu	Pr	Total		Sessional Exam		University Exam		Internal		University	
					Marks	Hrs	Marks	Hrs	Pr	TW		
4	0	0	4	4	30	1.5	70	3	--	--	--	100

Objectives:-

- To understand heterocyclic and carbocyclic chemistry chemical reaction pathways
- To learn theories and principles of heterocyclic chemistry.
- To create interest in students in learning hetero atoms and chemical reactions.

Prerequisites:-

- Before studying heterocyclic chemistry, all students have basic knowledge of organic chemistry, reaction mechanism and knowledge related to UG level chemistry.

Course outline:-

Sr. No.	Course Contents
1	**Nomenclature of Heterocyclic compounds:** **Three membered Heterocyclic Compounds with one and two hetero atom** Preparation, Chemical Reactions and properties of: Aziridine, Oxiranes, Thiiranes, Azirines, oxirane, diazirine and oxaziridine **Four membered heterocyclic compounds with one hetero atoms** Preparation, Chemical Reactions and properties Azetidine, Azetines, Oxetanes, Thietanes, Azetidinones, Oxetanones

2	**Five membered heterocyclic compounds** **Preparation, Chemical Reactions and properties of** Pyrrole, Furan, Thiophenes, Pyrazole, imidazole, thiazole, Oxazole **Six membered heterocyclic compounds** Preparation and properties of Pyridines, Pyrylium salts, α and ϒ-Pyrones
3	**Bicyclic ring system Preparation, Chemical Reactions and properties of** Indole, isoindoles, indolizines, Dibenzopyrroles, Benzfuran, Isobenzofuran, Benzthiophenes, Isobenzothiophenes, Dibenzothiophene Quinolines, isoquinolines, Acridines, Phenanthridines.
4	**Miscellenious heterocyclic compounds;** **Preparation, Chemical Reactions and properties of** Pyridazines, Cinnolines, Phthalazine, Pyrimidine, Quinazolines, Pyrazine, Quinoxalines, Azepines, Oxepines, Thiepins, Benzimidazole, Benzpyrazoles, Benzoxazole

Learning Outcomes:-

After the successful completion of the course, students will be able to understand,

- Preparation and chemical reactions of hetero atoms containing rings
- Understand the chemical and physical properties of heterocyclic compounds.

Books Recommended:-

1. **'**Heterocyclic chemistry', **K. Bansal.**
2. **'**An introduction to the chemistry of Heterocyclic compds', **R.H.Acheson.**
3. **'**Chemistry of Heterocyclic compounds', **J.J. Trivedi.**
4. **'**Heterocyclic chemistry', **R.R. Gupta, M.Kumar & V. Gupta**, *Springer.*
5. **'**The chemistry of Heterocycles', **T. Eicher& S. Hauptmann.**
6. **'**Heterocyclic chemistry', **J.A. Joule, K. Mills & G.F. Smith.**
7. **'**Comprehensive Heterocyclic chemistry', **A. R. Katritzky and C. W. Rees.**
8. **'**Heterocyclic chemistry', **T. L. Gilchrist.**

E-Resources:-

1. https://www2.chemistry.msu.edu/faculty/reusch/virttxtjml/heterocy.htm
2. http://en.wikipedia.org/wiki/Heterocyclic_compound
3. http://www.springer.com/chemistry/organic+chemistry/journal/10593
4. http://www.springer.com/series/7081

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DEPARTMENT OF CHEMISTRY

COURSE: M.Sc. **SEMESTER: III**

SUBJECT NAME: Advanced Chemistry **SUBJECT CODE: 5SC03ADC1**

Teaching & Evaluation Scheme:-

Teaching hours/week				Credit	Evaluation Scheme/semester							
					Theory				Practical			
Th	Tu	Pr	Total		Sessional Exam		University Exam		Internal		University	Total Marks
					Marks	Hrs	Marks	Hrs	Pr	TW		
4	0	0	4	4	30	1.5	70	3	--	--	--	100

Objectives:-

- To learn about advance chemistry and their applications in nanochemistry.
- To understand synthetic dyes, catalysis and process development.
- Aware about computation chemistry.

Prerequisites:-

- Before studying advance chemistry, all students have basic knowledge of basic chemistry, Nanotechnology, Industrial Chemistry, Computational chemistry reaction and knowledge related to UG level chemistry.

Course outline:-

Sr. No.	Course Contents
1	**Introduction of Nanomaterials** What is nanotechnology? Classification of Nano-structured materials. Nano-scale Architecture. Synthesis of Nanomaterials: Top down – ball milling; Bottom up –co-precipitation, sol-gel, electro deposition, using natural nano-particles – chemical vapor deposition. The Carbon Nanotube – New Forms of Carbon – Types of Nanotubes – Formation of Nanotubes – Uses for nanotubes – Applications of nano-materials in various fields.

2	**Dyes** Introduction, Sensation of color, Chromophore and Auxoxhromes group, basic operation of dyeing, methods for dyeing, classification of dye based on application and chemical constitution. Synthesis, methods of application and uses of methyl orange, methyl red, Aniline yellow, butter yellow, Diamonds black F, Malachite green, Rosaniline, methyl violet, crystal violet, Aurin, Chrome violet, fluoresceine, Eosin, Alizarin, indigo white, Indigotin, Indigo, Applications of dyes, Non-Textiles uses of dyes.
3	**Green Chemistry** Brief introduction, Principles, Green catalysts-acid catalyst, Basic catalyst, Oxidation catalysts, polymer supported catalysts, Photo catalyst, Green synthesis-phase transfer catalyst, Green synthesis of polycarbonates, Paracetamol, Ibuprofen, Citral, Urethane, Adipic acid and Styrene **Microwave Chemistry:** Introduction, Fundamental, Apparatus, Advantages, Limitation, Application, Recent advances.
4	**Computational Chemistry** Introduction, Introduction to Cheminformatics, Use & Prospects of cheminformatics, Representation of Molecules and Chemical Reactions, Nomenclature of compound, Different types of Notations, Different electronic effects; Structure databases and Reaction Databases; Searching of Chemical Structure. Use of computer in chemistry and industry, Patents, intellectual property rights, regulatory affairs.

Learning Outcomes:-

After the successful completion of the course, students will be able to understand,

- Industrial chemistry and computational chemistry.
- Unit process, catalysis and industrial applications.

Books Recommended:-

1. 'Nanotechnology', **M. Ratner &D. Ratner**, *Pearson.*
2. **'**Unit processes in organic synthesis', **P.H. Groggins**.
3. **'**Outline of chemical technologies', **Dryden.**
4. **'**Computer and Common Sense', **R. Hunt & J. Shelley.**
5. **'**Computational Chemistry', **A.C. Norris.**
6. **'**Microcomputer quantum mechanics', **J. P. Kiangbeck& Adam Hilger.**
7. **'**Principles of Instrumental Analysis', **D.A. Skoog, J.L. Loary & W.B. Saunders.**
8. **'**Biopharmaceutics and Pharmacokinetics', **Bhramankar**, *Valabhprakashan.*

E-Resources:-

1. http://en.wikipedia.org/wiki/Nanotechnology
2. http://iopscience.iop.org/0957-4484
3. http://en.wikipedia.org/wiki/Chemical_industry

4. http://chemistry.uonbi.ac.ke/degree_courses/837
5. http://www.engineering.unsw.edu.au/chemical-engineering/industrial-chemistry
6. http://en.wikipedia.org/wiki/Computer_chemistry
7. http://www.rsc.org/Membership/Networking/InterestGroups/CICAG/

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DEPARTMENT OF CHEMISTRY

COURSE: M.Sc. **SEMESTER: III**

SUBJECT NAME: Chemistry Practical - III **SUBJECT CODE: 5SC03PRO1**

Teaching & Evaluation Scheme:-

Teaching hours/week				Credit	Evaluation Scheme/semester							
					Theory				Practical			Total Marks
Th	Tu	Pr	Total		Sessional Exam		University Exam		Internal		University	
					Marks	Hrs	Marks	Hrs	Pr	TW		
0	0	12	12	6	--	--	--	--	30	20	150	200

Objectives:-

- To understand organic compounds and identification of their functional group.
- To learn practical principles related to drug synthesis, organic separation and preparation of dyes
- To create interest in students in learning basic chemistry.

Prerequisites:-

- Before studying practical of chemistry, all students have basic knowledge of organic and organic compounds, properties, medicinal chemistry, drugs and knowledge related to PG level chemistry.

Course outline:-

Sr. No.	Course Contents
1	**Organic Separation:** Mixture analysis: ternary mixture to be given. (S+S+S) or (L+L+L). Type determination. Separation by physical and chemical methods. (both permitted in case of liquids)
2	**Organic Preparation of Drugs :** Two & Three stage preparations from 4 to 5 grams starting material by semi micro method (Minimum five should be done) and monitoring reaction by TLC.

3	**Preparation of dyes:** Preparation of Azo dyes, dyes obtained by other methods- Fluorescein, Eosin, Malachite green, Crystal violet etc.

Learning outcomes:-

After the successful completion of the course, students will be able to,

- Understand basic principal of chemistry practical's
- Understand drug and dyes synthesis.

Books for References:

1. 'Textbook of practical chemistry', **Vogel**.
2. 'Practical chemistry', **Pandey**.
3. 'Practical in organic chemistry', **Dr. Ramesh K. Goyel**, *B.S. Shah Prakashan.*

E-Resources:-

1. http://chemistry.about.com/od/medicalhealth/
2. http://www.drugdiscoverytoday.com/category/210/medicinal-chemistry/
3. http://en.wikipedia.org/wiki/Drug