C. U. SHAH UNIVERSITY

WADHWAN CITY

FACULTY OF SCIENCES

M.Sc.

CHEMISTRY

SEM-IV

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

C. U. SHAH UNIVERSITY

FACULTY OF SCIENCES

DEPARTMENT OF CHEMISTRY

COURSE: M.Sc. **SEMESTER: IV**

SUBJECT NAME: Medicinal Chemistry- II **SUBJECT CODE: 5SC04MDC1**

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 chemistry synthesis, antibiotic and psychoactive drugs.
- To learn action, synthesis, doses and uses of medicinal drugs
- 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	**Antibiotics:** Introduction, classification, A. The β -lactum antibiotics : Penicillin and cephalosporin B. Aminoglycosides antibiotics (only name and structures) C. Chloramphenicol: structure, synthesis and SAR D. Non lactum antibiotics (only name and structures) E. Bacitracin, vancomycin and cycloserine (only name and structures) F. Penicillin: Synthesis and SAR **Synthesis, properties and uses of Following antibiotics drugs**: Methicillin, oxacillin, cloxacillin, dicloxacillin, floxacillin, ampicillin, pivampicillin, cephalexin, cefadroxil, cephalosporin

2	**1. CNS depressant:** **A. General and local anesthetics** Introduction, classification **Synthesis, Properties and uses:** Thiopental, procaine, lidocaine and dibucaine **B. Sedative and hypnotics:** Introduction, classification **Synthesis, Properties and uses:** Phenobarbital, amobarbital, diazepam, chlorozepan, bromazepam and alprazolam **2. Antipsychotic drugs** **A. Antidepressant**: Introduction, classification **B. Neuroleptics:** Introduction, classification **Synthesis, Properties and uses:** Fluvoxamine, imipramine, bupropion, glutethimide, nikethamide, ibuprofin, meclofenate sodium, novalgin, pethidine
3	**1. Antimalarial:** Introduction, classification, types of malaria, malaria life cycle in human and mosquito, mode of action of antimalarial agents SAR of antimalarial agents **Synthesis, properties and uses:** Mefloquines, chloroquine, primaquine and daraprim **2. Antituberculosis drugs:** Introduction, classification and categories **3. Synthesis, Mode of action and properties:** Isoniazid (INH), ethionamide, ethambutol, DDS (dapsone)
4	**1. Anticonvulsants**: Introduction, classification, SAR of barbiturates and hydantoin **Synthesis, Properties and uses:** Vigabatrin, progabide, sodium valproate, denzimol, zonisamide, nefimidone, lamotrigine, carbamazepine. **2. Antiarrhythmic:** Introduction, classification, types of cardiac arrhythmias, **Synthesis, Properties and uses:** Procanamide, mexiletine, encainide, flecainide, amiodarone, moricizine hydrochloride, tocainide hydrochloride, satalol

Learning Outcomes:-

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

- Medicinal chemistry and drugs synthesis.
- Antibiotics, Anticonvulsant, Anti tuberculosis, Sedative and hypnotics drugs.

Books Recommended:-

1. 'Wilson and Gisvsld's Textbook of Organic Medicinal & Pharmaceutical Chemistry', **Robert F. dorge**,Ed.
2. 'The Organic Chemistry of drug design and drug action',**R. B. Silverman.**
3. 'Strategies for organic drug synthesis & design', **D. Lednicer**, *John Wiley.*

4. 'Principles of Medicinal Chemistry',**William O. Foye, Lippincott, William and Wilkins.**
5. 'Total synthesis of Natural products', **Apsimon**(Series).
6. 'Textbook of Medicinal Chemistry', **A. Kar**, *Asian Age Publication*.
7. 'Analogue based Drug Discovery',**János Fischer and C. Robin Ganellin.**
8. 'Goodman and Gilmans Text book of Pharmacology',**Goodman and Gilmans**.
9. 'Textbook of Medicinal Chemistry', **A Kar,***Asian Age Publication.*
10. 'Medicinal Chemistry', **Sriram D and Yogeshwari P,** *Pearson Education.*
11. 'Medicinal Chemistry', **Ahluwalia V K, Chopra Madhu,** *Ane Books India.*
12. 'Burger's medicinal chemistry and drug design',**Manfred E.Woltt**, *John wiley and sons*
13. 'Principles of medicinal chemistry', **William A. Foye (ied), lea and febiys**, *Philadelphia.*
14. 'Medicinal chemistry', **ashutoshkar,** Nirali publication.
15. 'The organic chemistry of drug synthesis ', **D. lednicer and L.A. mitscher**, *Johynwiley and*
16. **Doerge**, *J.B. lippincoff company, phaladophia/ Toppan co.Ltd, Tokyo*.
17. 'Topics in medicinal chemistry', **rabinowitz Myerson**,*interscience.*
18. 'The pharmaceutical basis of theraperutics', **Geoman and Gilman**, *Mcmillan co.*

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

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DEPARTMENT OF CHEMISTRY

COURSE: M.Sc. **SEMESTER: IV**

SUBJECT NAME: Natural Products **SUBJECT CODE: 5SC04NPC1**

Teaching & Evaluation Scheme:-

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

Objectives:-

- To understand concept natural products.
- To get idea about plants pigment, vitamins, alkaloids and nucleic acid.
- To understand applications and action of natural product.
- To generate interest and curiosity about natural product.

Prerequisites:-

- Before studying Natural product, all students have basic knowledge of drugs, vitamines, alkaloids, steroids and knowledge related to UG level chemistry.

Course outline:-

Sr. No.	Course Contents
1	**Natural products:** Classification, method of isolation, structure determination and synthesis where specified. **Alkaloids:** Chemistry of recinone and atropine, synthesis of morphine, nicotine, colchinine, strychnine, cinchonine.
2	**Vitamins:** Introduction, synthesis and biochemical function of vitamin B (thiamine), vitamin H and α -tocopherol (vitamin E), vitamin C. **Plant pigments:** Porphin and porphyrins, chemistry of haemin, chemical relationship with chlorophyll
3	**Steroids:** Constitution of cholesterol (no synthesis), chemistry of progesterone and testosterone, synthetic hormones: hexosterol and stilbosterol, ACTH. **Nucleic acid:** Nucleoside, nucleotide, fine structure of protein. **Chemistry of starch and cellulose:** Constitution of starch and cellulose.

4	**Terpenoids and carotenoids:** Classification, nomenclature, general methods of structure determination, chemistry and synthesis of abietic acid and gibberellic acid (gibberllin-A), farnesol, zingeberine and squalene, biosynthetic studies on triterpenoids and tetraterpenoides.

Learning Outcomes:-

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

- Natural products, steroids, terpenoids application and functions.
- Vitamins, Pigments, chlorophyll and alkaloids.

Books Recommended:-

1. 'Organic chemistry', **I. L. Finar.**
2. 'Chemistry of vitamins', **S. F. Dyke.**
3. 'Chemistry of natural products', **Bantely.**
4. 'L.J.Wade Jr. Organic chemistry', **Prentice Nall**, *England cliffs.*
5. 'Chemistry of Natural products', **O. P. Agrawal**.

E-Resources:-

1. http://en.wikipedia.org/wiki/Natural_product
2. http://www2.chemistry.msu.edu/faculty/reusch/virttxtjml/biomol.htm
3. http://www.npainfo.org/
4. http://nopr.niscair.res.in/handle/123456789/54
5. http://www.sciencedirect.com/science/bookseries/15725995

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DEPARTMENT OF CHEMISTRY

COURSE: M.Sc. **SEMESTER: IV**

SUBJECT NAME: Spectroscopic Techniques **SUBJECT CODE: 5SC04STC1**

Teaching & Evaluation Scheme:-

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

Objectives:-

- To understand spectroscopic techniques.
- To learn theories and principles analysis methods
- To create interest in students in learning analytical chemistry.

Prerequisites:-

- Before studying spectroscopic techniques, all students have basic knowledge of analytical chemistry, analysis methods, characterization techniques and knowledge related to UG level chemistry.

Course outline:-

Sr. No.	Course Contents
1	**UV & IR:** **UV**: Electronic transitions, chromophores, auxochromes, bathochromic and hypsochromic shifts, solvent effects, wood ward fieser rules for dienes, enones and aromatic compounds. **I.R.:** Vibrational transitions, important group frequencies, factors affecting I.R. group frequency, I.R. instrumentation
2	**NMR:** Elementary ideas of NMR integration, chemical shifts, factors affecting, chemical shifts, coupling (first order, analysis) instrumentation and principles and instrumentation, FT, chemical shifts, spin-spin coupling different spin systems, mechanism of spin coupling. E.q. AB, ABX, factors affecting vicinal and geminal couplings, rate processes, long range couplings, spin decoupling, shift reagents, solvent shifts, nuclear overhauser effect, 2D NMR (COSY and HETCOR) applications

3	**^{13}C-NMR:** Elementary ideas, instrumental problems, chemical shift features of hydrocarbons, effect of substituent on chemical shifts olefinic, acetylenic, aromatic and carbonyl carbons, effects of coupling **Mass spectrometry**: Theory, instrumentation, modes of ionization, modes of fragmentation, different types of ions, molecular ions, isotopic peaks, factors controlling fragmentation, applications.
4	**Structural elucidation** of drug molecules based on joint application of UV, IR, PMR, CMR and mass spectroscopy.

Learning Outcomes:-

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

- Spectroscopic techniques and applications
- Structural elucidation of drug molecules based on joint application of UV, FTIR, PMR, CMR and mass spectroscopy.

Books Recommended:-

1. 'Spectroscopic methods in organic chemistry', **D. H. Williams and Tan fleming**.
2. 'Spectrometric identification of organic compounds',**T. C. Morril, R. M. Silverstein and G. Bassler**, *John Wiley and sons*.
3. 'Introduction to spectroscopy', **D. L. Pavia, G. M. Lampman and G. S. Kriz**, *Harcourt college publishers.*
4. 'Organic spectroscopy', **W. Kemp.**
5. 'Organic spectroscopy', **P. S. Kalsi**.

E-Resources:-

1. http://en.wikipedia.org/wiki/Spectroscopy
2. http://www2.chemistry.msu.edu/faculty/reusch/virttxtjml/spectrpy/spectro.htm
3. http://chemwiki.ucdavis.edu/Analytical_Chemistry/Analytical_Chemistry_2.0/10_Spectroscopic_Methods
4. http://icmab.es/spectroscopic-techniques-laboratory

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COURSE: M.Sc. **SEMESTER: IV**

SUBJECT NAME: Dissertation/Project Work **SUBJECT CODE: 5SC04DPO1**

Teaching & Evaluation Scheme:-

Teaching hours/week				Credit	Evaluation Scheme/semester							
					Theory				Practical			Total Marks
					Sessional Exam		University Exam		Internal		University	
Th	Tu	Pr	Total		Marks	Hrs	Marks	Hrs	Pr	TW		
0	**0**	**20**	**20**	**10**	-	-	-	-	50	--	250	300

Dissertation/Project work

1. Students should carry out a small research project. This should make them familiar with literature survey, research methodologies, and identification of products by analytical and spectral methods and familiarity with chromatographic techniques.
2. Students who are not assigned the project should carry out at least 12 experiments and students who are assigned project work should carry out at least 6 experiments to illustrate the principles of organic reaction mechanism, stereochemistry or selectivity of reagents.
3. Suggested reagents and reactions–
   LiAlH4 (reduction of ethylbenzoate to benzylalcohol), $NaBH_4$ (reduction of anisaldehyde to *p*-methoxybenzyl alcohol), SeO_2, NBS (bromination of *p*-nitrotoluene), grignard Reaction (preparation of triphenyl carbinolor diphenylmethylcarbinol), wittig reaction (preparation of ethyl cinnamate from benzaldehyde), cannizzaro's reaction. (on benzaldehyde) asymmetric reduction, phase transfer catalyst isolation of natural products (like eugenol from cloves, Limonene from or angepeels, trimyristinfrom nutmegetc.), photochemical reaction, peracid and leadtetraacetate oxidation, rearrangement reactions, synthesis of heterocyclic compounds like hydantoin, thiohydantoin, pyrazolone, biginelli reaction (synthesis of 4-aryl-3,4-dihydropyrimidinone)

Important Notes:

1. All theory and practical courses are university courses.
2. Each theory course is of 60 lectures.
3. Practicals/Dissertation should be carried out on microscale.
4. Each practical course should be given six hours of laboratory work per week and the course will be extended over two semesters and will be examined at the end of the year.
5. Practical batch will consist of not more than 10 students.
6. Atleast 25% students should be assigned the projects.
7. Students who are not assigned the project work have to carry out one two-stage preparation and two single stage preparations from the suggested reagents and reactions for 60 marks and undergo oral examination for 20 marks.
8. Post graduate departments should arrange at-least one industrial visit.
9. All required chemicals must be made available for practical's and certified journals should be shown to the examiner.