

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI -14.**(An Autonomous Institution – Affiliated to Madurai Kamaraj University)****(Re –accredited (3rd cycle) with Grade A⁺ and CGPA 3.51 by NAAC)****TANSCHÉ - CBCS with OBE****GENERIC ELECTIVE CHEMISTRY****For II B.Sc., Mathematics****(w.e.f. 2023– 2024 Batch onwards)****COURSE STRUCTURE**

Sem	Part	Course Code	Title of the Course	Teaching hrs. (Per week)	Duration of exam (hrs)	Marks allotted			Credits
						CIA	SE	Total	
III	III	23OUMAGECH3	GEC 3: Chemistry for Physical Sciences -III	3	3	25	75	100	3
		23OUMAGECH3P	GEC 3: Chemistry Practical for Physical Sciences -III	2	3	40	60	100	2
IV	III	23OUMAGECH4	GEC 4: Chemistry for Physical Sciences -IV	3	3	25	75	100	3
		23OUMAGECH4P	GEC 4: Chemistry Practical for Physical Sciences -IV	2	3	40	60	100	2

Department of Mathematics					Class: II B.Sc			
Sem	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	SE	Total
III	Generic Elective Course	23OUMAGECH3	Chemistry for Physical Sciences -III	3	4	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓	✓	

Course Objectives:

1. To gain knowledge about the chemistry of important manufacturing process of match industry.
2. To gain the basic knowledge about manufacture and properties of cement and glass.
3. To learn the preparation and uses of some important Organic Compounds and Industrial Organic Compounds.
4. To achieve the knowledge on the preparation, and applications of natural rubber and synthetic rubber.
5. To analyze and apply the knowledge of plastics and paper industry.

Unit: I Match Industry and Explosives: Match industry: Introduction -composition-types of matches-raw materials need for safety matches- manufacturing process. Pyrotechnic: Introduction-composition of fireworks- colored smokes. Explosives: Introduction- preparation and uses of TNT, GTN and Dynamite.

Unit: II Silicate Chemistry: Cement: Introduction-composition of cement-raw materials need for manufacturing of Portland cement-manufacture of Portland cement by wet process and dry process-role of gypsum in the setting of cement. Glass: Introduction- characteristics of glass- physical and chemical properties- manufacture of glass (tank furnace method)-annealing- characteristics of Borosilicate glass, optical glass, colored glass, safety glass.

Unit: III Industrial Organic Compounds:

Preparation and uses of some Important Organic Compounds –Saccharin, Salicylic acid, Aspirin, Salol and Picric acid. Manufacture and uses of some Industrial organic compounds -Alcoholic beverages (Beer and wine), Absolute alcohol, n-butyl alcohol, vinegar and lactic acid.

Unit: IV Rubber Chemistry: Introduction-composition of natural rubber-occurrence and isolation of natural rubber - draw backs of raw rubber- vulcanization-properties of vulcanized rubber- synthetic rubber- preparation and applications of SBR rubber, neoprene rubber, butyl rubber and Thiokol-Distinction between natural rubber and synthetic rubber.

Unit: V Polymer and Paper Chemistry: Plastics: Introduction-characteristics of plastics- classification of plastics- differences between thermo setting and thermo plastics- preparation and applications of Bakelite, PVC, Polypropylene, Poly Styrene and Urea formaldehyde resin. Differences between plastics and resins. Paper industry: Introduction- raw materials and manufacturing process of paper- types of paper-paper industry in India.

Books for Study:

1. Arora M.G. & Singh M., “Industrial Chemistry” Anmol Publications, Pvt Ltd, New Delhi, 1999.
2. Chakravarthy B.N., “Industrial Chemistry” Oxford & IBH Publishing & Co. Pvt Ltd., New Delhi, 1998.
3. Sharma B.K., “Industrial Chemistry” Tenth Edition, Krishna Prakashan Media (P) Ltd., Meerut, 1999.

Books for Reference:

1. Jain and Monika Jain, “Engineering Chemistry” Fifth Edition, Dhanpat Rai & Sons, Delhi, 1990.
2. Mahapatra G., “Elements of Industrial Chemistry”, Kalyani Publishers, New Delhi, 2001.
3. Aashish Roy., “The Text Book of Industrial Chemistry” Lulu.com, 2018

Web Resources / E.Books:

1. <https://www.chem.tamu.edu/class/majors/chem470/Notes.html>
2. <https://www.studocu.com/row/document/national-university-of-sciences-and-technology/applied-chemistry/industrial-chemistry-lecture-notes-1/9961442>
3. <http://ndl.ethernet.edu.et/bitstream/123456789/78703/1/Industrial%20Chemistry%20II%20module%20%20Chem451%20fina%28Submitted%29-1.pdf>

Pedagogy:

Chalk and Talk, Power Point presentations, Seminar, Group Discussion, Quiz through ICT-
Mode

Rationale for nature of Course:**Knowledge and Skill:**

Students can gain knowledge about Match Industry, Silicate Industry, Industrial Organic Compounds, Polymer Chemistry, Rubber, Plastics and Paper Industry.

Activities to be given:

Lab activity given to students to identify and compare the Colour and Properties of the various substances, Assign them case study about industries in current era.

Course learning Outcomes (CLOs):

CLO	Course Outcomes statements	Knowledge According to Bloom's Taxonomy (Upto K level)
CLO 1	Elaborate the concept of matches.	K1 to K3
CLO 2	Identify the properties and manufacture of cement and glass.	K1 to K3
CLO 3	Recognize the role of various organic compounds in Industries .	K1 to K4
CLO 4	Possess knowledge about natural rubber and synthetic rubber.	K1 to K3
CLO 5	Apply the knowledge of manufacturing plastics and paper and possess the potential on the usage and application of plastics, paper in the life habitat.	K1 to K4

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	2	1	1	2	2
CLO2	2	2	2	1	2	1
CLO3	3	2	1	2	1	3
CLO4	2	3	2	2	3	2
CLO5	3	2	2	1	2	3

1-Basic Level

2- Intermediate Level

3- Advanced Level

LESSON PLAN: TOTAL HOURS (60 Hrs)

UNIT	DESCRIPTION	Hrs	MODE
I	Match industry: Introduction -composition-types of matches-raw materials need for safety matches- manufacturing process. Pyrotechnic: Introduction-composition of fireworks- colored smokes. Explosives: Introduction- preparation and uses of cordite and RDX.	10	Chalk and Talk, PPT, group discussion , OHP presentations, quiz, on the spot test and Virtual Labs.
II	Cement: Introduction-composition of cement-raw materials need for manufacturing of Portland cement-manufacture of Portland cement by wet process and dry process-role of gypsum in the setting of cement. Glass: Introduction- characteristics of glass- physical and chemical properties- manufacture of glass (tank furnace method)-annealing- characteristics of Borosilicate glass, optical glass, colored glass, safety glass.	12	Chalk and Talk, PPT, group discussion, OHP presentations, quiz, on the spot test and Virtual Labs.
III	Industrial Organic Compounds: Preparation and uses of some Important Organic Compounds – Saccharin, Salicylic acid, Aspirin, Salol and Picric acid. Manufacture and uses of some Industrial organic compounds - Alcoholic beverages (Beer and wine), Absolute alcohol, n-butyl alcohol, vinegar and lactic acid.	12	Chalk and Talk, PPT, group discussion , OHP presentations, quiz, on the spot test and Virtual Labs
IV	Introduction-composition of natural rubber-occurrence and isolation of natural rubber - draw backs of raw rubber- vulcanization-properties of vulcanized rubber- synthetic rubber- preparation and applications of SBR rubber, neoprene rubber, butyl rubber and Thiokol-Distinction between natural rubber and synthetic rubber.	13	Chalk and Talk, PPT, group discussion , OHP presentations, quiz, on the spot test and Virtual Labs
V	Plastics: Introduction-characteristics of plastics- classification of plastics- differences between thermo setting and thermo plastics- preparation and applications of Bakelite, Polythene, PVC, Polypropylene, Poly Styrene and Urea formaldehyde resin. Differences between plastics and resins. Paper industry: Introduction- raw materials and manufacturing process of paper- types of paper-paper industry in India.	13	Chalk and Talk, PPT, group discussion, OHP presentations, quiz, on the spot test and Virtual Labs.

**Course Designer:
Dr.(Mrs).M.Sangeetha**

Department of Mathematics			Class: II B.Sc					
Semester	Category	Course Code	Course Title	Credits	Hours	CIA	SE	Total
III	Generic Elective Course	23OUMAGECH3P	Chemistry Practical for Physical Sciences -III	2	2	40	60	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓	✓	

Quantitative Estimation (Volumetric)

Preparation of standard solution, dilution from stock solution

Permanganometry

Estimation of Sodium oxalate using standard Ferrous ammonium sulphate

Estimation of Ferrous ammonium sulphate using standard Oxalic acid

Estimation of Oxalic acid using standard Ferrous ammonium sulphate

Dichrometry

Estimation of Ferric alum using standard dichromate (internal indicator)

Iodometry

Estimation of Copper in copper sulphate using standard dichromate

Argentimetry

Estimation of Chloride in barium chloride using standard sodium chloride

Text Books:

1. Venkateswaran, V.; Veeraswamy, R.; Kulandivelu, A.R. Basic Principles of Practical Chemistry, 2nd ed.; Sultan Chand & Sons: New Delhi, 1997.
2. Nad, A. K.; Mahapatra, B.; Ghoshal, A.; An advanced course in Practical Chemistry, 3rd ed.; New Central Book Agency: Kolkata, 2007.
3. Text book v.v.Ramanujam Inorganic Quantitative and Qualitative analysis

Reference Books:

1. Mendham, J.; Denney, R. C.; Barnes, J. D.; Thomas, M.; Sivasankar, B.; Vogel's Textbook of Quantitative Chemical Analysis, 6th ed.; Pearson Education Ltd: New Delhi, 2000.

Website and e-learning source:

- 1) <http://www.federica.unina.it/agraria/analytical-chemistry/volumetric-analysis>
- 2) <https://chemdictionary.org/titration-indicator/>

Pedagogy

Chalk and talk, laboratory practices, group discussion.

LESSON PLAN FOR PRACTICAL (Total hours : 60)

S.no	Description	Hours	Mode
1.	Instruction	4	Demonstration , Chalk and Talk, Discussion
2.	Demonstration		
	Demonstration for estimation of given solution	4	Demonstration , Chalk and Talk, Discussion
	Demonstration for estimation of given solution	4	Demonstration , Chalk and Talk, Discussion
3.	Estimation of Sodium oxalate (2)	6	Demonstration , Chalk and Talk, Discussion
4.	Estimation of Ferrous ammonium sulphate (2)	6	Demonstration , Chalk and Talk, Discussion
5.	Estimation of Oxalic acid (2)	6	Demonstration , Chalk and Talk, Discussion
6.	Estimation of Ferric alum (Internal indicator (2)	6	Demonstration , Chalk and Talk, Discussion
7.	Estimation of Copper (2)	6	Demonstration , Chalk and Talk, Discussion
8.	Estimation of Chloride in barium chloride (2)	6	Demonstration , Chalk and Talk, Discussion
9.	Revision	6	
10.	Model test (2)	6	

**Course Designer:
Dr.(Mrs).M.Sangeetha**

EVALUATION (PRACTICAL)

Internal (Formative)	: 40 marks
External (Summative)	: 60 marks
Total	:100 marks

Question Paper Pattern for Internal Practical Examination: 40 Marks

Components	Marks
Procedure	10
Experiment	30
Total	40

Question Paper Pattern for External Practical Examination (Major) : 60 Marks

S.No	Components	Marks
1.	Procedure	10
2.	Experiment	40
3.	Record book	10
	Total	60

In respect of external examinations passing minimum is **35% for Under Graduate Courses** and in total, **aggregate of 40%**.

Latest amendments and revisions as per **UGC** and **TANSCHÉ** norm is taken into consideration to suit the changing trends in the curriculum.

Allotment of Marks for Volumetric Analysis

Department of Mathematics					Class: II B.Sc			
Sem	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	SE	Total
IV	Generic Elective Course	23OUMAGECH4	Chemistry for Physical Sciences -IV	3	4	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓	✓	

Course Objectives :

1. To learn about classification, application of Anaesthetics, Analgesics and Antipyretics
2. To become familiar with Sulpha Drugs, Antibiotics and Antiseptics.
3. To understand the meaning of colloids and to learn the preparation and properties of colloids.
4. To study the nature of Green Chemistry.
5. To learn various synthesis techniques of Nanoparticles.

Unit: I Anaesthetics, Analgesics and Antipyretics: Anaesthetics: Definition-characteristics-classification-application of chloroform and cocaine. Analgesics: Definition-mode of action-specific applications of antipyrine, aspirin, ibuprofen. Antipyretics: Definition-mode of action-medicinal uses of salol and paracetamol. (Synthesis and Mechanism not required)

Unit: II Sulpha Drugs, Antibiotics and Antiseptics: Sulpha drugs: Definition-mode of action-applications of sulphanilamide, sulphapyridine and sulphadiazine. Antibiotics: Definition-characteristics- function - structure and uses of the following antibiotics- penicillins, streptomycin, chloramphenicol, erythromycin and tetracyclins. Antiseptics: Definition-types of antiseptics-difference between antiseptic and disinfectant. (Synthesis and Mechanism not required)

Unit: III Colloids: Definition - size of colloidal particles – classification- differences between lyophilic sols and lyophobic sols - preparation of sols-dispersion Method :Bredig's arc method, peptization –properties: Optical property-tyndall effect, kinetic property-brownian movement, electrical property-electrical double layer-application of colloids - colloidal medicines, sewage disposal, purification of water, artificial rain.

Unit: IV Green Chemistry: Need for Green chemistry-Goals of Green chemistry-Limitations/Obstacles-The progress of Green chemistry-Twelve principles of Green chemistry-Concept of Atom economy (Rearrangement reactions, Addition reactions, Substitution reactions)

and Elimination reactions)-Concept of selectivity (Chemoselectivity, Regioselectivity, Enantioselectivity and Diastereoselectivity)

UNIT: V Nano Chemistry: Characterisation of Nano materials- Synthesis of metal Nanoparticles by physical methods (Laser Ablation, Physical Vapour Deposition (Evaporation and Sputtering) -Synthesis by chemical methods (Thermolysis, Sonochemical Approach, Reduction by hydrogen, and Alkali metal reductions)-Biosynthesis of Nanoparticles.

Text Books:

1. Ashotosh Kaur, “*Medicinal Chemistry*”, 3rd Edition, New Age International Pvt Limited, New Delhi, 2006.
2. Bagavathi Sundari. K., “*Applied Chemistry*”, MJP Publishers, Chennai, 2006.
3. Kumar V., “*An Introduction to Green Chemistry*”, First Edition, Vishal Publishing Co., New Delhi, 2007.
4. Ownes F.J., “*Introduction to Nanotechnology*”, Academic Press, Santiago, 2000.

Reference books:

1. Bhalerao Marry & Giragon, ” *Pharmaceutical Chemistry*”, Himalaya Publishing House, Ramdoot, 2001.
2. Ahulwalia V.K. Kidwai M., “*New Trends in Green Chemistry*”, Second Edition, Anamaya Publishers, New Delhi, 2004.
3. Kenneth & Klabunde J., “*Nanoscale Materials in Chemistry*”, Wiley Interscience, 2001.
4. Sanghi. R. & Srivastava M.M., “*Green Chemistry*”, Narosa Publishing House, New Delhi, 2003.
5. Soni P.L. & Chawla H.M., “*Text Book of Organic Chemistry*”, Sultan & Sons, New Delhi, 2004.

Web Resources / E.Books:

1. [https://uogqueensmcf.com/wp-content/uploads/2020/BA%20Modules//Pharmacy/Year%20II%20\(semester%202\)/Medicinal%20Chemistry%20I/Reference%20books/MC%20Ashutoshkar.pdf](https://uogqueensmcf.com/wp-content/uploads/2020/BA%20Modules//Pharmacy/Year%20II%20(semester%202)/Medicinal%20Chemistry%20I/Reference%20books/MC%20Ashutoshkar.pdf)
2. https://books.google.co.in/books?id=Q-icDwAAQBAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

3.<http://repo.upertis.ac.id/1907/1/NANOSCALE%20MATERIALS%20IN%20CHEMISTRY.pdf>

Pedagogy:

Chalk and Talk method, Power Point presentations, Seminar, Group Discussion, Quiz through ICT-Mode

Rationale for nature of Course:**Knowledge and Skill:**

Students can learn about Anaesthetics, Analgesics, Antipyretics, Sulpha Drugs, Antibiotics Antiseptics, Colloids, Green Chemistry and Nano Chemistry

Activities to be given:

Assign students to submit case study on green chemistry preparing ppt on nano techniques.

Course learning Outcomes (CLOs):

CLO	Course Outcomes statement	Knowledge According to Bloom's Taxonomy (Upto K level)
CLO 1	Possess fundamental concepts on Anaesthetics, Analgesics and Antipyretics	K1 to K3
CLO 2	Recognize Sulpha Drugs, Antibiotics and Antiseptics	K1 to K3
CLO 3	Understand application of colloids in environment	K1 to K4
CLO 4	Attain brief knowledge on green chemistry	K1 to K3
CLO 5	Practice recent techniques in nano industries and laboratories by attaining knowledge through theoretical studies in current scenario	K1 to K4

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	2	2	1	2	2
CLO2	2	2	2	1	2	1
CLO3	2	2	3	2	2	2
CLO4	3	3	2	2	3	3
CLO5	3	2	3	2	3	3

1-Basic Level 2- Intermediate Level 3- Advanced Level

LESSON PLAN: TOTAL HOURS (60 Hrs)

UNIT	DESCRIPTION	Hrs	MODE
I	Anaesthetics: Definition-characteristics- classification- application of chloroform and cocaine. Analgesics: Definition-mode of action-specific applications of antipyrine, aspirin, ibuprofen. Antipyretics: Definition-mode of action-medicinal uses of salol and paracetamol. (Synthesis and Mechanism not required)	12	Chalk and Talk, PPT, group discussion, OHP presentations, quiz, on the spot test and Virtual Labs.
II	Sulpha drugs: Definition-mode of action-applications of sulphanilamide, sulphapyridine and sulphadiazine. Antibiotics: Definition- characteristics- function-structure and uses of the following antibiotics- penicillins, streptomycin, chloramphenicol, erythromycin and tetracyclins. Antiseptics: Definition-types of antiseptics-difference between antiseptic and disinfectant. (Synthesis and Mechanism not required)	12	Chalk and Talk, PPT, group discussion, OHP presentations, quiz, on the spot test and Virtual Labs.
III	Colloids: Definition - size of colloidal particles – classification- differences between lyophilic sols and lyophobic sols - preparation of sols-dispersion Method :Bredig's arc method, peptization –properties: Optical property-tyndall effect, kinetic property-brownian movement, electrical property-electrical double layer-application of colloids - colloidal medicines, sewage disposal, purification of water, artificial rain.	12	Chalk and Talk, PPT, group discussion, OHP presentations, quiz, on the spot test and Virtual Labs
IV	Need for Green chemistry-Goals of Green chemistry- Limitations/Obstacles-The progress of Green chemistry- Twelve principles of Green chemistry-Concept of Atom economy (Rearrangement reactions, Addition reactions, Substitution reactions and Elimination reactions)-Concept of selectivity (Chemoselectivity, Regioselectivity, Enantioselectivity and Diastereoselectivity)	12	Chalk and Talk, PPT, group discussion, OHP presentations, quiz, on the spot test and Virtual Labs
V	Characterisation of Nano materials- Synthesis of metal Nanoparticles by physical methods (Laser Ablation, Physical Vapour Deposition (Evaporation and Sputtering) -Synthesis by chemical methods (Thermolysis, Sonochemical Approach, Reduction by hydrogen, and Alkali metal reductions)- Biosynthesis of Nanoparticles.	12	Chalk and Talk, PPT, group discussion, OHP presentations, quiz, on the spot test and Virtual Labs.

Course Designer:
Dr. (Mrs).M.Sangeetha

Department of Mathematics			Class: II B.Sc					
Semester	Category	Course Code	Course Title	Credits	Hours	CIA	SE	Total
IV	Generic Elective Course	23OUMAGECH4P	Chemistry Practical for Physical Sciences -IV	2	2	40	60	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓	✓	

Analyze systematically the given simple salt containing one anion (acid radical) and one cation (basic radical).

Cations: Lead, bismuth, copper, cadmium, iron, aluminum, zinc, manganese, cobalt, nickel, Barium, strontium, calcium, magnesium and ammonium

Anions: Carbonate, sulphate, nitrate, chloride, bromide, fluoride, oxalate, borate and phosphate.

Books for references:

1. Malligarjunan U.M, “ Practical Chemistry”, Radha publications
2. Ramasamy .R, “ Ancillary Chemistry Practical Book -1”, Priya publications

Web resources/ e - books

https://www.academia.edu/12554372/Inorganic_Quantitative_Analysis_Lab_Manual_by_Rupam_Raha
<http://akimya.pharmacy.ankara.edu.tr/wp-content/uploads/sites/43/2018/08/ANALYTICAL-CHEMISTRY-LAB-MANUAL-1-Qualitative-analysis.pdf>

Pedagogy

Chalk and talk, laboratory practices, group discussion.

LESSON PLAN FOR PRACTICAL (Total hours : 60)

S.no	Description	Hours	Mode
1.	Instruction	2	Demonstration , Chalk and Talk, Discussion
2.	Demonstration		
	Analysis of Anions (Acid radical)	4	Demonstration , Chalk and Talk, Discussion
	Analysis of Cations (Basic radical)	4	Demonstration , Chalk and Talk, Discussion
3.	Analysis of Anions	4	Demonstration , Chalk and Talk, Discussion
4.	Analysis of Cations	6	Demonstration , Chalk and Talk, Discussion
5.	Analysis of inorganic salt – I	4	Demonstration , Chalk and Talk, Discussion
6.	Analysis of inorganic salt – II	4	Demonstration , Chalk and Talk, Discussion
7.	Analysis of inorganic salt – III	4	Demonstration , Chalk and Talk, Discussion
8.	Analysis of inorganic salt – IV	4	Demonstration , Chalk and Talk, Discussion
9.	Analysis of inorganic salt – V	4	Demonstration , Chalk and Talk, Discussion
10.	Analysis of inorganic salt – VI	4	Demonstration , Chalk and Talk, Discussion
11.	Analysis of inorganic salt – VII	4	Demonstration , Chalk and Talk, Discussion
12.	Revision	6	
10.	Model test (2)	6	

**Course Designer:
Dr.(Mrs).M.Sangeetha**

EVALUATION (PRACTICAL)

Internal (Formative)	: 40 marks
External (Summative)	: 60 marks
Total	:100 marks

Question Paper Pattern for Internal Practical Examination: 40 Marks

Components	Marks
Acid radical	10
Basic radical	10
Model exam	10
Viva	10
Total	40

Question Paper Pattern for External Practical Examination (Major) : 60 Marks

S.No	Components	Marks
1.	Acid radical with procedure	20
2.	Basic radical with procedure	20
3.	Viva	10
4.	Record book	10
	Total	60

In respect of external examinations passing minimum is **35% for Under Graduate** Courses and in total, **aggregate of 40%**.

Latest amendments and revisions as per **UGC** and **TANSCHE** norm is taken into consideration to suit the changing trends in the curriculum.