Annexure – 8b

E.M.G.YADAVAWOMEN'SCOLLEGE,MADURAI-14.

(An Autonomous Institution – Affiliated to Madurai Kamaraj University)
(Re–accredited (3rdcycle) with Grade A+ and CGPA 3.51 by NAAC)

GENERIC ELECTIVE CHEMISTRY

(For I B.Sc., Zoology(w.e.f.2022–2023onwards)

CBCS with OBE

COURSE STRUCTURE - SEMESTER WISE

Sem	Part	Course Code	Title of the Course	Teachinghrs. (Per week)	Duration of exam (hrs)	Marks allotted			Credits
						CIA	SE	Total	
I	III	22OUZOGECH1/ 22OUMAGECH1	**GEC**– Chemistry –I - Inorganic,Organic & PhysicalChemistry	4	3	25	75	100	4
			GEC-Practical-1 Saltanalysis	2	-	-	-	-	-
II	III	22OUZOGECH2/ 22OUMAGECH2	**GEC**–Chemistry–II-Organic, Applied &Analytical Chemistry	4	3	25	75	100	4
		22OUZOGECH2P/ 22OUMAGECH2P	**GEC**-Practical- 1 Saltanalysis	2	3	40	60	100	1
III	III	22OUZOGECH3/ 22OUMAGECH3	**GEC**–Chemistry–III-Industrial Chemistry	4	3	25	75	100	4
			GEC-Practical- II VolumetricAnalysis	2	-	-	-	-	-
IV	III	22OUZOGECH4/ 22OUMAGECH4	**GEC**–Chemistry–IV-Medicinal,Green & Nano Chemistry	4	3	25	75	100	4
		22OUZOGECH4P/ 22OUMAGECH4P	**GEC**-Practical –II Volumetric Analysis	2	3	40	60	100	1

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Department of Zoology and Mathematics					Class: IB.Sc			
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Contact Hours /Week**	**CIA**	**SE**	**Total**
III	Generic Elective Course	**22OUZOGECH3/ 22OUMAGECH3**	Chemistry–III-Industrial Chemistry	4	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 understand the classification, manufacture and applications of fertilizers.
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 cordite and RDX.

Unit: II Silicate Industry: 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 Agricultural Chemistry: Fertilizer: Introduction-classification- role of various elements in plant growth-requirements of a good fertilizer-Manufacturing methods and applications of following fertilizers: ammonium sulphate, ammonium chloride, urea, super phosphate of lime, calcium cyanamide, calcium ammonium nitrate and NPK fertilizer.

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Unit: IV Rubber Industry: 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 Industry: 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. PvtLtd., 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, NewDelhi, 2001.
3. Gowariker V.R, "Polymer Science", New Age International (P) Limited, Publishers, New Delhi, 2005.

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

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Rationale for nature of Course:

Knowledge and Skill:

Students can gain knowledge about Match Industry, Silicate Industry, Agricultural Chemistry, 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 agriculture in current era.

Course learning Outcomes (CLOs):

CLO	**Course Out comes statements**	**Knowledge According to Bloom's Taxonomy (Upto K level)**
CLO1	Elaborate the concept of matches.	K1toK3
CLO2	Identify the properties and manufacture of cement and glass.	K1toK3
CLO3	Recognize the role of various elements in plant growth, application of fertilizers.	K1toK4
CLO4	Possess knowledge about natural rubber and synthetic rubber.	K1toK3
CLO5	Apply the knowledge of manufacturing plastics and paper and possess the potential on the usage and application of plastics, paper in the life habitat.	K1toK4

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,presentationandmakeinferenceswithevidences

MappingofCourseLearningOutcomes(CLOs)withProgrammeOutcomes(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-BasicLevel **2-IntermediateLevel** **3-AdvancedLevel**

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LESSONPLAN:TOTAL HOURS(60Hrs)

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, groupdiscussion , OHPpresentations, quiz,on the spot test andVirtual 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, groupdiscussion, OHPpresentations, quiz,on the spot test andVirtual Labs.
III	Fertilizer: Introduction-classification- role of various elements in plant growth-requirements of a good fertilizer-Manufacturing methods and applications of following fertilizers: ammonium sulphate, ammonium chloride, urea, super phosphate of lime, calcium cyanamide, calcium ammonium nitrate and NPK fertilizer.	12	Chalk and Talk,PPT, groupdiscussion , OHPpresentations, quiz,on the spot test andVirtual Labs
IV	Rubber Industry: 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, groupdiscussion , OHPpresentations, quiz,on the spot test andVirtual Labs
V	Polymer and Paper Industry: 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, groupdiscussion, OHPpresentations, quiz,on the spot test andVirtual Labs.

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

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Department of Zoology and Mathematics					Class:IB.Sc			
Sem	**Category**	**CourseCode**	**CourseTitle**	**Credits**	**Contact Hours /Week**	**CIA**	**SE**	**Total**
IV	Generic Elective Course	**22OUZOGECH4/ 22OUMAGECH4**	Chemistry –IV - Medicinal, Green & Nano Chemistry	4	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 learn the chemistry of Hypnotics, Sedatives and Tranquilizers
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 nitrousoxide, 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 not required).

Unit: II Sulpha Drugs, Antibiotics and Antiseptics: Sulpha drugs:Definition-mode of action-applications of sulphanilamide, sulphapyridine andsulphadiazine. Antibiotics: Definition-characteristics- mode of action- structure and usesof the following antibiotics- penicillins, streptomycin, chloramphenicol, erythromycinand tetracyclins. Antiseptics: Definition-types of antiseptics-difference between antiseptic and disinfectant (preparation not required).

Unit: III Hypnotics, Sedatives and Tranquilizers: Hypnotics and Sedatives: Definition - types (alcohols-aldehydes, ketones and sulphones- urethans-amides and urea-barbiturates) - applications of chloral, paraldehyde, sulphonal andbarbituric acid. Tranquilizer: Definition-characteristics-classification-applications ofpiperadol and hydroxyzine (preparation not required).

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: IV Nano Chemistry: Characterisation of Nanomaterials-Stability of Colloidal solutions-Synthesis of metal Nanoparticles by physical methods (Laser Ablation, Physical Vapour Deposition (Evaporation and Sputterring) -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, NewDelhi, 2003.

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

2.https://books.google.co.in/books?id=QicDwAAQBAJ&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

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Pedagogy:

Chalk and Talk method, PowerPoint 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, Hypnotics, Sedatives, Tranquilizers, Green Chemistry and Nano Chemistry

Activitiestobegiven:

Assignstudentstosubmitcasestudyongreen chemistry preparingpptonnanotechniques.

CourselearningOutcomes(CLOs):

CLO	**CourseOutcomesstatement**	**Knowledge According to Bloom'sTaxonomy (UptoKlevel)**
CLO1	Possess fundamental concepts on Anaesthetics, Analgesics and Antipyretics	K1toK3
CLO2	RecognizeSulpha Drugs, Antibiotics and Antiseptics	K1toK3
CLO3	Elaborate different forms of Hypnotics, Sedatives and Tranquilizers	K1toK4
CLO4	Attainbriefknowledgeongreen chemistry	K1toK3
CLO5	Practice recent techniques in nanoindustries and laboratories by attaining knowledge Through theoretical studies in current scenario	K1toK4

K1-Rememberingandrecallingfactswithspecificanswers
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

MappingofCourseLearningOutcomes(CLOs)withProgrammeOutcomes(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-BasicLevel 2-IntermediateLevel 3-AdvancedLevel

Annexure – 8b

LESSON PLAN:TOTAL HOURS(60Hrs)

UNIT	DESCRIPTION	Hrs	MODE
I	Anaesthetics:Definition-characteristics-classification-application of nitrousoxide, 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.	12	Chalk and Talk,PPT, groupdiscussion , OHPpresentations, quiz,on the spot test andVirtual Labs.
II	Sulpha drugs: Definition-mode of action-applications of sulphanilamide, sulphapyridine and sulphadiazine. Antibiotics: Definition- characteristics- mode of action-structure and uses of the following antibiotics-penicillins, streptomycin, chloramphenicol, erythromycin and tetracyclins. Antiseptics: Definition-types of antiseptics-difference between antiseptic and disinfectant.	12	Chalk and Talk,PPT, groupdiscussion, OHPpresentations, quiz,on the spot test andVirtual Labs.
III	Hypnotics and Sedatives: Definition - types (alcohols-aldehydes, ketones and sulphones- urethans- amides and urea-barbiturates) - applications of chloral, paraldehyde, sulphonal and barbituric acid. Tranquilizer: Definition-characteristics-classification-applications of piperadol and hydroxyzine.	12	Chalk and Talk,PPT, groupdiscussion , OHPpresentations, quiz,on the spot test andVirtual 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, groupdiscussion , OHPpresentations, quiz,on the spot test andVirtual Labs
V	Characterisation of Nano materials-Stability of Colloidal solutions-Synthesis of metal Nanoparticles by physical methods (Laser Ablation, Physical Vapour Deposition (Evaporation and Sputterring) -Synthesis by chemical methods (Thermolysis, Sonochemical Approach, Reduction by hydrogen, and Alkali metal reductions)-Biosynthesis of Nanoparticles.	12	Chalk and Talk,PPT, groupdiscussion, OHPpresentations, quiz,on the spot test andVirtual Labs.

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

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Department of Zoology and Mathematics			Class: IB.Sc					
Semester	**Category**	**Course Code**	**Course Title**	**Credits**	**Hours**	**CIA**	**SE**	**Total**
III&IV	Generic Elective Course	**22OUZOGECH4P2 /2OUMAGECH4P2**	Practical – II Volumetric Analysis	1	2	40	60	100

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

Volumetric analysis (Question model)

You are given a solution containing Sodium carbonate. To estimate volumetrically the weight of Sodium carbonate present in the whole of the given solution. You are provided with approximately decinormal solution of hydrochloric acid and a standard solution of Sodium hydroxide Containing ……. g / L.

S.No.	Standard	Link	Solution to be estimated
1.	Na OH	HCI	Na_2CO3
2.	$FeSO_4$	$KMnO_4$	Mohr's salt
3.	NaOH	$C_2H_2O_4$	$KMnO_4$
4.	Na_2CO_3	HCI	NaOH
5.	Mohr's salt	$KMnO_4$	$FeSO_4$
6.	HCI	NaOH	$C_2H_2O_4$

Books for references:

1. Malligarjunan U.M, "Practical Chemistry", Radha publications
2. Ramasamy.R," AncillaryChemistryPracticalBook-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.

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LESSON PLAN FOR PRACTICAL(Totalhours: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 Na_2CO3(2)	6	Demonstration , Chalk and Talk, Discussion
4.	Estimation of Mohr's salt(2)	6	Demonstration, Chalk and Talk, Discussion
5.	Estimation of $KMnO_4$(2)	6	Demonstration , Chalk and Talk, Discussion
6.	Estimation of NaOH(2)	6	Demonstration, Chalk and Talk, Discussion
7.	Estimation of $FeSO_4$(2)	6	Demonstration , Chalk and Talk , Discussion
8.	Estimation of $C_2H_2O_4$(2)	6	Demonstration , Chalk and Talk, Discussion
9.	Revision	6	
10.	Model test(2)	6	

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

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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):60Marks

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 **TANSCHE** norm is taken into consideration to suit the changing trends in the curriculum.

Allotment of Marks for Volumetric Analysis