E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625 014.

(*An Autonomous Institution – Affiliated to Madurai Kamaraj University*)

Re-accredited (**3rd Cycle**) with Grade **A+** & **CGPA 3.51** by NAAC

DEPARTMENT OF CHEMISTRY

CBCS With OBE

BACHELOR OF SCIENCE

PROGRAMME CODE - K

COURSE STRUCTURE

(w.e.f. 2022 – 2023 Batch onwards)

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625 014.
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CRITERION - I

1.1.3 Details of courses offered by the institution that focus on employability / entrepreneurship / skill development during the year.

Syllabus copies with highlights of contents focusing on Employability / Entrepreneurship / Skill Development

To be Noted:

HIGHLIGHTED COLORS	COURSES
	Employability
	Skill Development
	Entrepreneurship
	Skilled & Employability

Annexure-18

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI -14.

(An Autonomous Institution – Affiliated to Madurai Kamaraj University)
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DEPARTMENT OF CHEMISTRY – UG

(w.e.f. 2022– 2023 Batch onwards)

CBCS with OBE

Vision

To build the vibrant and knowledgeable students community for careers in academia, industry, entrepreneur and government sectors through innovative teaching.

Mission

- To encourage students to face IIT-JAM, Entrance examinations for enroll M.Sc programme and other competitive examinations.
- To equip students become a successful women entrepreneur to run small scale industries like toiletry products and cosmetics.
- To impart quality chemical science education to enable the students to become an independent, competitive and professional graduates.

Programme Educational Objectives (PEOs): B.Sc. Chemistry

Sl. No.	Programme Educational Objectives
PEO1	To pursue further studies and able to work in various industries, research laboratories, schools and public sectors.
PEO2	To develop inter-social relationship and interpersonal skills in order to attain leadership qualities.
PEO3	Apply knowledge and understanding of Chemistry to identify problems and solutions in daily life.
PEO4	To possess skills of keen observation and drawing logical inferences from the practical experiments.
PEO5	Appear as a successful women entrepreneur to run small scale industries.

Annexure-18

Programme Outcomes for Science Graduates

On completion of B.Sc., Programmes students will be able to

SI.No.	**Programme Outcomes**
PO1	Develop necessary foundation in fundamentals, aptitude, applications of sciences and other related subjects. Able to clear competitive examinations, appear with confidence and possess basic skills on the related subjects. Secure jobs in employment in Government / Private / Industry and entrepreneurship.
PO2	Receive basic experimental skills in the observation and study of nature, biological techniques, scientific research and demonstrate proficiency in critical analysis or creativity and provide scientific solutions to the problems of the society.
PO3	Enhance the digital knowledge of statistics and to understand its application in interpreting the obtained data.
PO4	Obtain knowledge with emerging trends in their disciplinary and inter-disciplinary areas. Usage of modern tools and software can also be put to use.
PO5	Lead lifelong learning & contribute sustainability to environment, equip students enough to take up higher studies up to research in various disciplines to become professionals.
PO6	Imbibe democratic, ethical, moral, social & spiritual values in the minds of the learners to become responsible citizens and build a healthy nation.

Annexure-18

Programme Specific Outcome (PSOs)

PSO	Graduate Attributes	After completion of B.Sc Chemistry, the students will be able to	PO Addressed
PSO-1	Knowledge and Proficiency	Gain basic knowledge in fundamentals and applications of organic, inorganic, physical, analytical chemistry, nomenclature, stereochemistry, structures, reactivity, and mechanism of the chemical reactions and also in inter-disciplinary subjects such as Green, Nano, Environmental, Food chemistry, industrial chemistry, laboratory techniques, analytical clinical biochemistry, chemistry in everyday life, Pharmaceutical chemistry.	PO1
PSO-2	Problem analysis	Tackle problems and offer creative ideas based on analysis and critical thinking in all branches of Chemistry	PO2
PSO-3	Problem Solving	Apply the logical reasoning to find solutions for chemical problems	PO2
PSO-4	Modern tool usage	Impart knowledge in understanding and carrying out data analysis, use of library search tools, chemical simulation, drawing structures using computation software's	PO4
PSO-5	Social responsibility	Inculcate critical thinking and adopt healthier attitudes towards individual and society through the course of Chemistry	PO6
PSO-6	Lifelong learning	Develop life-long learning skills to pursue post graduate program in higher educational institutions and employment opportunities in chemistry fields through chemical science	PO5
PSO-7	Ethical & Moral and Spiritual Values	Develop Ethical and moral Values in the context of learning Chemistry to cater the business environment	PO6
PSO-8	Leadership, team work & Communication	Act as a team leader by contributing in laboratory, field based situation and industry. To make a graduate capable of expressing the chemistry subject through technical writing as well as through oral presentation	PO3

Annexure-18

Qualification for Admission

Candidates should have passed the Higher Secondary Examination, Mathematics, Physics, Chemistry, Biology / Physics, Chemistry, Botany, Zoology as one of the stream, conducted by the Board of Higher Education, Government of Tamil Nadu, CBSC & ICSE or any other examination approved by Madurai Kamaraj University as equivalent.

Duration of the Course

The students shall undergo this prescribed course of study for the period of three academic years under Choice Based Credit System (CBCS) semester pattern with Outcome Based Education (OBE).

Medium of Instruction: English

System: Choice Based Credit System with Outcome Based Education Model

Courses of Study with Credit Distribution for B.Sc Chemistry

Category	No. of Courses	No. of Credits
Part-I	4	12
Part –II	4	12
Major Core Paper	12	51
Discipline Specific Elective Courses	2	8
Generic Elective Courses	10	18+18
Skill Enhancement Courses	6	12
Inter Disciplinary Courses	2	4
Ability Enhancement Compulsory Courses	2	4
NSS/Physical Education	1	1
Total	43	140

Nature of the Course

Courses are classified according to the following nature

1. Knowledge and skill oriented
2. Employability oriented
3. Entrepreneurship oriented

Annexure-18

Outcome Based Education (OBE) & Assessment

Students understanding must be built on and assessed for wide range of learning activities, which includes different approaches and are classified along several basis, such as

1. **Based on purpose:**

- Continuous Assessment (internal tests, Assignment, seminar, quiz, Documentation, Case lets, ICT based Assignment, Mini projects administered during the learning process)
- External Assessment (Evaluation of students' learning at the end of instructional unit)

2. **Based on Domain Knowledge: (for UG Up to K4 levels)**
   Assessment through K1, K2, K3 & K4

Annexure-18

EVALUATION (THEORY)
(PART I / PART II / PART III)

Internal (Formative) : 25 marks
External (Summative) : 75 marks
Total :100 marks

Formative Test (CIA-Continuous Internal Assessment) : 25 Marks

Components	**Marks**
Test (Average of three tests) (Conducted for 100 marks and converted into 20 marks)	**20**
Assignment(Quiz/ Documentation/ Case lets/ ICT based Assignment/ Mini Projects)	**5**
Total	**25**

- ✓ **Centralized system** of Internal Assessment Tests
- ✓ There will be **Three Internal Assessment** Tests
- ✓ Duration of Internal assessment test will be **1 hour for Test I and 2 hours for Test II and III** respectively.
- ✓ Students shall write **retest** with the approval of HOD on genuine grounds if they are absent.

Question Paper Pattern for Continuous Internal Assessment- Test I

Section		**Marks**
A-Multiple Choice Question	(3x1 mark)	3
B-Short Answer	(1x2 marks)	2
C-Either Or type	(1/2x 5 marks)	5
D-Open choice type	(1/2 x 10 marks)	10
Total		20

Question Paper Pattern for Continuous Internal Assessment -Test II and III

Multiple choice for Section		**Marks**
A- Multiple Choice Question	(6x1 mark)	6
B-Short Answer	(2x2 marks)	4
C-Either Or Type	(2/4 x5 marks)	10
D-Open Choice Type	(2/3 x 10 marks)	20
Total		40

Conducted for 100 marks and converted into 20 marks

Question Paper Pattern for Summative Examination

Section	Marks
A- Multiple choice Questions without Choice (10x1 mark)	10
B-Short Answer without choice (5x2 marks)	10
C-Either Or type (5/10 x5 marks)	25
D-Open Choice type (3out of 5x10 marks)	30
Total	75

In respect of Summative Examinations passing minimum is **36% for UG.**

Distribution of Marks in % with K Levels CIA I, II, III & External Assessment

Blooms Taxonomy	Internal Assessment			External Assessment
	I	II	III	
Knowledge (K1)	12%	12%	12%	13%
Understanding (K2)	44%	22%	22%	21%
Apply (K3)	44%	33%	33%	33%
Analyze (K4)	-	33%	33%	33%

Latest amendments and revision as per **UGC** and **TANSCHE** norms is taken into consideration in curriculum preparation.

Annexure-18

BLUE PRINT FOR INTERNAL ASSESSMENT – I

Articulation Mapping - K Levels with Course Learning Outcomes (CLOs)

Sl. No	CLOs	K- Level	Section A		Section B		Section C	Section D	Total
			MCQs (No Choice)		Short Answers (No Choice)		(Either or Type)	(Open choice)	
			No. of Questions	K-Level	No. of Questions	K-Level			
1	CLO 1	Up to K3	3	(K1)	1	K1	2 (K2) (Each set of questions must be in the same level)	1 (K2) & 2 (K3)	
No. of Questions to be asked			3		1		2	3	9
No. of Questions to be answered			3		1		1	1	6
Marks for each question			1		2		5	10	-
Total Marks for each section			3		2		5	10	20

BLUE PRINT FOR INTERNAL ASSESSMENT – II

Articulation Mapping - K Levels with Course Learning Outcomes (CLOs)

Sl. No	CLOs	K- Level	Section A		Section B		Section C	Section D	Total
			MCQs (No Choice)		Short Answers (No Choice)		(Either or Type)	(Open choice)	
			No. of Questions	K-Level	No. of Questions	K-Level			
1	CLO 2	Up to K3	3	(K1/ K2)	1	(K1/ K2)	2 (K2) / 2 (K4) (Each set of questions must be in the same level)	2 (K3) & 1 (K4)	
2	CLO 3	Up to K4	3	(K1/ K2)	1	(K1/ K2)			
No. of Questions to be asked			6		2		4	3	15
No. of Questions to be answered			6		2		2	2	12
Marks for each question			1		2		5	10	-
Total Marks for each section			6		4		10	20	40

Annexure-18

BLUE PRINT FOR INTERNAL ASSESSMENT – III

Articulation Mapping - K Levels with Course Learning Outcomes (CLOs)

Sl. No	CLOs	K- Level	Section A		Section B		Section C	Section D	Total
			MCQs (No Choice)		Short Answers (No Choice)		(Either or Type)	(Open choice)	
			No. of Questions	K-Level	No. of Questions	K-Level			
1	CLO 4	Up to K3	3	(K1/ K2)	1	(K1/ K2)	2 (K2) / 2 (K4) (Each set of questions must be in the same level)	2 (K3) & 1(K4)	
2	CLO 5	Up to K4	3	(K1/ K2)	1	(K1/ K2)			
No. of Questions to be asked			6		2		4	3	15
No. of Questions to be answered			6		2		2	2	12
Marks for each question			1		2		5	10	-
Total Marks for each section			6		4		10	20	40

Distribution of Marks with Choice K Levels CIA I, CIA II and CIA III

CIA	K Levels	Section -A MCQ (No choice)	Section -B Short Answer (No choice)	Section -C (Either or Type)	Section –D (Open choice)	Total Marks	% of Marks
I	K1	3	2	-	-	5	12
	K2	-	-	10	10	20	44
	K3	-	-	-	20	20	44
	K4	-	-	-	-	-	-
	Marks	**3**	**2**	**10**	**30**	**45**	**100**
II	K1	5	2	-		7	12
	K2	1	2	10	-	13	22
	K3	-	-	-	20	20	33
	K4	-	-	10	10	20	33
	Marks	**6**	**4**	**20**	**30**	**60**	**100**
III	K1	5	2	-		7	12
	K2	1	2	10	-	13	22
	K3	-	-	-	20	20	33
	K4	-	-	10	10	20	33
	Marks	**6**	**4**	**20**	**30**	**60**	**100**

Annexure-18

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Articulation Mapping - K Levels with Course Learning Outcomes (CLOs) for External Assessment

Sl. No	CLOs	K- Level	Section A		Section B		Section C (Either/ or Type)	Section D (open choice)	Total
			MCQs (No choice)		Short Answers (No choice)				
			No. of Questions	K-Level	No. of Questions	K-Level			
1	CLO 1	Up to K3	2	K1/K2	1	K1/K2	2 (K3 & K3)	1(K2)	
2	CLO 2	Up to K3	2	K1/K2	1	K1/K2	2(K2 & K2)	1(K3)	
3	CLO 3	Up to K4	2	K1/K2	1	K1/K2	2 (K4 &K4)	1(K4)	
4	CLO 4	Up to K 3	2	K1/K2	1	K1/K2	2 (K3 & K3)	1(K3)	
5	CLO 5	Up to K 4	2	K1/K2	1	K1/K2	2 (K4 & K4)	1(K4)	
No. of Questions to be asked			10		5		10	5	30
No. of Questions to be answered			10		5		5	3	23
Marks for each question			1		2		5	10	
Total Marks for each section			10		10		25	30	75 (Marks)

Distribution of Section-wise Marks with K Levels for External Assessment

K Levels	Section A (MCQ'S) (No choice)	Section B (Short Answer) (No choice)	Section C (Either or Type)	Section D (Open Choice)	**Total Marks**	% of Marks
K1	9	6	-	--	**15**	13
K2	1	4	10	10	**25**	21
K3	-	-	20	20	**40**	33
K4	-	-	20	20	**40**	33
Total Marks	10	10	50	50	**120**	100

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, Justifying the statement and deriving Inferences.
K4- Examining, analyzing, presentation and make inferences with evidences.

Annexure-18

EVALUATION (THEORY)

(PART IV - SBE & NME)

Internal (Formative) : 25 marks
External (Summative) : 75 marks
Total :100 marks

Formative Test (CIA-Continuous Internal Assessment) : 25 Marks

Components	Marks
Test (Conducted for 50 marks and converted into 25 marks)	**25**

- ✓ There will be Only one Internal Assessment Test
- ✓ Duration of Internal assessment test will be 2 hour for Test
- ✓ Students shall write retest with the approval of HOD on genuine grounds if they are absent.

Question Paper Pattern for Continuous Internal Assessment- Test

Section	Marks
A-Multiple Choice Question (5x1 mark)	5
B-Short Answer (5x2 marks)	10
C-Either Or type (3x 5 marks)	15
D-Open choice type (2/3 x 10 marks)	20
Total	50

Conducted for 50 marks and converted into 25 marks

Question Paper Pattern for External Examination

Section	Marks
A-Multiple Choice Question (10x1 mark)	10
B-Short Answer (5x2 marks)	10
C-Either Or type (5x 5 marks)	25
D-Open choice type (3/5 x 10 marks)	30
Total	75

Annexure-18

BLUE PRINT FOR INTERNAL ASSESSMENT

Articulation Mapping - K Levels with Course Learning Outcomes (CLOs)

Sl. No	CLOs	K- Level	Section A		Section B		Section C	Section D	Total
			MCQs (No Choice)		Short Answers (No Choice)		(Either or Type)	(Open Choice)	
			No. of Questions	K-Level	No. of Questions	K-Level			
1.	CLO1	Up to K 3	1	K1	1	K1	4(K2) & 2(K3) (Each set of questions must be in the same level)	1(K2) & 2(K3)	
2.	CLO2	Up to K 3	1		1				
3.	CLO3	Up to K 3	1		1				
4	CLO4	Up to K 3	1		1				
5	CLO5	Up to K 3	1		1				
No. of Questions to be asked			5		5		6	3	19
No. of Questions to be answered			5		5		3	2	15
Marks for each question			1		2		5	10	
Total Marks for each section			**5**		**10**		**15**	**20**	**50**

Distribution of Marks with K Levels - CIA

CIA	K Levels	Section A MCQ	Section B (Short Answers)	Section C (Either/Or Choice)	Section D (Open Choice)	Total Marks	% of Marks
I	K1	5	10	-	-	15	20
	K2	-	-	20	10	30	40
	K3	-	-	10	20	30	40
	K4	-	-	-	-	-	-
	Marks	**5**	**10**	**30**	**30**	**75**	**100**

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Articulation Mapping - K Levels with Course Learning Outcomes (CLOs) for External Assessment

Sl. No	CLOs	K-Level	Section A		Section B		Section C (Either/or Choice)	Section D (Open Choice)	Total
			MCQs		Short Answers				
			No. of Questions	K-Level	No. of Questions	K-Level			
1	CLO 1	Up to K3	2	K1	1	K1	3(K2) & 2(K3) (Each set of questions must be in the same level)	2(K2) & 3(K3)	
2	CLO 2	Up to K3	2		1				
3	CLO 3	Up to K3	2		1				
4	CLO 4	Up to K 3	2		1				
5	CLO 5	Up to K 3	2		1				
No. of Questions to be asked			10		5		10	5	30
No. of Questions to be answered			10		5		5	3	23
Marks for each question			1		2		5	10	
Total Marks for each section			10		10		25	30	75

Distribution of Section-wise Marks with K Levels for External Assessment

K Levels	Section A (MCQ'S)	Section B (Short Answer)	Section C (Either/or)	Section D (Open Choice)	**Total Marks**	% of Marks without choice
K1	10	10	-	--	**20**	16
K2	-	-	30	20	**50**	42
K3	-	-	20	30	**50**	42
Total Marks	10	10	50	50	**120**	100

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DEPARTMENT OF CHEMISTRY – UG

(With Allied Mathematics and Allied Physics)

CBCS with OBE

COURSE STRUCTURE

(w.e.f. 2022 – 2023 Batch onwards)

Semester	Part	Course Code	Title of the Course	Teaching hrs (Per week)	Duration of Exam (hrs)	Marks Allotted			Credits
						CIA	SE	Total	
I	I	22OU1TA1	**Part I:** Tamil	6	3	25	75	100	3
	II	22OU2EN1	**Part II:** English	6	3	25	75	100	3
	III	22OUCH11	**Core**: General Chemistry-I	4	3	25	75	100	4
	III		**Core** : Practical – I Semi Micro Inorganic Qualitative Analysis	2	-	-	-	-	-
	III	22OUCHGEMA1	**GEC**: Mathematics –I Theory of equations, Trigonometry, Analytical Geometry 3D and Vector Calculus	6	3	25	75	100	4
	IV	22OUCHSE11	**SEC**: Good Laboratory Practices	2	3	25	75	100	2
	IV	22OUCHSE12	**SEC**: Pharmaceutical Chemistry	2	3	25	75	100	2
	IV	22OUCHID1	**IDC**: Chemistry in Everyday Life	2	3	25	75	100	2
II	I	22OU1TA2	**Part I:** Tamil	6	3	25	75	100	3
	II	22OU2EN2	**Part II:** English	6	3	25	75	100	3
	III	22OUCH21	**Core**: General Chemistry-II	4	3	25	75	100	4
	III	22OUCH2P	**Core**: Practical – I Semi Micro Inorganic Qualitative Analysis	2	3	40	60	100	2

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	III	**22OUCHGEMA2**	**GEC**: Mathematics– II Calculus, Differential Equations and Applications	6	3	25	75	100	5
	IV	**22OUCHSE21**	**SEC**: Industrial Chemistry	2	3	25	75	100	2
	IV	**22OUCHSE22**	**SEC**: Analytical Clinical Biochemistry	2	3	25	75	100	2
	IV	**22OUCHID2**	**IDC**: Food Chemistry	2	3	25	75	100	2
III	I	**22OUITA3**	**Part I:** Tamil	6	3	25	75	100	3
	II	**22OU2EN3**	**Part II:** English	6	3	25	75	100	3
	III	**22OUCH31**	**Core**: General Chemistry-III	4	3	25	75	100	4
	III		**Core**: Practical – II Volumetric Analysis	2	-	-	-	-	-
	III	**22OUCHGEMA3**	**GEC**: Mathematics–III Algebra and Statistics	6	3	25	75	100	4
	III	**22OUCHGEPH3**	**GEC** : Physics –I Mechanics and properties of matter	4	3	25	75	100	4
	III		**GEC** : Physics Practical –I	2	-	-	-	-	-
IV	I	**22OUITA4**	**Part I:** Tamil	6	3	25	75	100	3
	II	**22OU2EN4**	**Part II:** English	6	3	25	75	100	3
	III	**22OUCH41**	**Core**: General Chemistry-IV	4	3	25	75	100	4
	III	**22OUCH4P**	**Core**: Practical – II Volumetric Analysis	2	3	40	60	100	2
	III	**22OUCHGEMA4**	**GEC** : Mathematics– IV Linear Programming	6	3	25	75	100	5
	III	**22OUCHGEPH4**	**GEC**: Physics- II Thermal Physics	4	3	25	75	100	4
	III	**22OUCHGEPH4P**	**GEC** : Physics Practical-I	2	3	40	60	100	1
	III	**22OUCH51**	**Core**: Organic Chemistry-I	4	3	25	75	100	4
	III	**22OUCH52**	**Core**: Physical Chemistry-I	4	3	25	75	100	4
	III		**DSEC I**	4	3	25	75	100	4

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V	III	**22OUCH5P**	**Core**: Practical – III Gravimetric Estimation and Organic Preparations	4	6	40	60	100	5
	III		**Core**: Practical – I Physical Chemistry Experiments	4	-	-	-	-	-
	III	**22OUCHGEPH5**	**GEC**: Physics- III Electricity and Electronics	4	3	25	75	100	4
	III		**GEC** : Physics Practical-II	2	-	-	-	-	-
	IV	**22OUCHSE5**	**SEC**: Cheminformatics	2	3	25	75	100	2
	IV	**22OUAECEV5**	**AECC:** Environmental Studies	2	3	25	75	100	2
VI	III	**22OUCH61**	**Core**: Organic Chemistry -II	4	3	25	75	100	4
	III	**22OUCH62**	**Core**: Physical Chemistry-II	4	3	25	75	100	4
	III		**DSEC II**	4	3	25	75	100	4
	III	**22OUCH61P**	**Core:** Practical –IV Physical Chemistry Experiments	4	6	40	60	100	5
	III	**22OUCH62P**	**Core**: Practical – V Organic Analysis & Estimation	4	6	40	60	100	5
	III	**22OUCHGEPH6**	**GEC** : Physics- IV Optics	4	3	25	75	100	4
	III	**22OUCHGEPH6P**	**GEC**: Physics Practical-II	2	3	40	60	100	1
	IV	**22OUCHSE61**	**SEC**: Green and Nano Chemistry	2	3	25	75	100	2
	IV	**22OUAECVE6**	**AECC**: Value Education	2	3	25	75	100	2
	V	**22OU5NS4/ 22OU5PE4**	Extension Activities NSS/ Phy. Education	-	3	25	75	100	1
			Total	180					140

GEC : Generic Elective Course
SEC : Skill Enhancement Course
DSEC : Discipline Specific Elective Course
AECC: Ability Enhancement Compulsory Course
IDC : Inter Disciplinary Course

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DSEC: Discipline Specific Elective Course

Semester V (DSEC I- Choose any one)

1. **Inorganic and Analytical Chemistry - 22OUCHDSE5A**
2. Chemistry of Materials - 22OUCHDSE5B

Semester VI (DSEC II- Choose any one)

1. **Inorganic and Applications of Computer in Chemistry - 22OUCHDSE6A**
2. Diffraction Methods and Applications - 22OUCHDSE6B

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DEPARTMENT OF CHEMISTRY-UG

Generic Elective Course

(For B.Sc., N&D**)**

CBCS with OBE

COURSE STRUCTURE

(w.e.f. 2022 – 2023 Batch onwards)

Semester	Course Code	Title of the Course	Teaching hrs. (Per week)	Duration of Exam (hrs.)	Marks allotted			Credits
					CIA	SE	Total	
III	22OUNDGECH3	**GEC** : Chemistry-I Bio Chemistry	4	3	25	75	100	4
		GEC: Chemistry Practical - I Inorganic Qualitative Analysis	2	-	-	-	-	
IV	22OUNDGECH4	**GEC** : Chemistry-II Environmental and Organic Chemistry	4	3	25	75	100	4
	22OUNDGECH4P	**GEC:** Chemistry Practical - I Inorganic Qualitative Analysis	2	3	40	60	100	1
V	22OUNDGECH5	**GEC :** Chemistry-III Applied Chemistry	4	3	25	75	100	4
		GEC : Chemistry Practical -II Volumetric Analysis	2	-	-	-	-	-
VI	22OUNDGECH6	**GEC** :Chemistry-IV Applied and Medicinal Chemistry	4	3	25	75	100	4
	22OUNDGECH6P	**GEC** : Chemistry Practical - II Volumetric Analysis	2	3	40	60	100	1

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DEPARTMENT OF CHEMISTRY-UG

Generic Elective Course

(For B.Sc., Physics**)**

CBCS with OBE

COURSE STRUCTURE

(w.e.f. 2022 – 2023 Batch onwards)

Semester	Course Code	Title of the Course	Teaching hrs. (Per week)	Duration of exam (hrs)	Marks allotted			Credits
					CIA	SE	Total	
III	**22OUPHGECH3**	**GEC**: Chemistry –I Physical Chemistry	4	3	25	75	100	4
		GEC: Chemistry Practical - I Inorganic Qualitative Analysis	2	-	-	-	-	
IV	**22OUPHGECH4**	**GEC**: Chemistry –II Organic and Physical Chemistry	4	3	25	75	100	4
	22OUPHGECH4P	**GEC:** Chemistry Practical -I Inorganic Qualitative Analysis	2	3	40	60	100	1
V	**22OUPHGECH5**	**GEC** : Chemistry –III Inorganic, Physical and Medicinal Chemistry	4	3	25	75	100	4
		GEC: Chemistry Practical - II Volumetric Analysis	2	-	-	-	-	-
VI	**22OUPHGECH6**	**GEC** : Chemistry –IV Analytical and Inorganic Chemistry	4	3	25	75	100	4
	22OUPHGECH6P	**GEC:** Chemistry Practical - II Volumetric Analysis	2	3	40	60	100	1

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NOTE:

The students are permitted to obtain additional credits (Optional)

1. MOOCs / SWAYAM / NPTEL Courses (Online)
2. Project

Year	Semester	Title	Duration of Study	Credit
III	VI	Project title	6 months	1

Compulsory Courses:

Year	Semester	Nature of Course	Course Code	Title of the Course	Hours	Offered to students of
I	I	Add on Course	22CHAOC 22CHAOCP	Water Analysis Lab in Water Analysis	30	I B.Sc., Chemistry
II	III&IV	Certificate Course	22CHC 22CHCP	Small Scale Industrial Chemicals Lab in Small Scale Industrial Chemicals	90	II year students of all other disciplines
III	V	Value Added Course	22CHVAC 22CHVACP	Cosmetic Products Lab in Cosmetic Products	30	III B.Sc., Chemistry

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Department of Chemistry					Class: I B.Sc			
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Contact Hours/ Week**	**CIA**	**SE**	**Total**
I	Core	**22OUCH11**	General Chemistry -I	4	4	25	75	100

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

Course Objectives:

1. To outline the fundamental concepts of organic chemistry.
2. To gain knowledge about electronic effects, bonding and its influences.
3. To understand about the atomic structure and periodic properties.
4. To compare the hybridization and shapes of simple inorganic molecules based on VB, VSEPR and MO theories.
5. To discuss the gas laws, various types of molecular velocities and explain the behavior of real gas.

Course Content:

Unit -- I Fundamentals of Organic Chemistry: Classification of organic compounds- differences between organic and inorganic compounds- IUPAC system of nomenclature of common organic compounds (upto C-10)- alkanes, alkenes, alkynes, cycloalkanes and aromatic compounds - Naming of organic compounds with one functional group- halogen compounds, alcohols, phenol, aldehydes, ketones, carboxylic acids and its derivatives, cyano compounds, amines, nitro compounds (Both aliphatic and aromatic) -Naming of compounds with two functional groups - Naming of heterocyclic compounds containing one hetero atoms present in five/six membered rings-calculation of empirical and molecular formulae-definition and problems-Hybridization and geometry of molecules (methane, ethylene and acetylene) -bond angle, bond length, bond strength of C-H and C-C bonds.

Unit -- II Basic Concepts of Organic Compounds: Vander Waal's interactions-hydrogen bonds- inter & intra molecular forces and their effects on physical properties -electronic effects -inductive effect, resonance effect -drawing of resonance structures -conditions for resonance -stability of resonance structures, hyper conjugation, electromeric effect, steric

effect- Dissociation of bonds -homolysis and heterolysis –preparation and properties of radicals, carbocations and carbanions- stability of radicals, carbocations and carbanions- attacking reagents – nucleophiles and electrophiles-Types of organic reactions- electrophilic, nucleophilic addition, substitution and elimination reactions (elementary idea with examples).

Unit -- III Atomic Structure and Periodic Properties: Introduction to atomic structure- Rutherford concept and its draw backs-Planck's quantum theory -Bohr's model of hydrogen atom (no derivation)-atomic orbitals-shapes of s, p and d- orbitals- Quantum numbers- Principal, Azimuthal, Magnetic and Spin quantum numbers and their significance - Pauli's exclusion principle – Hund's rule- Aufbau Principle, (n+l) rule-Stability of half-filled and completely filled orbitals-inert pair effect-Periodic properties: Classification of elements as s, p, d and f-block elements- Periodic table anomalies and variations in atomic radius, ionic radius, electronic configuration, electron affinity and electro negativity, ionization energy and metallic character of elements along the group and periods and their influences on stability, colour, coordination number, geometry, physical and chemical properties- Factors affecting the electron affinity and ionization energy .

Unit -- IV Chemical Bonding: Ionic bond-general properties of ionic compounds - Lattice energy-Born-Haber Cycle-Polarizing power and Polarizability-Covalent character of ionic compounds -Fajan's rules -Covalent bond -structure and bonding of homo and heteronuclear molecules -Valence bond theory- orbital overlap-hybridization- sp^3, sp^2, sp - sigma and pi bonds- VSEPR Theory -postulates - Shapes of simple inorganic molecules ($BeCl_2$, BF_3, PCl_5, SF_6, H_2O, NH_3)- MO Theory-Bonding and anti-bonding orbital's-Applications of MO theory H_2, He_2, N_2, O_2, HF and CO molecules-Comparison of VB and MO Theories.

Unit -- V Gaseous State: Postulates of Kinetic theory of gases - gas laws (derivation not required) – Maxwell distribution of molecular velocities-equation-graphical representation (derivation not required)- Temperature dependence of these distributions -Definition of Most probable velocity , Average velocity, RMS velocity - collision diameter, collision number, collision frequency, Mean free path of molecules- reason for deviation of real gases from ideal behavior – compressibility factor- Van der Waals equation of state for real gases –. Boyle temperature-Law of corresponding states and reduced equation of state.

Books for Study:

1. Jain M.K. Sharma S.C., (2009), "*Modern Organic Chemistry*", Vishal Publishing Co., Jalandhar.
2. Madan. R. D., (2011), "*Modern Inorganic Chemistry*," 3rd Revised Edition, S. Chand & Company Ltd., New Delhi.
3. Puri B.R., Sharma L.R.and Madan Pathania S., (2009), "*Principles of Physical Chemistry*", Vishal Publishing Co, Jalandhar.

Books for Reference:

1. Finar I. L., (2011), "*Organic Chemistry*" Volume I, Pearson Education (Singapore) Pvt. Ltd, Indian Branch, New Delhi.
2. Puri B.R., Sharma L.R., Kalia K.C., (2017), "*Principles of Inorganic Chemistry*," 23rd Edition, Shoban Lal Nagin Chand & Co., New Delhi.
3. Morrision R.T. and Boyd R.N., (2011), "*Organic Chemistry*", 7th Edition, Dorling Kindersley Pvt. Ltd., New Delhi.
4. Soni P.L. and Dharmarha O.P., (2001), "*Text Book of Physical Chemistry*", Sultan Chand & Sons, New Delhi.
5. Tewari K.S., Vishnoi N. K. and Mehotra S.N., (2001), "*A Text Book of Organic Chemistry*", 1st Edition, Vikas Publishing House Pvt. Ltd., New Delhi.

Web Resources/e-books:

1. https://nptel.ac.in./courses/104/106/104106119/
2. https://www.askiitians.com/revision-notes/chemistry/gaseous-state/
3. https://www.khanacademy.org/science/chemistry/periodic-table
4. https://www.khanacademy.org/science/chemistry/chemical-bonds#hybridization-and-hybrid-orbitals-chemistry

Pedagogy:

Chalk and Talk method, Power point Presentations, Seminar, Group Discussion, Quiz through ICT-Mode

Rationale for nature of Course:

Knowledge and Skill:

This course will enable the students to name the organic molecules by apply IUPAC system, to draw the IUPAC system of organic molecules, to acquired knowledge about the

gas law governing the physical and chemical behavior of gases, to recall the atomic structure, periodic table and its elements, current bonding models for simple organic and inorganic molecules in order to predict.

Activities to be given:

1. The basic study of chemical bonding helps the students to understand the bonding nature of organic compounds.
2. To identify and compare the colour and properties of various inorganic substances using laboratory procedure.
3. To construct the structure and bonding of organic and inorganic molecules using atomic model set.
4. The concept of gas laws and real gases were explained by doing small experiments and chart ork.

Course Learning Outcomes (CLOs)

CLOs	Course Learning Outcomes statements	Knowledge Level (According to Bloom's Taxonomy)
CLO 1	Apply IUPAC concept to name the organic molecules	K1 to K4
CLO 2	Identify the geometry and stability of organic intermediates formed by homolytic and heterolytic cleavages	K1 to K4
CLO 3	State the fundamental concepts of atomic structure, explain the periodic properties and its periodic variations	K1 to K4
CLO 4	Illustrate the formation of chemical bonding, compare VB theory and MO theory	K1 to K4
CLO 5	Recognize kinetic theory of ideal gases, gas laws, Vanderwaal's equation	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

Annexure-18

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

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

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

LESSON PLAN: TOTAL HOURS (60 Hrs)

Unit	Description	Hours	Mode
I	Classification of organic compounds- differences between organic and inorganic compounds- IUPAC system of nomenclature of common organic compounds (upto C-10)- alkanes, alkenes, alkynes, cycloalkanes and aromatic compounds	3	Chalk and Talk, PPT
	Naming of organic compounds with one functional group- halogen compounds, alcohols, phenol, aldehydes, ketones, carboxylic acids and its derivatives, cyano compounds, amines, nitro compounds (Both aliphatic and aromatic) -Naming of compounds with two functional groups - Naming of heterocyclic compounds containing one hetero atoms present in five/six membered rings.	4	Chalk and Talk, PPT
	Calculation of empirical and molecular formulae- Hybridization and geometry of molecules (methane, ethylene and acetylene) - bond angle, bond length, bond strength of C-H and C-C bonds.	3	Chalk and Talk, PPT
II	Vander Waal's interactions-hydrogen bonds- inter & intra molecular forces and their effects on physical properties -electronic effects -inductive effect, resonance effect -drawing of resonance structures -conditions for resonance -stability of resonance structures, hyper conjugation, electromeric effect, steric effect-	5	Chalk and Talk, PPT
	Dissociation of bonds -homolysis and heterolysis –preparation and properties of radicals, carbocations and carbanions- stability of radicals, carbocations and carbanions-attacking reagents – nucleophiles and electrophiles-Types of organic reactions-electrophilic, nucleophilic addition, substitution and elimination reactions (elementary idea with examples).	7	Chalk and Talk, PPT, group discussion
III	Introduction to atomic structure-Rutherford concept and its draw backs-Planck's quantum theory -Bohr's model of hydrogen atom (no derivation)-atomic orbitals-shapes of s, p and d- orbitals-Quantum numbers- Principal, Azimuthal, Magnetic and Spin quantum numbers and their significance - Pauli's exclusion	7	Chalk and Talk, PPT

	principle – Hund's rule- Aufbau Principle, (n+l) rule-Stability of half-filled and completely filled orbitals-inert pair effect		
	Periodic properties: Classification of elements as s, p, d and f-block elements- Periodic table anomalies and variations in atomic radius, ionic radius, electronic configuration, electron affinity and electro negativity, ionization energy and metallic character of elements along the group and periods and their influences on stability, colour, coordination number, geometry, physical and chemical properties- Factors affecting the electron affinity and ionization energy.	7	Chalk and Talk, PPT,
IV	Ionic bond-general properties of ionic compounds - Lattice energy-Born-Haber Cycle-Polarizing power and Polarizability-Covalent character of ionic compounds -Fajan's rules -Covalent bond - structure and bonding of homo and heteronuclear molecules	4	Chalk and Talk, PPT and Seminar
	Valence bond theory- orbital overlap-hybridization- sp^3, sp^2, sp - sigma and pi bonds- VSEPR Theory -postulates - Shapes of simple inorganic molecules ($BeCl_2$, BF_3, PCl_5, SF_6, H_2O, NH_3).	6	Chalk and Talk, PPT and Virtual Lab.
	MO Theory-Bonding and anti-bonding orbital's-Applications of MO theory H_2, He_2, N_2, O_2, HF and CO molecules-Comparison of VB and MO Theories.	4	Chalk and Talk, PPT and Virtual Lab
V	Postulates of Kinetic theory of gases - gas laws (derivation not required) – Maxwell distribution of molecular velocities-equation-graphical representation (derivation not required)- Temperature dependence of these distributions.	4	Chalk and Talk, PPT
	Definition of Most probable velocity, Average velocity, RMS velocity - collision diameter, collision number, collision frequency, Mean free path of molecules- reason for deviation of real gases from ideal behavior – compressibility factor- Van der Waals equation of state for real gases –. Boyle temperature-Law of corresponding states and reduced equation of state.	6	Chalk and Talk, PPT
	Total Hours	60	

Course Designers: 1. Dr.(Mrs).S.Manimekalai

2. Dr.(Mrs).P.Bhuvaneswari

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Department of Chemistry					Class: I B.Sc			
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Contact Hours/ Week**	**CIA**	**SE**	**Total**
I	Skill Enhancement Course	**22OUCHSE11**	Good Laboratory Practices	2	2	25	75	100

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

Course Objectives:

1. To outline the fundamental concepts of laboratory practices.
2. To gain knowledge about instrument techniques and laboratory preparation procedure.
3. To learn about gravimetric methods of analysis.
4. To study the purification techniques.
5. To acquire knowledge about principles and techniques of semi-micro methods.

Course content:

Unit -- I General Laboratory Practices: Common calculations in chemistry laboratories. Understanding the details on the label of reagent bottles. Preparation of solutions. Molarity and normality of common acids and bases. Dilutions. Percentage solutions. Molar, Molal and Normal solutions. Technique of handling micropipettes; Knowledge about common toxic chemicals and safety measures in their handling.

Unit --II Instrument Techniques and Laboratory Preparation Procedure: Use of micropipette, analytical balances, pH meter, conductivity meter, rotary evaporator, potentiometer. Use of purified water in lab experiments, Cleaning and drying of glasswares, Preparation of crystals from given salt. Preparation of Dyes-Methyl Orange, Bismark Brown, Malachite green and Indigo, Demonstration of preparation of material using Sol-gel procedure.

Unit -- III Gravimetric Methods of Analysis: Introduction- contamination of precipitates-Co-precipitation-types, post precipitation- differences between Co precipitation and post precipitation-precipitation from homogeneous solution-theory of precipitation-properties of a precipitate-general rules of precipitation-specific and selective precipitants-choice of precipitants.

Unit–IV General Purification Techniques: Purification of solid organic compounds-recrystallization, use of miscible solvents, use of drying agents and their properties, sublimation. Purification of liquids. Experimental techniques of distillation, fractional distillation, distillation under reduced pressure.

Unit --V Principles and Techniques of Semi-micro Methods: Aims of semi micro qualitative analysis – theory behind inorganic qualitative analysis – Dry reactions – precipitation reactions – Applications of solubility product principle in qualitative analysis – Complexation reaction – Oxidation and reduction reactions – Spot tests – preparation of solution for cation testing on semi micro scale – Removal of interfering ions in the analysis of cations – oxalate, borate, fluoride, chromate, phosphate and arsenite.

Books for Study:

1. Gopalan R. Subramanian. P.S., Rengarajan. K., (2005), *"Elements of Analytical Chemistry",* S. Chand & Sons, New Delhi.
2 .Venkateswaran V., Veeraswamy R. and Kulandaivelu A.R., (2007), *"Basic Principles of Practial Chemistry",* S. Chand & Sons, New Delhi.

Books for Reference:

1. Skoog D.A. West D.M. and Holler F.J., (1990), *"Analytical Chemistry"* 5th Edition Saunders College Publishing, Philadelphia.
2. Mendham J., (2009), Vogel's *"Quantitative Chemical Analysis"* Pearson.
3. Garner, W.Y., Barge M.S., Ussary. P.J., (1992), *"Good Laboratory Practice Standards: Application for field and Laboratory studies",* Wiley VCH.
4. Dash U.N., (1995), *"Analytical Chemistry Theory and Practice"*, Sultan Chand and Sons Educational Publishers, New Delhi.
5. Svehla G. and Vogel's, (2012), *"Qualitative Inorganic Analysis,"* Pearson Education.

Web Resource/e-Books:

1. https://ntp.niehs.nih.gov/iccvam/suppdocs/feddocs/oecd/oecd_glpcm.pdf
2. https://www.researchgate.net/profile/Mathew-Olaniyan-2/publication/317181728_LECTURE_NOTES_ON_LABORATORY_INSTRUMENTATION_AND_TECHNIQUES/links/592b2315aca27295a80b7793/LECTURE-NOTES-ON-LABORATORY-INSTRUMENTATION-AND-TECHNIQUES.pdf

3. https://soe.unipune.ac.in/studymaterial/ashwiniWadegaonkarSelf/Unit%201%20621.pdf
4. https://ncert.nic.in/pdf/publication/sciencelaboratorymanuals/classXI/chemistry/kelm202.pdf
5. https://www.ijddr.in/drug-development/laboratory-techniques-of-purification-and-isolation.pdf
6. http://www.demarcheiso17025.com/document/Guidelines%20for%20the%20validation%20and%20verification%20of%20quantitative%20and%20qualitative%20test%20methods.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 acquire lab knowledge on preparation of molar and normal solution, gain skill to handle the instruments, gravimetric methods, purification techniques, interfering ions separation in inorganic semi-micro qualitative analyses.

Employability Oriented: Take up employment in various chemical laboratories.

Activities to be given:

1. To prepare normal and molar solution of given substances in laboratory.
2. To predict the P^H value of consumer products using P^H meter.
3. To identify carcinogenic chemicals in laboratory.
4. To purify the impure substance using recrystallization method and sublimation process.
5. To analyze the inorganic mixture by semi-micro qualitative method.

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Course Learning Outcomes (CLOs)

CLOs	Course Learning Outcomes statements	Knowledge Level (According to Bloom's Taxonomy)
CLO 1	Understand the basics concept of laboratory practice on the label of reagent bottles and Preparation of mole and normal solutions.	K1 to K3
CLO 2	Explain about the various micropipette, analytical balances, pH meter, conductivity meter, rotary evaporator, potentiometer	K1 to K3
CLO 3	Distinguish between co precipitation and post precipitation. Explain the type's precipitation.	K1 to K3
CLO 4	Classify recrystallization, use of miscible solvents, use of drying agents and their properties, sublimation	K1to K3
CLO 5	Apply the solubility product principle in qualitative analysis Complexation reaction Oxidation and reduction reactions.	K1 to K3

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)

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

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

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LESSON PLAN : TOTAL HOURS (30 Hrs)

Unit	Description	Hours	Mode
I	Common calculations in chemistry laboratories. Understanding the details on the label of reagent bottles. Preparation of solutions. Molarity and Normality of common acids and bases. Dilutions. Percentage solutions	3	Chalk and Talk, PPT .
	Molar, Molal and Normal solutions. Technique of handling micropipettes; Knowledge about common toxic chemicals and safety measures in their handling.	2	Chalk and Talk, PPT
II	Use of micropipette, analytical balances, pH meter, conductivity meter, rotary evaporator, potentiometer. Use of purified water in lab experiments, Cleaning and drying of glassware's, Preparation of crystals from given salt	3	Chalk and Talk, PPT,
	Preparation of Dyes, Demonstration of preparation of material using Sol-gel procedure.	2	Chalk and Talk
III	Introduction- contamination of precipitates-Co-precipitation-types, post precipitation- differences between Co precipitation and post precipitation	3	Chalk and Talk, PPT,
	precipitation from homogeneous solution-theory of precipitation-properties of a precipitate	3	Chalk and Talk,
	General rules of precipitation-specific and selective precipitants-choice of precipitants.,	3	Chalk and Talk, PPT,
IV	Purification of solid organic compounds- recrystallization, use of miscible solvents, use of drying agents and their properties, sublimation.	3	Chalk and Talk,
	Purification of liquids. Experimental techniques of distillation, fractional distillation, distillation under reduced pressure.	2	Chalk and Talk, PPT,
V	Composition and functions of blood, blood coagulation. Anemia, Regulation,	3	Chalk and Talk, PPT,
	Estimation and interpretation of data for blood sugar, urea, creatinine, cholesterol and bilirubin.	3	Chalk and Talk, PPT,
	Total hours	30	

Course Designer: Miss: K.Punitha

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Department of Chemistry					Class: I B.Sc			
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Contact Hours/ Week**	**CIA**	**SE**	**Total**
I	Skill Enhancement Course	**22OUCHSE12**	Pharmaceutical Chemistry	2	2	25	75	100

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

Course Objectives:

1. To know the pharmaceutical terms, and find out the symptoms and drugs for chronic diseases.
2. To understand sulpha drugs in antibacterial.
3. To provide the importance of analgesics and its classifications, and study the antipyretic drugs, drugs that influences CNS.
4. To study anaesthetics and its classifications, and provide the important aspects of cancer antineoplastics, diabetes and blood related factors.
5. To study vitamins and its classifications, physiological functions of harmones and enzymes.

Course Content:

Unit--I Basic Pharmaceutical Chemistry: Definition of the following terms: drug, pharmachophore, pharmacology, Pharmacopeia, bacteria, virus and vaccine. Causes, symptoms and drug for anemia, jaundice, cholera, malaria and filarial. Indian Medicinal plants and uses – Tulasi, Neem, Kizhanelli, Mango, Semparuthi, Adadodai and Thoothvelai.

Unit—II Antibacterials: Sulpha drugs-examples and actions-prontosil, sulphathiazole, sulphafurazole. Antibiotics-definition and action of penicillin, streptomycin, chloramphenicol, erythromycin-tetracyclin – SAR of chloramphenicol only. Antiseptics and disinfectans – definition and distinction – phenolic compounds, chlorocompounds and cationic surfactant.

Unit--III Analgesics and CNS stimulants: Analgesics: Definition and Actions – narcotic and non- narcotic – morphine and its derivatives, pethidine and methodone – disadvantages and uses. Antipyretic analgesics - salicylic derivative, paracetamol, ibuprofen. Drugs affecting CNS – Definition, distinction and examples for tranquilisers, sedatives, hypnotics, psychedelic drugs – LSD, Hashish – their effects.

Unit-- IV Anasthetics and Drugs for Chronic diseases: Anaesthetics - definition – local and general – volatile nitrous oxide, ether, Chloroform, cyclo propane – uses and disadvantages – non – volatile intravenous – thiopental sodium, methohexitone, propanidid. Causes, medicines and their mode of action for the treatment of cancer – antineoplastics – diabetes – hypoglycemic agents AIDS – AZT, DDC. Blood: Grouping, composition, Rh factor, blood pressure, hyper tension and hypotension.

Unit-- V Vitamins, Harmones and Enzymes: Vitamins – fat soluble vitamins – (i) vitamin A; (ii) vitamin D; (iii) vitamin B complex; (iv) vitamin C; (V) vitamin E; (vi) vitamin K; (vii) vitamin P. Hormones – Introduction, properties and function of hormones, chemical nature of hormones. Physiological function of some harmones: Adrenaline, thyroxin, oxytoxin, insulin, the sex harmones. Enzymes – Chemical nature of enzymes, classification of enzymes, properties of enzymes, mechanism of enzyme action. Action of Co-enzymes.

Books for Study:

1. Bagavathi sundari.K., (2008), *"Applied Chemistry"*, MJP Publishers, Chennai.
2. Vhenchu Lakshmi N.V., (2013), *"Pharmaceutical Inorganic Chemistry"*, Theory and Practice, Dorling Kindersley Pvt. Ltd., India.
3. Roseline.A., (2011), *"Pharmacognosy"*, MJP Publishers, Chennai.

Books for Reference:

1. Jayashree Ghosh, (2012), *"A Text Book of Pharmaceutical Chemistry"*, 3rd Edition, S.Chand & Company LTD, New Delhi.
2. Vhenchu Lakshmi. N.V, (2013), *"Pharmaceutical Inorganic Chemistry"*, Theory and Practice, Dorling Kindersley Pvt. Ltd., India.
3. Tisdale, S.L., Nelson, W.L. and Beaton, J. D., (1990), "*Soil Fertility and Fertilizersl"*, Macmillian Publishing Company, New York.

4. Joseph E. and Rice, (2014), *"Organic Chemistry Concepts and Applications for Medicinal Chemistry"*, Academic Press.
5. David G. and Watson, (2012), *"Pharmaceutical Analysis-A Textbook for Pharmacy Students and Pharmaceutical Chemists*", 3rd Edition, Elsevier.

Web Resource/E-Books:

1. https://www.fpharm.uniba.sk/uploads/media/Seminar_1_from_Pharmaceutical_chemistry_I_02.pdf
2. https://www.sciencedirect.com/topics/chemistry/antibacterial-agent
3. https://www.drugs.com/drug-class/central-nervous-system-agents.html
4. https://www.asahq.org/madeforthismoment/anesthesia-101/types-of-anesthesia/anesthesia-risks/
5. https://www.thieme-connect.com/products/ejournals/pdf/10.1055/s-2007-958715.pdf
6. https://downloads.lww.com/wolterskluwer_vitalstream_com/samplecontent/9780781779296-beale/samples/frontmatter.pdf
7. file:///D:/Users/Intel/Downloads/Pharmaceutical%20chemistry1%20(Inorganic)%20By%20Mohammed%20Ali%20.pdf

Pedagogy:

Chalk and Talk, PPT, Group Discussion, Quiz, Virtual labs.

Rationale for nature of Course:

Knowledge and Skill:

1. To understand the basic terms involved in pharmaceutical chemistry
2. To study the sulpha drug and identify the different types of drugs
3. To acquire the knowledge about the Analgesics and CNS stimulants
4. To study the students may apply their skills and knowledge to a variety of areas, such as development of Anasthetics and drugs to treat rare diseases.
5. To study the different types of Vitamins and Harmones in physiological functions.

Entrepreneurship Oriented: Students will get employment in pharmaceutical industries.

Activities to be given:

1. To find out the chemicals components present in the drugs that is commercially available.
2. To list out the classification of various drugs.
3. To identify different types of analgesic drugs used in different diseases.
4. Find the vitamins present in food sources.

Course Learning Outcomes (CLOs)

CLOs	Course Learning Outcomes statements	Knowledge Level (According to Bloom's Taxonomy)
CLO 1	Students can able to study about the important terminologies of Pharma Chemistry, and brings about the knowledge towards Indian Medicinal Plants.	K1 to K3
CLO 2	Students can able to know about Sulpha drugs, Antibiotics and their important features, and gives the clinical uses of Antiseptics and disinfectants.	K1 to K3
CLO 3	Gives a knowledge towards the Basic information about Analgesics, Anti pyretic drugs, and the drugs affecting CNS; and its examples.	K1 to K3
CLO 4	Brings about a clear idea towards Anaesthetics and its significants, and provide the importantance of the drugs for cancer, Diabetes, AIDS and Blood related diseases.	K1 to K3
CLO 5	Can brings the knowledge toward Vitamins and their classifications. To give the informations about harmones and enzymes along with their physiological functions and mode of actions through a specific mechanism	K1 to K3

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

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

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

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

LESSON PLAN: TOTAL HOURS (30 Hrs)

Unit	Description	Hours	Mode
I	**Basic Pharmaceutical Chemistry** Definition of the following terms: drug, pharmachophore, pharmacology, Pharmacopeia, bacteria, virus and vaccine.	2	Chalk and Talk/PPT
	Causes, symptoms and drug for anemia, jaundice, cholera, alaria and filarial.	1	Chalk and Talk
	Indian Medicinal plants and uses – Tulasi, Neem, Kizhanelli, Mango, Semparuthi, Adadodai and Thoothvelai.	2	Chalk and Talk /PPT
II	**Antibacterials** Sulpha drugs-examples and actions-prontosil, sulphathiazole, sulphafurazole. Antibiotics-definition and action of penicillin, streptomycin, chloramphenicol,	3	Chalk and Talk
	Antiseptics and disinfectans – definition and distinction – phenolic compounds, chlorocompounds and cationic surfactant.	2	Chalk and Talk /PPT
III	**Analgesics and CNS stimulants** Analgesics: Definition and Actions – narcotic and non- narcotic – morphine and its derivatives,	2	Chalk and Talk /PPT
	Pethidine and methodone – disadvantages and uses. Antipyretic analgesics - salicylic derivative, paracetamol, ibuprofen.	2	Chalk and Talk

	Drugs affecting CNS – Definition, distinctionand examples for tranquilisers, sedatives, hypnotics, psychedelic drugs – LSD, Hashish – their effects.	2	Chalk and Talk /PPT
IV	**Anasthetics and Drugs for Chronic diseases** Anaesthetics - definition – local and general – volatile nitrous oxide, ether, Chloroform, cyclo propane – uses and disadvantages- non – volatile intravenous – thiopental sodium, methohexitone, propanidid.	3	Chalk and Talk /PPT
	Causes, medicines and their mode of action for the treatment of cancer – antineoplastics, diabetes – hypoglycemic agents AIDS – AZT, DDC.	2	Chalk and Talk /PPT
	Blood: Grouping, composition, Rh factor, blood pressure, hyper tension and hypotension.	2	Chalk and Talk /PPT
V	**Vitamins, Harmones and Enzymes** Vitamins – fat soluble vitamins – (i) vitamin A; (ii) vitamin D; (iii) vitamin B complex; (iv) vitamin C; (V) vitamin E; (vi) vitamin K; (vii) vitamin P.	3	Chalk and Talk
	Hormones – Introduction, properties and function of hormones, chemical nature of hormones. Physiological function of some harmones: Adrenaline, thyroxin, oxytoxin, insulin, the sex harmones.	2	Chalk and Talk /PPT
	Enzymes – Chemical nature of enzymes, classification of enzymes, properties of enzymes, mechanism of enzyme action. Action of Co-enzymes.	2	Chalk and Talk
	Total hours	30	

Course Designer: Dr. (Mrs). A.Ramya

Annexure-18

Department of Chemistry					Class: I UG			
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Contact Hours/ Week**	**CIA**	**SE**	**Total**
I	Inter Disciplinary Course	**22OUCHID1**	Chemistry in Everyday Life	2	2	25	75	100

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

Course Objectives:

1. To learn how to make soaps and detergents.
2. To understand importance of vitamins and minerals.
3. To acquire knowledge about cosmetics and plastics.
4. To understand the manufacturing technique for small–scale industrial chemicals.
5. To gain knowledge about plaster of pairs, gum and shoe polish.

Course Content:

Unit – I Soaps and Synthetic Detergents : Introduction- detergent action-types of detergents- raw materials. Washing powder: Introduction- raw materials- method of manufacturing. Soaps: Introduction-raw materials-Manufacturing methods- Features in the preparation of toilet soaps.

Unit -- II Vitamins and Minerals: Need for vitamins in body, types of vitamins- water soluble and fat soluble vitamins, sources and deficiency diseases of vitamins A, B complex, C, D, E and K- Role of minerals in body, iodine deficiency and remedy.

Unit -- III Cosmetics and Plastics: Introduction – classification – bathing oils, face creams, skin products, hair dye, and shampoo- general formulation of each type- toxicology of cosmetics. Plastics in everyday life - uses of PET, PVC – recycling of plastics – biodegradable of plastics – Environmental hazards of plastics.

Unit -- IV Phenoils, Incense stick, Sambirani and Napthalene balls: Phenoils**:** Introduction- raw materials - methods of preparation and uses. Incense stick**:** Introduction- raw materials- method of manufacturing and uses. Sambrani: Introduction- raw materials-

methods of manufacturing and uses. Naphthalene Balls: Introduction- raw materials-methods of manufacturing and uses.

Unit -- V Plaster of paris, Gum and Shoe polish: Plaster of Paris**:** Introduction- Method of manufacturing and uses. Gum: Introduction- Method of manufacturing and uses. Shoe polish**:** Introduction- raw materials-Method of manufacturing and uses.

Books for study:

1. Sharma B.K., (2000*), "Industrial Chemistry "* Goel Publishing House, Meerut.
2. Kirpal Singh., (2012), *"Chemistry in everyday life"*, PHI Learning Pvt. Ltd., 3rd Edition.

Books for Reference:

1. Kumarappa J.C., *"Preparative materials"*, Institute of Rural Technology and Development, T. Kallupatti.
2. Sawyer W., (2000), *"Experimental cosmetics*", Dover publishers, New York.
3. Berg J. M., Tymoczeko J. L., Stryer l., (2008), *"Bio chemistry"*, W. H. Freeman.

Web resources/ E Books:

1. https://www.slideshare.net/BSMRSTUFUN/soap-and-detergentsoaps-detergents/
2. https://vikaspedia.in/health/nutrition/types-of-vitamins-and-minerals
3. https://www.chemicalsafetyfacts.org/plastics/
4. http://www.petrecycling.in/applications-of-pet/
5. https://www.vashutraders.com/post/sambrani101
6. https://www.britannica.com/technology/plaster-of-paris
7. https://byjus.com/chemistry/to-prepare-colloidal-solution-of-gum/
8. https://www.cs.mcgill.ca/~rwest/wikispeedia/wpcd/wp/s/Shoe_polish.htm

Pedagogy:

Chalk and Talk method, Power point Presentations, Seminar, Group Discussion, and Quiz through ICT-Mode

Rationale for nature of Course:

Entrepreneurship oriented:

This course will enable the students to develop their entrepreneurial skills that enable them to become a successful entrepreneur**.**

Knowledge and Skill: This course will enable the students to find different types of raw materials used in cosmetics, Soap and detergent.

1. Acquire the knowledge about detergents in comparison to soaps,
2. Understand the knowledge about varies types of vitamins present our body
3. Can prepare daily used products such as incense stick, sambrani and phenoils.

Activities to be given:

1. To find out the types of vitamins present in varies food.
2. List out the ingredients present in commercial soap.
3. List out the raw materials of incense stick, sambrani, phenoils and naphthalene balls which is commercially available.

Course Learning Outcomes (CLOs)

CLOs	Course Learning Outcomes statements	Knowledge Level (According to Bloom's Taxonomy)
CLO 1	Understand the cleaning action of soap and detergents.	K1 to K3
CLO 2	Explain the types of vitamins and role of minerals in body.	K1 to K3
CLO 3	Develop the skill of making cosmetics and consumer products.	K1 to K3
CLO 4	Demonstrate the preparation of some home products like Phenoils,Incense stick,Sambrani and Naphthalene balls.	K1 to K3
CLO 5	To know the manufacturing processes and uses of Plaster of Pairs, Gums and Shoe polish.	K1 to K3

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

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

(SCIENCE)

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

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

(ARTS)

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

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

LESSON PLAN: TOTAL HOURS (30 Hrs)

Unit	Description	Hours	Mode
I	Introduction-detergent action-types of detergent- raw materials...Washing powder: Introduction- raw materials - method of manufacturing. Enzymes used in commercial detergents. **Soaps:** Introduction - raw materials - Manufacturing methods- Features in the preparation of toilet soaps.	6	Chalk and Talk, PPT, group discussion. .
II	Need for vitamins in body, types of vitamins- water soluble and fat soluble vitamins, sources and deficiency diseases of vitamins A , B complex, C, D, E and K- Role of minerals in body, iodine deficiency and remedy	6	Chalk and Talk, PPT, group discussion.
III	Introduction – classification – bathing oils, face creams, skin products, hair dye, and shampoo- general formulation of each type - toxicology of cosmetics. Plastic in everyday life - uses of PET, PVC – recycling of plastics – biodegradable of plastics – Environmental hazards of plastics.	6	Chalk and Talk, PPT, group discussion.
IV	Phenoils: Introduction- raw materials - methods of preparation and uses. Incense stick: Introduction- raw materials- method of manufacturing and uses.	3	Chalk and Talk, PPT, group discussion
	Sambrani: Introduction- raw materials- methods of manufacturing and uses. Naphthalene Balls: Introduction- raw materials- methods of manufacturing and uses.	3	Chalk and Talk, PPT, group discussion.
V	Plaster of Paris: Introduction- Method of manufacturing and uses. Gum: Introduction- Method of manufacturing and uses. Shoe polish: Introduction- raw materials-Method of manufacturing and uses.	6	Chalk and Talk, PPT, group discussion , .
	Total Hours	30	

Course Designer: Mrs.V.Gokilaa

Annexure-18

Department of Chemistry					Class: I B.Sc			
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Contact Hours/ Week**	**CIA**	**SE**	**Total**
II	Core	**22OUCH21**	General Chemistry-II	4	4	25	75	100

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

Course objectives:

1. To identify the composition and stability of the nucleus and types of nuclear reactions.
2. To understand the acid base reactions, oxidation number and valency.
3. To know about basic metallurgical processes.
4. To learn the preparation, properties and importance of aliphatic compounds.
5. To study the basic concepts of structure of solids and semiconductors.

Course Content:

UNIT – I Nuclear Chemistry: Composition of the nucleus-stability of nuclei- mass defect-binding energy- nuclear fission-atom bomb- nuclear fusion- hydrogen bomb- Radioactivity- definition – nature of radiations from radioactive substances – comparison of the properties of α, β and γ radiations- detection and measurements of radioactivity – Geiger – Muller counter – radioactive decay –group displacement law – radioactive decay series – artificial radio activity –Half-life period-Average life period- applications of radioactive isotopes-problems using carbon dating.

UNIT – II Acids, Bases, Oxidation and Reduction: Modern concepts of acids and bases: Arrhenius, Bronsted- Lowry, Lewis and Lux-Flood; Relative strengths of acids and bases – amphoteric solvents- differentiating solvents- levelling effects. Hard and soft acids and bases: Pearson's concept –HSAB principle and its applications. Oxidation and reduction: Definitions- oxidation number-differences between oxidation number and valency- rules for calculating oxidation number- solved examples- oxidizing and reducing agents- redox reactions. Balancing of redox equations by oxidation number method.

UNIT – III Metallurgy: Occurrence of metals –basic metallurgical operations and metallurgy process – General methods involved in extraction of metals- concentration of ores – Froth floatation method and electromagnetic separation – calcinations –roasting – smelting; flux, slag –Alumino-thermic process. Extraction processes – Chemical reduction – electrolytic reduction – metal displacement – refining methods – distillation – fractional crystallization – electrolysis. Zone refining – Van Arkel de-Boer methods – electrolytic refining –chemical properties – important compounds and uses of Chromium ($CrCl_2$, Cr_2O_3), Manganese (MnO_2) and Nickel ($Ni(DMG)_2$.

UNIT – IV Aliphatic Compounds: Alkanes – General method of preparations- hydrogenation of alkenes and alkynes, reduction of alkyl halides, action of sodium on alkyl halides, hydrolysis of Grignard reagents, wurtz reaction , physical properties, reactions- bromination, iodination, fluorination, nitration, sulphonation, aromatisation, reactions with radical mechanism for substitution reaction – cracking (pyrolysis) - Alkenes: Preparation from alcohol, haloalkane, dihaloalkanes and alkynes - reactions of alkenes - mechanisms involved in addition of hydrogen, halogen, hydrogen halide, hypohalous acid, water, hydroboration, hydroxylation, ozonolysis and epoxidation - peroxide effect - allylic substitution, oxidation by $KMnO_4$ and polymerization - Application in the synthesis of following molecules. Akynes: preparation, reactions - addition of hydrogen, halogen, hydrogen halide, water, HCN, CH_3COOH, hydroboration – ozonolysis- dimerisation and cyclisation (polymerisation) - acidity of terminal alkynes.

UNIT – V Solid State: Forms of solids-Symmetry elements of a crystal- seven crystal systems, Space lattice and unit cells- Bravais lattice types and identification of lattice planes- Laws of Crystallography -Law of rational indices, Miller indices. X–Ray diffraction by crystals, Bragg's equation-derivation. Types of crystal-Molecular crystal(H_2O)-covalent crystal (diamond)-ionic crystal- Characteristic structure of NaCl and Wurtzite - Definition of Conductors, Insulators and Semi conductors- Defects in crystals- Schottky defect – Frenkel defect.

Books for Study:

1. Tewari.K.S and Vishnoi.N.K, (2017), *"A Text Book of Organic Chemistry"*, 4th Edition, Vikas Publishing House Pvt Ltd.
2. Arun Bahl and Bahl.B.S, (2016), *"A Text Book of Organic Chemistry"*, S Chand & Company, 22nd Edition.
3. Finar.I.L, (2004), *"Organic Chemistry"* Vol-1&2, 6th Edition, Pearson Education, South Asia.
4. Soni. P. L, Mohan Katyal, (2007), *"Text book of Inorganic Chemistry"*, 20th Edition, Sultan Chand & Sons, New Delhi.
5. Puri. B.R, Sharma. L.R and Pathania. M.S, (2016), *"Principles of Physical Chemistry"*, 47th Edition, Vishal Publishing Co.

Books for Reference:

1. Bhupinder Mehta and Manju Mehta, (2015), "*Organic Chemistry"*, 2nd Edition, PHI Learning Pvt Ltd.
2. Jain. M.K and Sharma. S. C, (2015), *"Modern Organic Chemistry"*, Visal Publishing Co.
3. Tewari.N, (2011), *"Advanced Organic Reaction Mechanism"*, 3rd Edition, Books & Allied (P) Ltd.
4. Malik. W. U., Tuli. G. D and Madan. R. D, (1998), *"Selected Topic in Inorganic Chemistry"* S. Chand & Company Ltd, New Delhi.
5. Kundu. N and Jain. S.K, (2000), *"Physical Chemistry"*, S. Chand & Company Ltd.
6. Barrow. G.M, (1996), *"Physical Chemistry"*, 6th Edition, McGraw-Hill Inc., US.

Web Resource/E-books:

1. https://wou.edu/chemistry/files/2017/01/CH105-Chapter-8-PDF-file.pdf
2. https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Book%3A_Basic_Principles_of_Organic_Chemistry_(Roberts_and_Caserio)/12%3A_Cycloalkanes_Cycloalkenes_and_Cycloalkynes
3. https://www2.chemistry.msu.edu/faculty/reusch/virttxtjml/chapt5.htm
4. https://www.britannica.com/science/metallurgy/Testing-mechanical-properties

5. https://nios.ac.in/media/documents/SrSec313NEW/313_Chemistry_Eng/313_Chemistry_Eng_Lesson5.pdf
6. https://www.rachidscience.com/2021/01/a-textbook-of-organic-chemistry-arun.html file:///D:/Users/Intel/Downloads/ATextbookofPhysicalChemistryVolume1byMandepDalal.pdf

Pedagogy:

Chalk and Talk, PPT, Group Discussion, Seminar , Quiz, Spot test, Virtual labs.

Rationale for nature of Course:

Knowledge and Skill:

1. This course to study and understand the chemical concepts, principles and theories of nuclear chemistry.
2. To study the students may apply their skills and knowledge to Acid base and oxidation and reduction reactions.
3. To gain the knowledge and skill to study the occurrence and extraction of metals. And uses of different metal components in our daily life.
4. To develop students ability and skill to acquire expertise over Aliphatic compounds including alkanes, alkenes, and alkynes.
5. To acquired knowledge about the solid state in crystal lattice structure and laws of rational indices and types of defects in crystals.

Activities to be given:

1. To identify the applications of radioactive isotopes in various field.
2. To balance the redox equation by oxidation number using chart work method.
3. To frame the structure of alkane, alkene and alkyne using atomic model set.
4. To find out the crystal structure and Miller indices using chart work and avagadro software to frame the structure of NaCl.

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Course Learning Outcomes (CLOs)

CLOs	Course Learning Outcomes statements	Knowledge Level (According to Bloom's Taxonomy)
CLO 1	Outline the concepts of nuclear reactions and its applications.	K1 to K4
CLO 2	Illustrate the modern concepts if acid and bases	K1 to K4
CLO 3	Explain the basics of metallurgy and the principles of extraction and refining on metals.	K1 to K4
CLO 4	Compare the properties of alkane, alkene and alkyne	K1 to K4
CLO 5	To classify the types of crystals in solid state. and Explain the defects in crystals.	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)

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

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

Annexure-18

LESSON PLAN: TOTAL HOURS (60 Hrs)

Unit	Description	Hours	Mode
I	**Nuclear Chemistry** Composition of the nucleus-stability of nuclei- mass defect-binding energy	2	Chalk and Talk/PPT
	Nuclear fission-atom bomb- nuclear fusion- hydrogen bomb- Radioactivity- definition – nature of radiations from radioactive substances	3	Chalk and Talk
	Comparison of the properties of α, β and γ radiations- detection and measurements of radioactivity –Geiger – Muller counter – radioactive decay –group displacement law –	3	Chalk and Talk /PPT
	Radioactive decay series – artificial radio activity –Half-life period-Average life period applications of radioactive isotopes-problems using carbon dating.	4	Chalk and Talk /PPT
II	Modern concepts of acids and bases: Arrhenius, Bronsted-Lowry, Lewis and Lux-Flood; Relative strengths of acids and bases	3	Chalk and Talk
	Amphoteric solvents- differentiating solvents-levelling effects. Hard and soft acids and bases: Pearson's concept –HSAB principle and its applications.	3	Chalk and Talk /PPT
	Oxidation and reduction: Definitions- oxidation number-differences between oxidation number and valency- rules for calculating oxidation number, solved examples- oxidizing and reducing agents- redox reactions. Balancing of redox equations by oxidation number method.	6	Chalk and Talk /PPT/animated video
III	Occurrence of metals –basic metallurgical operations and metallurgy process – General methods involved in extraction of metals	3	Chalk and Talk /PPT
	concentration of ores – froth floatation, magnetic separation, calcination, roasting, smelting, flux, aluminothermic process.	3	Chalk and Talk
	Extraction processes – Chemical reduction – electrolytic reduction – metal displacement – refining methods – distillation – fractional crystallization – electrolysis. Zone refining – van Arkel de Boer methods – electrolytic refining – ion exchange method- muffle furnace – chemical properties – important	6	Chalk and Talk /PPT

	compounds and uses of Cr, Mn, Co, Ni and Zn.		
IV	Alkanes – General method of preparations-hydrogenation of alkenes and alkynes,reduction of alkyl halides, action of sodium on alkyl halides, hydrolysis of Grignard reagents, wurtz reaction , physical properties, reactions-bromination, iodination, fluorination, nitration, sulphonation, aromatisation,	3	Chalk and Talk /PPT
	Reactions with radical mechanism for substitution reactions – cracking (pyrolysis) - Alkenes: Preparation from alcohol, haloalkane, dihaloalkanes and alkynes - reactions of alkenes -	2	Chalk and Talk
	Mechanisms involved in addition of hydrogen, halogen, hydrogen halide, hypohalous acid, water, hydroboration, hydroxylation, ozonolysis and epoxidation - peroxide effect - allylic substitution, oxidation by $KMnO_4$ and polymerization - Application in the synthesis of following molecules - Dibenzyl (from toluene), cis and trans 2-butene, propanal and 1-methyl cyclohexanol.	4	Chalk and Talk /PPT
	Akynes: preparation, reactions - addition of hydrogen, halogen, hydrogen halide, water, HCN, CH_3COOH, hydroboration – ozonolysis- dimerisation and cyclisation (polymerisation) - acidity of terminal alkynes.	3	Chalk and Talk /PPT
V	Forms of solids-Symmetry elements of a crystal- seven crystal systems, Space lattice and unit cells-Bravais lattice types and identification of lattice planes	3	Chalk and Talk
	Laws of Crystallography -Law of rational indices, Miller indices. X–Ray diffraction by crystals, Bragg's equation-derivation.	3	Chalk and Talk
	Types of crystal-Molecular crystal(H_2O)-covalent crystal (diamond)-ionic crystal- Characteristic structure of NaCl, Wurtzite) - Definition of Conductors, Insulators and Semi conductors- Defects in crystals- Schottky defect – Frenkel defect.	6	Chalk and Talk /PPT
	Total hours	60	

Course Designers: Dr.(Mrs).A.Ramya

Dr.(Mrs).S.Manimekalai

Annexure-18

Department of Chemistry					Class: I B.Sc			
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Contact Hours/ Week**	**CIA**	**SE**	**Total**
II	Skill Enhancement Course	**22OUCHSE21**	Industrial Chemistry	2	2	25	75	100

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

Course Objectives:

1. To gain the knowledge on match industry and explosives.
2. To learn about to manufacturing method of cement and glass.
3. To understand the various types of fertilizers and their uses.
4. To gain knowledge about the preparation and properties of rubber.
5. To acquire knowledge on plastics and paper industry.

Course Content:

Unit-- I MATCH INDUSTRY AND EXPLOSIVES: Match industry**:** Raw materials – Types of matches - composition of match head striking - surface manufacture of safety matches - Pyrotechnic - colored matches. Explosives**:** Classification of explosives- Requirements and classification of a good explosives TNT, RDX, Picric acid, Gun powder, Ammonium nitrate.

Unit-- II CEMENT AND GLASS: 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, fiber glass, flint glass and bottle glass.

Unit-- III AGRICULTURAL CHEMISTRY: Fertilizers: Definition-Nutrients for plant-role of various elements in plant growth –Natural and chemical fertilizer- classification of chemical fertilizers-ammonium sulphate, urea, calcium cyanamide, super phosphate of lime and potassium nitrate, NPK fertilizers, mixed fertilizers.

Unit--IV POLYMER CHEMISTRY: Importance of 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 PLASTICS AND PAPER INDUSTRY: 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.

Book for study:

1. Sharma B.K., (1999), *"Industrial Chemistry"* 10th Edition, Krishna Prakashan Media (P)
   Ltd., Meerut.

Books for Reference:

1. Arora M.G. & Singh M., (1999), *"Industrial Chemistry"*, Anmol Publications, Pvt Ltd,
   New Delhi.
2. Chakravarthy B.N, (1998), *"Industrial Chemistry"* Oxford & IBH Publishing & Co. Pvt
   Ltd., New Delhi.
3. Jain and Monika Jain, (1990), *"Engineering Chemistry"* 5th Edition, Dhanpat Rai & Sons, New Delhi.
4. Mahapatra G., (2001), *"Elements of Industrial Chemistry*", Kalyani Publishers, New Delhi.

Web resources/ E-books:

1. https://www.slideshare.net/AlexGeorge3/match-manufacture-alex
2. https://www.slideshare.net/prashantmehta371/glass-9219937
3. https://www.jagranjosh.com/general-knowledge/fertilizer-types-and-important-fertilizers-1456826098-1

4. .https://www.vedantu.com/chemistry/rubber
5. https://www.embibe.com/exams/some-commercially-important-polymers/
6. https://unacademy.com/content/railway-exam/study-material/static-gk/paper-manufacturing-industry-in-india/

Pedagogy:

Chalk and Talk method, PPT, Seminar, Group Discussion, and Quiz.

Rationale for nature of Course:

Knowledge and Skill:

Understand the manufacturing methods of matches, explosives, cement, glass, fertilizers, rubber and plastics.

Activities to be given:

To find out the composition in various types of fireworks.

1. Data collection on raw materials of cement availability in various districts.
2. To determine the potassium content in given fertilizer.
3. List out the types of paper and paper Industry in various areas.

Course Learning Outcomes (CLOs)

CLOs	Course Learning Outcomes statements	Knowledge Level (According to Bloom's Taxonomy)
CLO 1	Understand the basic principle and manufacturing process of match industry and explosives.	K1 to K3
CLO 2	Enumerate the manufacturing method of Portland cement & glass.	K1 to K3
CLO 3	Illustrate the manufacturing methods and applications of fertilizer.	K1 to K3
CLO 4	Explain the isolation of natural rubber, vulcanization, applications of synthetic rubber.	K1 to K3
CLO 5	Classify plastics, knowing their preparation and applications	K1 to K3

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

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

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

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

LESSON PLAN: TOTAL HOURS (30 Hrs)

Unit	Description	Hours	Lecture Mode
I	Match industry**:** Raw materials – Types of matches - composition of match head striking - surface manufacture of safety matches - Pyrotechnic - colored matches. Explosives**:** Classification of explosives- Requirements and classification of a good explosives TNT, RDX, Picric acid, Gun powder, Ammonium nitrate.	6	Chalk and Talk, PPT.
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.	3	Chalk and Talk, PPT.
	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, fiber glass, flint glass and Bottle glass.	3	Chalk and Talk, PPT.
III	Fertilizers: Definition-Nutrients for plant-role of various elements in plant growth –Natural and chemical fertilizer- classification of chemical fertilizers-ammonium sulphate, urea, calcium cyanamide, super phosphate of lime and potassium nitrate, NPK	6	Chalk and Talk, PPT.

	fertilizers, mixed fertilizers.		
IV	Rubber: 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.	6	Chalk and Talk, PPT.
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	6	Chalk and Talk, PPT. .
	Total hours	30	

Course Designer: (Mrs.) V.Gokilaa

Annexure-18

Department of Chemistry					Class: I B.Sc			
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Contact Hours/ Week**	**CIA**	**SE**	**Total**
II	Skill Enhancement Course	**22OUCHSE22**	Analytical Clinical biochemistry	2	2	25	75	100

Knowledge and Skill oriented	Employability oriented	Entrepreneurship oriented
✓		

Course Objectives:

1. To understand biological importance of carbohydrates.
2. To gain knowledge on structures of proteins and mechanism of enzyme action.
3. To give the detailed aspects of functions of lipids, cholesterol, lipoproteins.
4. To discuss the structure of DNA and RNA.
5. To learn the functions of blood and estimate the constituents of pathological urine.

Course Content:

Unit -- I Carbohydrates: Biological importance of carbohydrates, Metabolism, Cellular currency of energy (ATP), Glycolysis, Alcoholic and Lactic acid fermentations, Krebs cycle. Isolation and characterization of polysachharides.

Unit --II Proteins and Enzymes: Classification, Biological importance; Primary and secondary and tertiary structures of proteins: α-helix and β- pleated sheets, Isolation, characterization, denaturation of proteins. Enzymes: Nomenclature, Characteristics (mention of Ribozymes), Classification; Active site, Mechanism of enzyme action, Stereospecificity of enzymes, Coenzymes and cofactors, Enzyme inhibitors, Introduction to Biocatalysis: Importance in "Green Chemistry" and chemical industry.

Unit -- III Lipids, Cholesterol and Lipoproteins: Classification, Biological importance of triglycerides and phosphoglycerides and cholesterol; Lipid membrane, Liposomes and their biological functions and underlying applications. Lipoproteins: Properties, functions and biochemical functions of steroid hormones. Biochemistry of peptide hormones.

Unit -- IV DNA and RNA: Structure of DNA (Watson- Crick model) and RNA, Genetic Code, Biological roles of DNA and RNA: Replication, Transcription and Translation, Introduction to Gene therapy.

Unit –V Blood and Urine: Composition and functions of blood, blood coagulation. Anemia, Regulation, estimation and interpretation of data for blood sugar, urea, creatinine, cholesterol and bilirubin. Urine: Formation of urine. Composition and estimation of constituents of normal and pathological urine

Books for study:

1. Prof.Rulsy Fatima , Meyyan R.P. , Narayanan L.M., Nallasingam K., Prasanna Kumar S.,
   Arumugam N., (2012), *"Elements of Biochemistry"*, Saras Publication.
2. Jain J.L., Sunjay Jain and Nitin Jain, (2007), *"Fundamentals of Biochemistry"*, S.Chand & Company Ltd., New Delhi.
3. Dr.Ambika Shanmugam, (1996), *"Fundamentals of Biochemistry for Medical students"*
   West C.I.T Nagar, Madras.

Books for References:

1. Cooper T.G., (1977), *"Tool of Biochemistry"*, Wiley-Blackwell.
2. Wilson K. & Walker J., (2009), *"Practical Biochemistry"* Cambridge University Press.
3. Varley H., Gowenlock A.H., & Bell M., (1980), *"Practical Clinical Biochemistry"*, Heinemann, London.
4. Devlin, T.M., 2010, *"Textbook of Biochemistry with Clinical Correlations"* John Wiley & Sons.
5. Berg J.M., Tymoczko, J.L. & Stryer, L., (2002) , *" Biochemistry"* W.H. Freeman,
6. Talwar G.P. & Srivastava, M., *"Textbook of Biochemistry and Human Biology"* 3rd Edition, PHI Learning.
7. O.Mikes R.A., Chalmers, (1961), *"Laboratory Handbook of Chromatographic Methods"*, VanNostrand D. & Company.

Web Resources/E-books:

1. https://courses.lumenlearning.com/suny-ap2/chapter/carbohydrate-metabolism-no-content/
2. https://byjus.com/chemistry/protein-structure-and-levels-of-protein/
3. https://lubrizolcdmo.com/technical-briefs/protein-structure/
4. https://www.mlsu.ac.in/econtents/984_Enzyme%20introduction%20and%20factor%20affecting%20action.pdf
5. https://www.biologydiscussion.com/dna/dna-and-rna-composition-and-structure/9667
6. https://byjus.com/biology/blood/
7. https://books.google.co.in/books?id=NuaFRNaCce8C&lpg=PP1&pg=PA75#v=onepage&q&f=false

Pedagogy:

Chalk and Talk method, Power point Presentations, Seminar, Group Discussion and Quiz

Rationale for nature of Course:

Knowledge and skill:

Students gained the knowledge on biological importance of carbohydrates, proteins, enzymes, lipids, DNA and RNA. Having skills in estimation of blood sugar, normal and pathological urine.

Employability Oriented: Take up employment in pathology lab.

Activities given:

1. Estimation and interpretation of data for blood sugar, urea, creatinine, cholesterol and bilirubin
2. Estimation of constituents of normal and pathological urine.

Annexure-18

Course Learning Outcomes (CLOs)

CLOs	Course Learning Outcomes statements	Knowledge Level (According to Bloom's Taxonomy)
CLO 1	Describe the importance of carbohydrates,Glycolysis, Krebs Cycle and polysaccrides	K1 to K3
CLO 2	Recognize the structures of primary, secondary and tertiary proteins, mechanism of enzyme action and enzyme inhibitors	K1 to K3
CLO 3	Explain biological importance of triglycerides, phosphoglycerides, cholesterol and lipoproteins	K1 to K3
CLO 4	Demonstrate the structure of DNA and RNA	K1 to K3
CLO 5	Discuss the composition, functions of blood & urine	K1 to K3

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

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

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

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

Annexure-18

LESSON PLAN: TOTAL HOURS (30Hrs)

Unit	Description	Hours	Mode
I	Biological importance of carbohydrates, Metabolism, Cellular currency of energy (ATP), Glycolysis, Alcoholic and Lactic acid fermentations.	3	Chalk and Talk, PPT
	Krebs cycle. Isolation and characterization of polysachharides.	3	Chalk and Talk, PPT, Group discussion
II	Classification, biological importance; Primary and secondary and tertiary structures of proteins: α-helix and β- pleated sheets, Isolation, characterization, denaturation of proteins. *Enzymes:* Nomenclature, Characteristics (mention of Ribozymes), Classification; Active site, Mechanism of enzyme action,	3	Chalk and Talk, PPT
	Stereospecificity of enzymes, Coenzymes and cofactors, Enzyme inhibitors, Introduction to Biocatalysis: Importance in "Green Chemistry" and Chemical Industry.	3	Chalk and Talk, PPT
III	Classification. Biological importance of triglycerides and phosphoglycerides and cholesterol; Lipid membrane, Liposomes and their biological functions and underlying applications.	3	Chalk and Talk, PPT, Group discussion
	Lipoproteins: Properties, functions and biochemical functions of steroid hormones. Biochemistry of peptide hormones.	3	
IV	Structure of DNA (Watson-Crick model) and RNA, Genetic Code, Biological roles of DNA and RNA Replication, Transcription and Translation, Introduction to Gene therapy.	6	Chalk and Talk, PPT
V	Composition and functions of blood, blood coagulation. Anaemia, Regulation, estimation and interpretation of data for blood sugar, urea, creatinine, cholesterol and bilirubin.	3	Chalk and Talk, PPT
	Urine: Formation of urine.Composition and estimation of constituents of normal and pathological urine	3	Chalk and Talk, PPT
	Total hours	30	

Course Designers: Dr.P.Bhuvaneswari

Annexure-18

Department of Chemistry					Class: I UG			
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Contact Hours/ Week**	**CIA**	**SE**	**Total**
II	Inter Disciplinary Course	**22OUCHID2**	Food Chemistry	2	2	25	75	100

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

Course Objectives:

1. To learn about food and water.
2. To understand modern foods and beverages.
3. To acquire knowledge about food additives.
4. To study the food nutrition and balanced diet.
5. To gain knowledge about food adulteration and hygiene.

Course content:

UNIT -- I Introduction: Food- source, functions of food – food groups – food guide – basic five food groups, usage of the food guide – food in relation to health – objectives of cooking.Water: Purification processes – Ion exchangers, reverse osmosis, activated charcoal treatment. Use of chlorination, ozone, and UV light disinfection. Specification of drinking water. Water borne diseases – microbiological examination. Sources and detection.

UNIT--II Foods and Beverages: Modern food: Mushroom cultivation and types, spirulina composition. Snack foods. Production of bread, bun and biscuits. Raw materials, methods and machinery required. Candy manufacturing. Caramellisation. Fast foods. Instant foods. Dehydrated foods. Beverages**:** Soft drinks, soda, fruit juices and alcoholic beverages (Types and content of alcohol).Examples, Carbonation. Addiction to alcohol. Cirrhosis of liver. Social problems. Composition of soft drinks. Excessive use leading to urinary

bladder stones. Preservation of tetrapak. Nitrogen preservation and packing of fruit juices. Coconut Water.

UNIT—III Food Additives: Artificial sweeteners – saccharin, cyclomate, asparatame – food flavours– esters, aldehydes and heterocyclic compounds. Antioxidants and their uses (Ascorbic acid, citric acid and Butylated Hydroxy Anisole (BHA). Chemistry of Food colours – natural and synthetic colours. Limiting value of colouring agents and safety. Emulsifying agents, preservatives – leavening agents. Baking powder –Yeast. Taste enhancers – MSG-vinegar

UNIT--IV Nutrition and Balanced Diet: Nutrition – calorific value of food stuff – RQ of food (Respiratory quotient of food) –basal metabolic rate – factors influencing BMR, Specific Dynamic Action (SDA) of food. Thermogenic effect – energy requirements of individuals – diet and its components – the protein requirements – biological value of proteins, supplementary value of proteins. Diseases associated with protein malnutrition. Nutritional value of carbohydrates. – Fibers in the diet, dietary sugars – nutritional aspects of lipids.

UNIT--V Food Adulteration and Hygiene: Adulterants-Common adulterants in different foods – milk and milk products, vegetable oils, and fats, spices and condiments, cereals, pulses, sweetening agents and beverages. Contamination with toxic chemicals – pesticides and insecticides. Principles involved in the analysis of detection and prevention of food adulteration.

Microbial growth: growth curve of bacteria. Effect of environmental factors on growth of microorganisms. pH, water activity, oxygen availability temperature – beneficial effect of Micro-organisms Food borne illness – bacteria, virus, moulds and parasites. (Any two illness each).

Books for study:

1. Gobala Rao S., (1998), *"Outlines of chemical technology",* Affiliated East West press.
2. Kafaro, (1995), *"Wasteless chemical processing",* Mira publishers.
3. Sawyer W., (2000), "Experimental cosmetics", Dover publishers, New York.

Books for References:

1. Kumarappa J.C., "*Preparative materials*", Institute of Rural Technology and Development, T. Kallupatti.
2. Mohan, (1980), "*Latest Cottage Industries*", 20th Edition, Malhotra et al..
3. Sharma B.K., (2000) "*Industrial Chemistry*" Goel Publishing House, Meerut.

Web Resource/E-Books:

1. https://www.brainkart.com/article/Functions-of-food_33938/
2https://www.wqpmag.com/water-disinfection/uv-disinfection/article/10958170/uv-ozone- a-match-made-in-heaven
3. https://krishijagran.com/health-lifestyle/different-types-of-mushrooms/
4. https://www.mdpi.com/2076-3921/10/8/1264/htm
5 .https://tandobeverage.com/types-of-beverage/
6.http://stannscollegehyd.com/department/wp-content/uploads/2018/08/BMR-SDA-AND- RDA.pdf
7. https://byjus.com/biology/food-adulteration/
8.https://www.nationwidechildrens.org/conditions/health-library/viruses-bacteria-and-parasites-in-the-digestive-tract

Pedagogy:

Chalk and Talk method, Power point Presentations, Seminar, Group Discussion, Quiz.

Rationale for nature of Course:

Knowledge and Skill:

Students gained the knowledge on biological importance of food, water, soft drinks. And familiarize in food nutritive values, thermogenic effect of food.

Activities to be given:

Understanding the functions of some important nutrients in the body, food sources and adulterants present in food stuff.

Annexure-18

Course Learning Outcomes (CLOs)

CLOs	Course Learning Outcomes statements	Knowledge Level (According to Bloom's Taxonomy)
CLO 1	Understand the and be able to functions of food food groups food guide basic five food groups, usage of the food guide	K1 to K3
CLO 2	Explain the Antioxidants and their uses (Ascorbic acid, citric acid and Butylated Hydroxy Anisole (BHA).	K1 to K3
CLO 3	Develop the skill Artificial sweeteners saccharin, cyclomate, asparatame food flavours esters, aldehydes and heterocyclic compounds.	K1 to K3
CLO 4	Demonstrate the preparation of some home products like Phenoils, Incense stick, Sambrani and Naphthalene balls.	K1 to K3
CLO 5	To know the manufacturing process and uses of Plaster of Pairs, Gums and Shoe polish.	K1 to K3

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

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

(Science)

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

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

(Arts)

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

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

Annexure-18

LESSON PLAN: TOTAL HOURS (30 Hrs)

Unit	Description	Hours	Mode
I	Food- source, functions of food – food groups – food guide – basic five food groups, usage of the food guide – food in relation to health – objectives of cooking	2	Chalk and Talk, PPT.
	Water- Purification processes – Ion exchangers, reverse osmosis, activated charcoal treatment. Use of chlorination, ozone, and UV light disinfection. Specification of drinking water. Water borne diseases – microbiological examination. Sources and detection.	4	Chalk and Talk, PPT
II	Modern food: Mushroom cultivation and types, spirulina composition. Snack foods. Production of bread, bun and biscuits. Raw materials, methods and machinery required. Candy manufacturing. Caramellisation. Fast foods. Instant foods. Dehydrated foods.	3	Chalk and Talk, PPT
	Beverages: Soft drinks, soda, fruit juices and alcoholic beverages (Types and content of alcohol).Examples, Carbonation. Addiction to alcohol. Cirrhosis of liver. Social problems. Composition of soft drinks. Excessive use leading to urinary bladder stones. Preservation of tetrapak. Nitrogen preservation and packing of fruit juices. Coconut Water.	3	Chalk and Talk, PPT
III	Artificial sweeteners – saccharin, cyclomate, asparatame – food flavours–esters, aldehydes and heterocyclic compounds. Antioxidants and their uses (Ascorbic acid, citric acid and Butylated Hydroxy Anisole (BHA).	3	Chalk and Talk, PPT
	Chemistry of Food colours – natural and synthetic colours. Limiting value of colouring agents and safety. Emulsifying agents, preservatives – leavening agents. Baking powder –Yeast. Taste enhancers – MSG-vinegar	3	Chalk and Talk, PPT
IV	Nutrition – calorific value of food stuff – RQ of food (Respiratory quotient of food) –basal metabolic rate – factors influencing BMR, Specific Dynamic Action (SDA) of food.	2	Chalk and Talk, PPT
	Thermogenic effect – energy requirements of individuals – diet and its components – the protein requirements – biological value of proteins, supplementary value of proteins. Diseases associated with protein malnutrition. Nutritional value of carbohydrates. – Fibers in the diet, dietary sugars – nutritional aspects of lipids	4	Chalk and Talk, PPT
V	Adulterants: Common adulterants in different foods – milk and milk products, vegetable oils, and fats, spices and condiments, cereals, pulses, sweetening agents and beverages. Contamination with toxic chemicals – pesticides and insecticides. Principles involved in the analysis of detection and prevention of food adulteration.	3	Chalk and Talk, PPT

	Microbial growth**:** growth curve of bacteria. Effect of environmental factors on growth of microorganisms. pH, water activity, oxygen availability temperature – beneficial effect of microorganisms Food borne illness – bacteria, virus, moulds and parasites. (Any two illness each).	3	Chalk and Talk, PPT
	Total hours	30	

Course Designer: Miss: K.Punitha

Annexure-18

Sem	Course Type	Course Code	Course Title	Credits	Contact Hours/ Week
I & II	Core	**22OUCH2P**	Semi-Micro Inorganic Qualitative Analysis	2	2

Analysis of a mixture containing two cations and two anions of which one is an interfering ions by semi- micro method.

Cations: Lead, Bismuth, Copper, Cadmium, Iron (II &III), 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. Venkateswaran.V, Veeraswamy.R, Kulandaivelu.A.R, (2007*),"Basic Principles of Practical Chemistry",* 2nd Edition, Sultan Chand & Sons, New Delhi
2. Mala Nath,(2016), *"Inorganic Chemistry-A Laboratory Manual,"* Narosa Publishing House Pvt Ltd, New Delhi

Web Resources/E books:.

1. http://www.iscnagpur.ac.in/study_material/dept_chemistry/4.1_MIS_and_NJS_Manual_for_Inorganic_semi-micro_qualitative_analysis.pdf
2. https://www.goodearthschool.org/admin/product_document/Chemistry---Inorganic-Qualitative-analysis.pdf
3. http://www.rbmcollege.ac.in/sites/default/files/files/reading%20material/inorganic-qualitative-analysis.pdf
4. https://books-library.net/files/books-library.online_noo7f92c9ed2bbcef1ddf21cc-47353.pdf
5. https://kresnadipayana.files.wordpress.com/2018/10/macro-and-semimicro-qualitative-inorganic-analysis-5ed-vogel.pdf

Pedagogy

Chalk and Talk, Group Discussion and Demonstration

Annexure-18

LESSON PLAN: TOTAL HOURS (60 Hrs)

S.No	Description	Hrs	Mode
1	Instructions	2	Chalk and Talk, Demonstration
2	Analysis of Anions (Acid Radicals)	4	Demonstration
	Analysis of Cations (Basic Radicals)	4	Demonstration
3	Analysis of Anions	4	Chalk and Talk, Discussion, Procedure with illustration
4	Analysis of Cations	4	Chalk and Talk, Discussion, Procedure with illustration
5	Analysis of inorganic mixture -I	5	Chalk and Talk, Discussion, Procedure with illustration
6	Analysis of inorganic mixture-II	5	Chalk and Talk, Discussion, Procedure with illustration
7	Analysis of inorganic mixture -III	5	Chalk and Talk, Discussion, Procedure with illustration
8	Analysis of inorganic mixture –IV	5	Chalk and Talk, Discussion, Procedure with illustration
9	Analysis of inorganic mixture -V	5	Chalk and Talk, Discussion, Procedure with illustration
10	Analysis of inorganic mixture -VI	5	Chalk and Talk, Discussion, Procedure with illustration
11	Revision	6	
12	Model	6	
	Total	60	

Course Designers: 1. Dr.(Mrs).S.Manimekalai

2. Dr.(Mrs).A.Ramya

Annexure-18

EVALUATION (PRACTICAL)

Internal (Formative) : 40 marks

External (Summative) : 60 marks

Total :100 marks

Question Paper Pattern for Internal Practical Examination: 40 Marks

S.No	Components	Marks
1.	Acid Radicals	10
2	Basic Radicals	10
3.	Model Exam	10
4.	Viva	5
5	Observation Book	5
	Total	**40**

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

S.No	Components	Marks
1.	Acid Radicals with procedure	20
2	Basic Radicals 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.