Department of Chemistry Pavanatma College, Murickassery Idukki-685604

Curriculum Framework



Academic Year 2018 – 2019

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Course - I

Semester - I

General and Analytical Chemistry

1	Course	Core		
2	Course Type	Theory		
3	Course Code	CH1CRT01		
4	Credit	2		
5	Duration of External Examination	3 hours		
6	External Assessment	60		
7	Internal Assessment	15		
8	Total hours	36		
9	Hours per Week	2		
10	Number of Modules	5		
	Distribution of Inter	nal Marks		
11	Attendance	5		
12	Assignment/Seminar	2		
13	Assessment Test	$8(2 \times 4 = 8)$		

Module	Module Title	Delivery Methods	Total hours
1	methadology of Chemistry	Chalk and talk, ICT	7
2	Periodic Table and Periodic Properties	Chalk and talk	5
3	Analytical Methods in Chemistry	Chalk and talk	12
4	Chromatographic Methods	Powerpoint Presenttion	7
5	Evaluation of Analytical Data	Problem Solving	5

1.3 Evaluation Methods

No.	Assessment Methods	Evaluation Type		
1	Assessment tests	Internal Assessment		
2	Assignments	Internal Assessment		
3	Seminar	Internal Assessment		
4	University Examination	External Assessment		

1.4 Course Outcome

CO-1	Students may get a concept of atom models and basic				
00-1	principles				
CO-2	Students will acquire concept of periodic classification of				
CO-2	elements and their periodic properties				
CO-3	Students will acquire concept of different types of bonding				
CO-3	and molecular structure.				
CO 4	Students will acquire concept of different types of nuclear				
CO-4	models and nuclear reactions and their applications.				

1.5 CO - PO Mapping

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10
CO-1	3	0	2	0	0	0	0	0	2	0
CO-2	2	0	2	0	0	0	0	0	1	0
CO-3	1	0	2	2	0	0	0	0	0	0
CO-4	0	2	0	0	0	0	2	0	0	0

СО	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	3	1	CK ₁ AS	0	0	0
CO-2	3	2	0	0	0	0
CO-3	1	3	0	0	0	0
CO-4	2	3	0	0	0	0

Course - II

Semester - II

Theoretical and Inorganic Chemistry

1	Course	Core		
2	Course Type	Theory		
3	Course Code	CH2CRT02		
4	Credit	2		
5	Duration of External Examination	3 hours		
6	External Assessment	60		
7	Internal Assessment	15		
8	Total hours	36		
9	Hours per Week	2		
10	Number of Modules	5		
	Distribution of Inter	rnal Marks		
11	Attendance	5		
12	Assignment/Seminar	2		
13	Assessment Test	$8 (2 \times 4 = 8)$		

Module	Module Title	Delivery Methods	Total hours
1	Atomic Structure	6	
2	Chemical Bonding I	9	
3	Chemical Bonding II	Chalk and talk	9
4	Chemistry of s and p Block Elements	Chalk and Talk	3
5	Chemistry of d and f Block elements	Chalk and Talk	9

2.3 Evaluation Methods

No.	Assessment Methods	Evaluation Type
1	Assessment tests	Internal Assessment
2	Assignments	Internal Assessment
3	Seminar	Internal Assessment
4	University Examination	External Assessment

2.4 Course Outcome

CO-1	Students may get a concept of atom models and basic
00-1	principles
CO-2	Students will acquire concept of periodic classification of
CO-2	elements and their periodic properties.
CO-3	Students will acquire concept of different types of bonding
CO-3	and molecular structure.
CO 4	Students will acquire concept of different types of nuclear
CO-4	models and nuclear reactions and their applications.

2.5 CO - PO Mapping

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10
CO-1	2	0	1	0	0	0	0	0	0	0
CO-2	3	0	1	2	0	0	0	0	0	0
CO-3	2	0	2	0	0	0	0	0	0	0
CO-4	1	0	3	3	0	0	0	0	0	0

СО	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	3	0		0	0	0
CO-2	2	0	0	0	0	0
CO-3	2	2	1	0	0	0
CO-4	0	1	0	0	0	0

Course - III

Semester – III

Organic Chemistry I

1	Course	Core		
2	Course Type	Theory		
3	Course Code	CH3CRT03		
4	Credit	3		
5	Duration of External Examination	3 hours		
6	External Assessment	60		
7	Internal Assessment	15		
8	Total hours	54		
9	Hours per Week	3		
10	Number of Modules	5		
	Distribution of Inter	rnal Marks		
11	Attendance	5		
12	Assignment/Seminar	2		
13	Assessment Test	$8 (2 \times 4 = 8)$		

Module	Module Title	Delivery Methods	Total hours
1	Fundamentals of organic Chemistry	Chalk and talk, ICT	8
2	Stereochemistry	Chalk and talk ,ICT	15
3	Aliphatic Hydrocarbons and Alkyl Halides	Chalk and talk	12
4	Aromatic Hydrocarbons and Aryl Halides	Chalk and Talk	15
5	Pericyclic Reactions	Chalk and Talk	4

3.3 Evaluation Methods

No.	Assessment Methods	Evaluation Type
1	Assessment tests	Internal Assessment
2	Assignments	Internal Assessment
3	Seminar	Internal Assessment
4	University Examination	External Assessment

3.4 Course Outcome

CO-1	Students may get a concept about the classification and
00-1	nomenclature of organic compounds.
CO 9	"Students will acquire concept of fundamentals of organic
CO-2	reaction mechanism, aromaticity and stereochemistry"
CO 2	Students will acquire concept of understanding and studying
CO-3	organic reactions.
CO 4	Students will get exposure to various emerging new areas of
CO-4	organic chemistry like nanochemistry.

3.5 CO - PO Mapping

СО	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10
CO-1	3	0	0	0	0	0	3	0	0	0
CO-2	2	0	0	2	0	0	0	0	0	0
CO-3	0	0	0	2	0	0	2	0	0	0
CO-4	0	0	0	0	0	0	3	0	1	0

СО	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	2	2		0	0	0
CO-2	2	3	0	0	0	0
CO-3	0	3	0	2	0	0
CO-4	0	0	0	2	0	0

Course - IV

Semester - IV

Organic Chemistry II

1	Course	Core		
2	Course Type	Theory		
3	Course Code	CH4CRT04		
4	Credit	3		
5	Duration of External Examination	3 hours		
6	External Assessment	60		
7	Internal Assessment	15		
8	Total hours	54		
9	Hours per Week	3		
10	Number of Modules	3		
	Distribution of Inter	rnal Marks		
11	Attendance	5		
12	Assignment/Seminar	2		
13	Assessment Test	8 (2 × 4 = 8)		

Madala	Madala midla	Dalinam Madhada	Total	
Module	Module Title	Delivery Methods	hours	
1	Alcohols, Phenols and	Challe and talk ICT	16	
$oxed{1}$	Ethers	Chalk and talk, ICT		
2	Aldehydes and Ketones	Chalk and talk, ICT	20	
3	Carboxylic acid, sulphonic	Chalk and talk	18	
	acids and their Derivatives	Chaik and talk	18	

4.3 Evaluation Methods

No.	Assessment Methods	Evaluation Type
1	Assessment tests	Internal Assessment
2	Assignments	Internal Assessment
3	Seminar	Internal Assessment
4	University Examination	External Assessment

4.4 Course Outcome

	"Students may get a concept about the chemistry of alcohols,
	phenols, carboxylic acids, derivatives of Carboxylic acids,
CO-1	Sulphonic acids, carbonyl compounds, poly nuclear
	hydrocarbons, active methylene compounds and Grignard
	reagents."
00.0	Students will get exposure to understand and study Organic
CO-2	reaction mechanisms

4.5 CO - PO Mapping

СО	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10
CO-1	3	0	0	0	1	0	0	0	2	1
CO-2	0	2	0	1	0	3	2	1	0	0

СО	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	3	2		0	0	0
CO-2	3	2	1	0	0	0

Environment Ecology and Human Rights

1	Course	Core		
2	Course Type	Theory		
3	Course Code	CH5CRT05		
4	Credit	4		
5	Duration of External Examination	3 hours		
6	External Assessment	60		
7	Internal Assessment	15		
8	Total hours	72		
9	Hours per Week	4		
10	Number of Modules	5		
	Distribution of Inter	rnal Marks		
11	Attendance	5		
12	Assignment/Seminar	2		
13	Assessment Test	$8 (2 \times 4 = 8)$		

Module	Module Title	Dolivous Mothodo	Total	
Module	wiodule little	Delivery Methods	hours	
	Introduction to			
1	Environmental Studies:	Chalk and talk	10	
	Natural Resources	700//		
2	Environment: Pollution and	Chalk and talk	18	
2	Social Issues	Chark and talk	10	
3	Population and	Chalk and talk	o	
О	Enviromental Isues	Chark and talk	8	
4	Ecological Chemistry	Chalk and talk	18	
5	Human Rights	Chalk and Talk	18	

5.3 Evaluation Methods

No.	Assessment Methods	Evaluation Type
1	Assessment tests	Internal Assessment
2	Assignments	Internal Assessment
3	Seminar	Internal Assessment
4	University Examination	External Assessment

5.4 Course Outcome

CO-1	Students will understand about the natural resources in our
001	environment
	Students will acquire the knowledge of social and
CO-2	environmental issues arises from population growth and
	pollution
CO-3	Students will study the definition and scope of ecological
00-3	chemistry
CO-4	Students will understand the rights of human beings

5.5 CO - PO Mapping

СО	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10
CO-1	0	3	1	3	0	0	0	3	0	0
CO-2	0	3	1	3	0	0	0	3	0	0
CO-3	0	3	1	3	0	0	0	3	0	0
CO-4	0	3	1	3	0	0	0	3	0	0

СО	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	2	0	0	3	1	0
CO-2	2	0	0	3	1	0
CO-3	3	0	0	3	1	0
CO-4	2	0	0	3	1	0

Course - VI

Semester - V

Organic Chemistry III

1	Course	Core		
2	Course Type	Theory		
3	Course Code	CH5CRT06		
4	Credit	3		
5	Duration of External Examination	3 hours		
6	External Assessment	60		
7	Internal Assessment	15		
8	Total hours	54		
9	Hours per Week	3		
10	Number of Modules	7		
	Distribution of Inter	rnal Marks		
11	Attendance	5		
12	Assignment/Seminar	2		
13	Assessment Test	$8 (2 \times 4 = 8)$		

Module	Module Title	Delivery Methods	Total hours
1	Nitrogen Containing Compounds	Chalk and talk	15
2	Heterocyclic Compounds	Chalk and talk	8
3	Active Methylene Compounds	Chalk and talk	5
4	Drugs	Chalk and talk	11
5	Dyes	Chalk and Talk	5
6	Polymers	Chalk and Talk	4
7	Null	Null	6

6.3 Evaluation Methods

No.	Assessment Methods	Evaluation Type
1	Assessment tests	Internal Assessment
2	Assignments	Internal Assessment
3	Seminar	Internal Assessment
4	University Examination	External Assessment

6.4 Course Outcome

	"Students may get a concept of chemistry of nitro
CO-1	compounds, amines, dyes, organic polymers, drugs,
	carbohydrates and organic reagents."
CO 9	Students will understand the applications of these
CO-2	compounds in our daily life.
CO 2	Students will be able to identify different types of drugs and
CO-3	their chemical constitution.
00.4	Students will acquire a thorough idea on the structures of
CO-4	carbohydrates and some heterocyclic compounds

6.5 CO - PO Mapping

СО	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10
CO-1	3	2	0	1	0	0	1	0	0	3
CO-2	3	2	1	2	0	0	2	0	0	3
CO-3	3	2	1	2	0	0	1	0	0	3
CO-4	3	2	0	1	0	0	1	0	0	3

СО	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	3	2	0	2	0	1
CO-2	3	2	0	3	0	1
CO-3	3	2	0	3	0	3
CO-4	3	2	0	2	0	1

Course - VII

Semester - V

Physical Chemistry I

1	Course	Core		
2	Course Type	Theory		
3	Course Code	CH5CRT07		
4	Credit	2		
5	Duration of External Examination	3 hours		
6	External Assessment	60		
7	Internal Assessment	15		
8	Total hours	36		
9	Hours per Week	2		
10	Number of Modules	4		
	Distribution of Inter	rnal Marks		
11	Attendance	5		
12	Assignment/Seminar	2		
13	Assessment Test	$8 (2 \times 4 = 8)$		

Module	Module Title	Dolizzary Mothoda	Total
Module	Module Title	Delivery Methods	hours
1	Gaseous State	Chalk and talk	12
2	Liquid State	Chalk and talk	3
3	Solid State	Chalk and talk	12
4	Surface Chemistry and	Chalk and talk	9
4	Colloidal State	Oliaik allu taik	J

7.3 Evaluation Methods

No.	Assessment Methods	Evaluation Type		
1	Assessment tests	Internal Assessment		
2	Assignments	Internal Assessment		
3	Seminar	Internal Assessment		
4	University Examination	External Assessment		

7.4 Course Outcome

CO-1	Students will understand the intermolecular forces of the
CO-1	molecules in gases and liquids.
GO 0	Students will acquire elementary idea of the dynamics of the
CO-2	molecules in the gases and liquids and liquefaction of gases.
00.9	Students will learn the structure of solids and study defects
CO-3	in crystals
CO-4	Students will study adsorption and applications.

7.5 CO - PO Mapping

СО	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10
CO-1	3	2	0	1	0	0	0	0	0	3
CO-2	3	2	0	1	0	0	0	0	0	3
CO-3	3	2	0	2	0	0	0	0	0	3
CO-4	3	2	0	2	0	0	0	0	0	3

СО	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	3	0	1	2	3	2
CO-2	3	0	1	2	3	2
CO-3	3	0	1	2	2	0
CO-4	3	0	0	2	3	2

Course - VIII

Semester - V

Physical Chemistry II

1	Course	Core		
2	Course Type	Theory		
3	Course Code	CH5CRT08		
4	Credit	3		
5	Duration of External Examination	3 hours		
6	External Assessment	60		
7	Internal Assessment	15		
8	Total hours	36		
9	Hours per Week	2		
10	Number of Modules	3		
	Distribution of Inter	rnal Marks		
11	Attendance	5		
12	Assignment/Seminar	2		
13	Assessment Test	$8 (2 \times 4 = 8)$		

Madula	Modulo Titlo	Dolizzary Mothoda	Total
Module	Module Title	Delivery Methods	hours
1	Quantum Mechanics	Chalk and talk	14
2	Molecular Spectroscopy I	Chalk and talk, ICT	12
3	Molecular Spectroscopy II	Chalk and talk	10

8.3 Evaluation Methods

No.	Assessment Methods	Evaluation Type
1	Assessment tests	Internal Assessment
2	Assignments	Internal Assessment
3	Seminar	Internal Assessment
4	University Examination	External Assessment

8.4 Course Outcome

CO-1	Students will understand the differences between classical				
00-1	and quantum mechanics.				
	Students will acquire elementary idea postulates of quantum				
CO-2	mechanics and the quantum mechanical model of the				
	hydrogen atom				
CO 9	Students will learn the basics of LCAO Principle and				
CO-3	molecular orbital theory				
	"Students will learn the principle and applications of				
CO-4	microwave, infra red, Raman, electronic and magnetic				
	resonance spectroscopy"				

8.5 CO - PO Mapping

СО	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10
CO-1	3	2	0	1	0	0	0	0	0	3
CO-2	3	1	0	1	0	0	0	0	0	3
CO-3	3	2	0	1	0	0	0	0	0	2
CO-4	3	1	0	2	0	0	0	0	0	3

СО	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	3	0	1	1	3	0
CO-2	3	0	1	1	3	0
CO-3	3	0	1	1	2	2
CO-4	3	0	2	2	3	0

Course - IX

Semester - V

Chemistry in Everyday Life

1	Course	Core		
2	Course Type	Theory		
3	Course Code	CH5OPT01		
4	Credit	3		
5	Duration of External Examination	3 hours		
6	External Assessment	80		
7	Internal Assessment	20		
8	Total hours	72		
9	Hours per Week	4		
10	Number of Modules	7		
	Distribution of Inter	rnal Marks		
11	Attendance	5		
12	Assignment/Seminar	5		
13	Assessment Test	$10 (2 \times 5 = 10)$		

Module	Module Title	Delivery Methods	Total
			hours
1	Food Addittives	Chalk and talk, ICT	12
2	Soaps and Detergents	Chalk and talk, ICT	10
3	Cosmetics	Chalk and talk	10
4	Plastic, Paper and Dyes	Chalk and talk	12
5	Drugs	Chalk and Talk	9
6	Chemistry and Agriculture	Chalk and Talk	12
7	NanoMaterials	Powerpoint Presentation	7

9.3 Evaluation Methods

No.	Assessment Methods	Evaluation Type
1	Assessment tests	Internal Assessment
2	Assignments	Internal Assessment
3	Seminar	Internal Assessment
4	University Examination	External Assessment

9.4 Course Outcome

CO-1	"Have attained basic knowledge about the food additives, adulteration and food laws"
CO-2	Acquired elementary idea of chemistry of soaps and detergents.
CO-3	"Have attained basic knowledge about the chemistry of cosmetics, plastics, paper and dyes."
CO-4	Acquired elementary idea of chemistry of drugs.
CO-5	Have attained basic knowledge about chemistry of Agriculture.
CO-6	Acquired elementary idea of basics of nanomaterials.

СО	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10
CO-1	3	2	0	2	0	0	0	2	0	3
CO-2	3	2	0	2	0	0	0	2	0	3
CO-3	3	2	0	2	0	0	0	2	0	3
CO-4	3	2	0	2	0	0	0	2	0	3
CO-5	3	2	0	2	0	0	0	2	0	3
CO-6	3	2	0	2	0	0	0	2	0	3

СО	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	3	0	1	1	0	0
CO-2	3	0	1	1	0	0
CO-3	3	0	MAC	1	0	0
CO-4	3	0	2	2	0	0
CO-5	3	0	0	2	0	0
CO-6	3	0	0	1	0	0

Course - X

Semester - VI

Inorganic Chemistry

1	Course	Core
2	Course Type	Theory
3	Course Code	CH6CRT09
4	Credit	3
5	Duration of External Examination	3 hours
6	External Assessment	60
7	Internal Assessment	15
8	Total hours	54
9	Hours per Week	3
10	Number of Modules	7
	Distribution of Inter	rnal Marks
11	Attendance	5
12	Assignment/Seminar	2
13	Assessment Test	$8 (2 \times 4 = 8)$

10.2 Curriculum Structure

Module	Module Title	Delivery Methods	Total hours
1	Coordination Chemistry I	Chalk and talk	7
2	Coordiantion Chemistry II	Chalk and talk	14
3	Coordination Chemistry III	Chalk and talk	6
4	Organo Metallic Compounds	Chalk and talk	12
5	Bioinorganic Chemistry	Chalk and Talk	6
6	Boron Compounds	Chalk and Talk	3
7	Interhalogen and Noble Gas Compounds	Chalk and Talk	6

10.3 Evaluation Methods

No.	Assessment Methods	Evaluation Type
1	Assessment tests	Internal Assessment
2	Assignments	Internal Assessment
3	Seminar	Internal Assessment
4	University Examination	External Assessment

10.4 Course Outcome

CO-1	Students may get a concept of bioinorganic chemistry.			
CO-2	Students may get a concept of the coordination compounds			
CO 2	Students may get an elementary idea about the boron			
CO-3	compounds and interhalogen compounds.			
GO 4	Students may get fundamental ideas of organometallic			
CO-4	chemistry and quadruple bonding.			

10.5 CO - PO Mapping

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10
CO-1	3	1	0	0	0	0	0	0	0	0
CO-2	3	0	3	0	0	0	1	0	0	1
CO-3	3	0	0	0	0	0	1	0	0	2
CO-4	3	1	2	0	0	0	2	0	0	1

СО	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	3	2	0	3	0	0
CO-2	3	Mura	0	3	0	0
CO-3	3	1	0	3	0	0
CO-4	3	1	0	3	0	0

Course - XI

Semester - VI

Organic Chemistry IV

1	Course	Core		
2	Course Type	Theory		
3	Course Code	CH6CRT10		
4	Credit	3		
5	Duration of External Examination	3 hours		
6	External Assessment	60		
7	Internal Assessment	15		
8	Total hours	54		
9	Hours per Week	3		
10	Number of Modules	9		
	Distribution of Inter	nal Marks		
11	Attendance	5		
12	Assignment/Seminar	2		
13	Assessment Test	$8 (2 \times 4 = 8)$		

11.2 Curriculum Structure

Module	Module Title	Delivery Methods	Total hours
1	Natural Products	Chalk and talk	6
2	Lipids	Chalk and talk, ICT	6
3	Vitamins, Steroids, Hormones	Chalk and talk	6
4	Aminoacids, Peptides and Proteins	Chalk and talk	8
5	Nucleic Acids	Chalk and Talk	4
6	Enzymes	Chalk and Talk	3
7	Supramolecular Chemistry	Chalk and Talk	3
8	Organic Photochemistry	Chalk and Talk	4
9	Organic Spectroscopy	Problem solving	14

11.3 Evaluation Methods

No.	Assessment Methods	Evaluation Type
1	Assessment tests	Internal Assessment
2	Assignments	Internal Assessment
3	Seminar	Internal Assessment
4	University Examination	External Assessment

11.4 Course Outcome

CO 1	"Students may get a concept of chemistry of Natural
CO-1	Products, Hormones, amino acids, proteins and nucleic acids"
CO 9	"Students may get a concept of the structure and functions of
CO-2	enzymes, proteins and nucleic acids "
CO-3	Students may get an elementary idea of supramolecular
00-3	chemistry and Green Fluorescent Proteins
CO 4	"Students will be able to identify organic compound using
CO-4	UV, IR and PMR spectroscopic techniques "

11.5 CO - PO Mapping

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10
CO-1	3	1	0	1	0	0	1	0	0	3
CO-2	3	1	1	2	0	0	2	0	0	3
CO-3	3	1	1	2	0	0	1	0	0	3
CO-4	3	1	0	1	0	0	1	0	0	3

СО	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	3	1		2	0	1
CO-2	3	1	0	2	0	1
CO-3	3	1	0	1	0	1
CO-4	3	1	0	1	0	2

Course - XII

Semester - VI

Physical Chemistry III

1	Course	Core		
2	Course Type	Theory		
3	Course Code	CH6CRT11		
4	Credit	3		
5	Duration of External Examination	3 hours		
6	External Assessment	60		
7	Internal Assessment	15		
8	Total hours	54		
9	Hours per Week	3		
10	Number of Modules	6		
	Distribution of Inter	rnal Marks		
11	Attendance	5		
12	Assignment/Seminar	2		
13	Assessment Test	$8 (2 \times 4 = 8)$		

12.2 Curriculum Structure

M. J. L.	M. J. L. 19741.	D.P M.d. l.	Total
Module	Module Title	Delivery Methods	hours
1	Thermodynamics I	Chalk and talk	15
2	Thermodynamics II	Chalk and talk	12
3	Chemical Equllibria	Chalk and talk	3
4	Ionic Equillibria	Chalk and talk	8
5	Phase Equillibria	Chalk and Talk	6
6	Chemical Kinetics	Chalk and Talk	10

12.3 Evaluation Methods

No.	Assessment Methods	Evaluation Type
1	Assessment tests	Internal Assessment
2	Assignments	Internal Assessment
3	Seminar	Internal Assessment
4	University Examination	External Assessment

12.4 Course Outcome

CO 1	Students will remember the laws of thermodynamics and
CO-1	their applications.
CO 9	"Students will be able to derive Gibbs-Helmholtz,
CO-2	Clausius-Clapeyron, and Gibbs-Duhem equations "
	"Students will understand the laws of chemical equilibria
CO-3	and the concepts of ionic equilibria, acids and bases, pH and
	buffer solutions."
CO 4	Students will be able to derive the phase rule and to study
CO-4	the phase diagrams of one and two component systems
CO F	Students will be able to understand the theories of chemical
CO-5	kinetics

СО	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10
CO-1	3	2	0	0	0	0	1	0	0	2
CO-2	3	0	0	0	0	0	1	0	0	1
CO-3	3	0	0	2	0	0	1	0	0	2
CO-4	3	0	0	2	0	0	2	0	0	2
CO-5	3	1	70-	0	0	0	2	0	0	2

СО	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	3	0	2	2	2	0
CO-2	3	0	2	2	0	0
CO-3	3	0	2	2	2	2
CO-4	3	0	2	2	3	2
CO-5	3	0	2	2	3	3

Course - XIII

Semester - VI

Physical Chemistry IV

1	Course	Core		
2	Course Type	Theory		
3	Course Code	CH6CRT12		
4	Credit	3		
5	Duration of External Examination	3 hours		
6	External Assessment	60		
7	Internal Assessment	15		
8	Total hours	54		
9	Hours per Week	3		
10	Number of Modules	5		
	Distribution of Inter	rnal Marks		
11	Attendance	5		
12	Assignment/Seminar	2		
13	Assessment Test	$8 (2 \times 4 = 8)$		

13.2 Curriculum Structure

M. J. L.	Mr. J. J. 10741.	D.P M.d. l.	Total
Module	Module Title	Delivery Methods	hours
1	Solutions	Chalk and talk	12
2	Electrical Conductance	Chalk and talk	12
3	Electromotive Force	Chalk and talk	15
4	Photochemistry	Chalk and talk	6
5	Group Theory	Chalk and Talk	9

13.3 Evaluation Methods

No.	Assessment Methods	Evaluation Type
1	Assessment tests	Internal Assessment
2	Assignments	Internal Assessment
3	Seminar	Internal Assessment
4	University Examination	External Assessment

13.4 Course Outcome

CO-1	"Students will understand the behaviour of binary liquid
CO-1	mixtures, CST, azeotropes, colligative properties"
GO 9	Students will recall the factors affecting solubility of gases in
CO-2	liquids
GO 9	Students will study electrical conductance and electromotive
CO-3	forces
00.4	Students will understand elementary ideas in symmetry and
CO-4	group theory
CO-5	students will recognises the fundamentals of photochemistry

СО	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10
CO-1	3	0	0	0	0	0	1	0	0	2
CO-2	3	0	0	0	0	0	1	0	0	1
CO-3	3	2	0	0	0	0	1	0	0	2
CO-4	3	0	0	0	0	0	2	0	0	2
CO-5	3	0	0	0	0	0	2	0	0	2

СО	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	3	0	2	2	2	2
CO-2	3	0	2	2	1	3
CO-3	3	0	2	2	2	2
CO-4	3	0	2	2	3	0
CO-5	3	0	2	2	3	2

Soil and Agricultural Chemistry

1	Course	Core		
2	Course Type	Theory		
3	Course Code	CH6CBT03		
4	Credit	3		
5	Duration of External Examination	3 hours		
6	External Assessment	60		
7	Internal Assessment	15		
8	Total hours	54		
9	Hours per Week	3		
10	Number of Modules	5		
	Distribution of Inter	rnal Marks		
11	Attendance	5		
12	Assignment/Seminar	2		
13	Assessment Test	$8 (2 \times 4 = 8)$		

14.2 Curriculum Structure

Madula	Modulo Titlo	Dolinour Mothedo	Total
Module	Module Title	Delivery Methods	hours
1	Origin of Soil	Chalk and talk	9
2	Physical Properties of Soil	Chalk and talk	9
3	Chemistry aspects of soil	Chalk and talk	9
4	Plant Nutrients	Chalk and talk	18
E	Pesticides, Fugicides and	Chalk and Talk	9
5	Herbicide	Chaik and Talk	9

14.3 Evaluation Methods

No.	Assessment Methods	Evaluation Type
1	Assessment tests	Internal Assessment
2	Assignments	Internal Assessment
3	Seminar	Internal Assessment
4	University Examination	External Assessment

14.4 Course Outcome

CO-1	Students will understand the soil and its formation
001	properties
CO-2	Students will understand the physical properties of soil and
CO-2	other related aspects
CO 2	Students will understand the chemistry of nutrients that are
CO-3	present in soil
CO-4	Students will chemistry of pesticides and herbicides

14.5 CO - PO Mapping

СО	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10
CO-1	3	1	0	0	0	0	1	0	0	2
CO-2	3	2	0	0	0	0	1	0	0	1
CO-3	3	1	0	0	0	0	/ 1	0	0	2
CO-4	3	1	0	0	0	0	2	0	0	1

СО	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	3	0	0	2	1	0
CO-2	3	0	0	2	1	0
CO-3	3	1	2	2	1	1
CO-4	3	0	0	2	1	1

Course - I

Semester - I & II

Volumetric Analysis(P)

1	Course	Core					
2	Course Type	Practical					
3	Course Code	CH2CRP01					
4	Credit	2					
5	Duration of External Examination	3 hours					
6	External Assessment	40					
7	Internal Assessment	10					
8	Total hours	144					
9	Hours per Week	2					
10	Number of Experiments	15					
11	Total Week to complete	39					
Distribution of Internal Marks							
12	Attendance	2					
13	Record	4					
14	Assessment Test	4 (1 × 4 = 1)					

No.	Assessment Methods	Evaluation Type
1	Assessment tests	Internal Assessment
2	Practical Record	Internal Assessment
3	Exprimental Skill	Internal Assessment
4	University Examination	External Assessment

15.3 Course Outcome

CO-1	Students will gain a practical knowledge about Volumetric
CO-1	Analysis
	Students can apply the analytical techniques and graphical
CO-2	analysis to the experimental data related to Volumetric
	Analysis

15.4 CO - PO Mapping

СО	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10
CO-1	3	0	2	2	0	3	0	0	3	3
CO-2	3	0	2	2	0	3	0	0	3	3

СО	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	3	3	3	0	0	3
CO-2	3	3	3	0	0	3

Qualitative Organic Analysis(P)

1 Course Core 2 Course Type Practical 3 Course Code CH4CRP02 4 Credit 2 5 Duration of External Examination 3 hours 6 External Assessment 40 7 Internal Assessment 10 8 Total hours 144 9 Hours per Week 2 10 Number of Experiments 15 11 Total Week to complete 39			
3 Course Code CH4CRP02 4 Credit 2 5 Duration of External Examination 3 hours 6 External Assessment 40 7 Internal Assessment 10 8 Total hours 144 9 Hours per Week 2 10 Number of Experiments 15 11 Total Week to complete 39	1	Course	Core
4 Credit 2 5 Duration of External Examination 3 hours 6 External Assessment 40 7 Internal Assessment 10 8 Total hours 144 9 Hours per Week 2 10 Number of Experiments 15 11 Total Week to complete 39	2	Course Type	Practical
5 Duration of External Examination 3 hours 6 External Assessment 40 7 Internal Assessment 10 8 Total hours 144 9 Hours per Week 2 10 Number of Experiments 15 11 Total Week to complete 39	3	Course Code	CH4CRP02
6 External Assessment 40 7 Internal Assessment 10 8 Total hours 144 9 Hours per Week 2 10 Number of Experiments 15 11 Total Week to complete 39	4	Credit	2
7 Internal Assessment 10 8 Total hours 144 9 Hours per Week 2 10 Number of Experiments 15 11 Total Week to complete 39	5	Duration of External Examination	3 hours
8 Total hours 144 9 Hours per Week 2 10 Number of Experiments 15 11 Total Week to complete 39	6	External Assessment	40
9 Hours per Week 2 10 Number of Experiments 15 11 Total Week to complete 39	7	Internal Assessment	10
10 Number of Experiments 15 11 Total Week to complete 39	8	Total hours	144
11 Total Week to complete 39	9	Hours per Week	2
	10	Number of Experiments	15
Distribution of Internal Mayles	11	Total Week to complete	39
Distribution of Internal Marks			
12 Attendance 2	12	Attendance	2
13 Record 4	13	Record	4
14 Assessment Test $4 (1 \times 4 = 1)$	14	Assessment Test	4 (1 × 4 = 1)

No.	Assessment Methods	Evaluation Type
1	Assessment tests	Internal Assessment
2	Practical Record	Internal Assessment
3	Exprimental Skill	Internal Assessment
4	University Examination	External Assessment

16.3 Course Outcome

CO-1	Students will gain a practical knowledge about Qualitative
CO-1	Organic Analysis
CO-2	Students can apply the analytical techniques to Qualitative
	Organic Analysis

16.4 CO - PO Mapping

СО	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10
CO-1	3	0	2	2	0	3	0	0	3	3
CO-2	3	0	2	2	0	3	0	0	3	3

CO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	3	3	3	0	0	3
CO-2	3	3	3	0	0	3

Qualitative Inorganic Analysis(P)

1	Course	Core
2	Course Type	Practical
3	Course Code	CH6CRP03
4	Credit	2
5	Duration of External Examination	3 hours
6	External Assessment	40
7	Internal Assessment	10
8	Total hours	216
9	Hours per Week	2
10	Number of Experiments	15
11	Total Week to complete	57
	Distribution of Inter	nal Marks
12	Attendance	2
13	Record	4
14	Assessment Test	4 (1 × 4 = 1)

No.	Assessment Methods	Evaluation Type
1	Assessment tests	Internal Assessment
2	Practical Record	Internal Assessment
3	Exprimental Skill	Internal Assessment
4	University Examination	External Assessment

17.3 Course Outcome

CO-1	Students will gain a practical knowledge about Qualitative Inorganic Analysis					
	Inorganic Analysis					
	Students can apply the analytical techniques and graphical					
CO-2	analysis to the experimental data related to Qualitative					
	Inorganic Analysis					

17.4 CO - PO Mapping

СО	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10
CO-1	3	0	2	2	0	3	0	0	3	3
CO-2	3	0	2	2	0	3	0	0	3	3

СО	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	3	3	3	0	0	3
CO-2	3	3	3	0	0	3

Semester - V & VI

Oraganic Preparations and Basic Laboratory Techniques(P)

1	Course	Core						
2	Course Type	Practical						
3	Course Code	CH6CRP04						
4	Credit	2						
5	Duration of External Examination	3 hours						
6	External Assessment	40						
7	Internal Assessment	10						
8	Total hours	144						
9	Hours per Week	2						
10	Number of Experiments	15						
11	Total Week to complete	39						
	Distribution of Internal Marks							
12	Attendance	2						
13	Record	4						
14	Assessment Test	4 (1 × 4 = 1)						

No.	Assessment Methods	Evaluation Type
1	Assessment tests	Internal Assessment
2	Practical Record	Internal Assessment
3	Exprimental Skill	Internal Assessment
4	University Examination	External Assessment

18.3 Course Outcome

CO-1	Students will gain a practical knowledge about Organic
CO-1	Preparations And Laboratory Techniques
	Students can apply the analytical techniques and graphical
CO-2	analysis to the experimental data related to Organic
	Preparations And Laboratory Techniques

18.4 CO - PO Mapping

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10
CO-1	3	0	2	2	0	3	0	0	3	3
CO-2	3	0	2	2	0	3	0	0	3	3

СО	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	3	3	3	0	0	3
CO-2	3	3	3	0	0	3

Physical Chemistry Practicals(P)

1 Course Core 2 Course Type Practical 3 Course Code CH6CRP05 4 Credit 2 5 Duration of External Examination 3 hours 6 External Assessment 40 7 Internal Assessment 10 8 Total hours 216 9 Hours per Week 2 10 Number of Experiments 15 11 Total Week to complete 57 Distribution of Internal Marks 12 Attendance 2 13 Record 4 14 Assessment Test 4 (1 × 4 = 1)			
3 Course Code CH6CRP05 4 Credit 2 5 Duration of External Examination 3 hours 6 External Assessment 40 7 Internal Assessment 10 8 Total hours 216 9 Hours per Week 2 10 Number of Experiments 15 11 Total Week to complete 57 Distribution of Internal Marks 12 Attendance 2 13 Record 4	1	Course	Core
4 Credit 2 5 Duration of External Examination 3 hours 6 External Assessment 40 7 Internal Assessment 10 8 Total hours 216 9 Hours per Week 2 10 Number of Experiments 15 11 Total Week to complete 57 Distribution of Internal Marks 12 Attendance 2 13 Record 4	2	Course Type	Practical
5 Duration of External Examination 3 hours 6 External Assessment 40 7 Internal Assessment 10 8 Total hours 216 9 Hours per Week 2 10 Number of Experiments 15 11 Total Week to complete 57 Distribution of Internal Marks 12 Attendance 2 13 Record 4	3	Course Code	CH6CRP05
6 External Assessment 40 7 Internal Assessment 10 8 Total hours 216 9 Hours per Week 2 10 Number of Experiments 15 11 Total Week to complete 57 Distribution of Internal Marks 12 Attendance 2 13 Record 4	4	Credit	2
7 Internal Assessment 10 8 Total hours 216 9 Hours per Week 2 10 Number of Experiments 15 11 Total Week to complete 57 Distribution of Internal Marks 12 Attendance 2 13 Record 4	5	Duration of External Examination	3 hours
8 Total hours 216 9 Hours per Week 2 10 Number of Experiments 15 11 Total Week to complete 57 Distribution of Internal Marks 12 Attendance 2 13 Record 4	6	External Assessment	40
9 Hours per Week 2 10 Number of Experiments 15 11 Total Week to complete 57 Distribution of Internal Marks 12 Attendance 2 13 Record 4	7	Internal Assessment	10
10 Number of Experiments 15 11 Total Week to complete 57 Distribution of Internal Marks 12 Attendance 2 13 Record 4	8	Total hours	216
11 Total Week to complete 57 Distribution of Internal Marks 12 Attendance 2 13 Record 4	9	Hours per Week	2
Distribution of Internal Marks 12 Attendance 2 13 Record 4	10	Number of Experiments	15
12Attendance213Record4	11	Total Week to complete	57
13 Record 4		Distribution of Inter	nal Marks
	12	Attendance	2
14 Assessment Test $4(1 \times 4 = 1)$	13	Record	4
	14	Assessment Test	4 (1 × 4 = 1)

No.	Assessment Methods	Evaluation Type
1	Assessment tests	Internal Assessment
2	Practical Record	Internal Assessment
3	Exprimental Skill	Internal Assessment
4	University Examination	External Assessment

19.3 Course Outcome

CO-1	Students will gain a practical knowledge about Physical
CO-1	Chemistry experiments
	Students can apply the analytical techniques and graphical
CO-2	analysis to the experimental data related to Physical
	Chemistry experiments

19.4 CO - PO Mapping

СО	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10
CO-1	3	0	2	2	0	3	0	0	3	3
CO-2	3	0	2	2	0	3	0	0	3	3

СО	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	3	3	3	0	0	3
CO-2	3	3	3	0	0	3

Gravimetric Analysis(P)

Course	Core
Course Type	Practical
Course Code	CH6CRP06
Credit	2
Duration of External Examination	3 hours
External Assessment	40
Internal Assessment	10
Total hours	72
Hours per Week	2
Number of Experiments	15
Total Week to complete	21
Distribution of Inter	nal Marks
Attendance	2
Record	4
Assessment Test	4 (1 × 4 = 1)
	Course Type Course Code Credit Duration of External Examination External Assessment Internal Assessment Total hours Hours per Week Number of Experiments Total Week to complete Distribution of Inter Attendance Record

No.	Assessment Methods	Evaluation Type
1	Assessment tests	Internal Assessment
2	Practical Record	Internal Assessment
3	Exprimental Skill	Internal Assessment
4	University Examination	External Assessment

20.3 Course Outcome

CO-1	Have gained practical knowledge by applying the
CO-1	experimental methods related to gravimetric analysis.
	Be able to apply the analytical techniques and graphical
CO-2	analysis to the experimental data related to analysis of
	various species by gravimetric method.

20.4 CO - PO Mapping

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10
CO-1	3	0	2	2	0	3	0	0	3	3
CO-2	3	0	2	2	0	3	0	0	3	3

СО	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	3	3	3	0	0	3
CO-2	3	3	3	0	0	3

