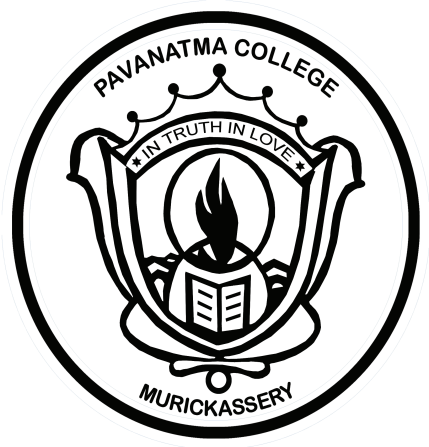
Department of Chemistry

Pavanatma College, Murickassery

Idukki-685604

Curriculum Framework



Academic Year 2018 – 2019

Table of Contents

Course – I Semester – I

General and Analytical Chemistry

1.1 Course Overview

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 Internal Marks		
11	Attendance	5
12	Assignment/Seminar	2
13	Assessment Test	8 ($2 \times 4 = 8$)

1.2 Curriculum Structure

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 Presenation	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 principles
CO-2	Students will acquire concept of periodic classification of elements and their periodic properties
CO-3	Students will acquire concept of different types of bonding and molecular structure.
CO-4	Students will acquire concept of different types of nuclear 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

1.6 CO – PSO Mapping

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

2.1 Course Overview

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 Internal Marks		
11	Attendance	5
12	Assignment/Seminar	2
13	Assessment Test	8 (2 × 4 = 8)

2.2 Curriculum Structure

Module	Module Title	Delivery Methods	Total hours
1	Atomic Structure	Chalk and talk	6
2	Chemical Bonding I	Chalk and talk	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 principles
CO-2	Students will acquire concept of periodic classification of elements and their periodic properties.
CO-3	Students will acquire concept of different types of bonding and molecular structure.
CO-4	Students will acquire concept of different types of nuclear 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

2.6 CO – PSO Mapping

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

3.1 Course Overview

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 Internal Marks		
11	Attendance	5
12	Assignment/Seminar	2
13	Assessment Test	8 (2 × 4 = 8)

3.2 Curriculum Structure

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

3.5 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	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

3.6 CO – PSO Mapping

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

4.1 Course Overview

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 Internal Marks		
11	Attendance	5
12	Assignment/Seminar	2
13	Assessment Test	8 (2 × 4 = 8)

4.2 Curriculum Structure

Module	Module Title	Delivery Methods	Total hours
1	Alcohols, Phenols and Ethers	Chalk and talk, ICT	16
2	Aldehydes and Ketones	Chalk and talk, ICT	20
3	Carboxylic acid, sulphonic acids and their Derivatives	Chalk 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

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

4.5 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	0	0	1	0	0	0	2	1
CO-2	0	2	0	1	0	3	2	1	0	0

4.6 CO – PSO Mapping

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

Course – V Semester – V

Environment Ecology and Human Rights

5.1 Course Overview

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 Internal Marks		
11	Attendance	5
12	Assignment/Seminar	2
13	Assessment Test	8 (2 × 4 = 8)

5.2 Curriculum Structure

Module	Module Title	Delivery Methods	Total hours
1	Introduction to Environmental Studies: Natural Resources	Chalk and talk	10
2	Environment: Pollution and Social Issues	Chalk and talk	18
3	Population and Enviromental Isues	Chalk 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 environment
CO-2	Students will acquire the knowledge of social and environmental issues arises from population growth and pollution
CO-3	Students will study the definition and scope of ecological chemistry
CO-4	Students will understand the rights of human beings

5.5 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	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

5.6 CO – PSO Mapping

CO	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

6.1 Course Overview

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 Internal Marks		
11	Attendance	5
12	Assignment/Seminar	2
13	Assessment Test	8 (2 × 4 = 8)

6.2 Curriculum Structure

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

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

6.5 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	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

6.6 CO – PSO Mapping

CO	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

7.1 Course Overview

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 Internal Marks		
11	Attendance	5
12	Assignment/Seminar	2
13	Assessment Test	8 (2 × 4 = 8)

7.2 Curriculum Structure

Module	Module Title	Delivery Methods	Total 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 Colloidal State	Chalk and talk	9

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

7.5 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	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

7.6 CO – PSO Mapping

CO	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

8.1 Course Overview

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 Internal Marks		
11	Attendance	5
12	Assignment/Seminar	2
13	Assessment Test	8 (2 × 4 = 8)

8.2 Curriculum Structure

Module	Module Title	Delivery Methods	Total 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 and quantum mechanics.
CO-2	Students will acquire elementary idea postulates of quantum mechanics and the quantum mechanical model of the hydrogen atom
CO-3	Students will learn the basics of LCAO Principle and molecular orbital theory
CO-4	"Students will learn the principle and applications of microwave, infra red, Raman, electronic and magnetic resonance spectroscopy"

8.5 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	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

8.6 CO – PSO Mapping

CO	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

9.1 Course Overview

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 Internal Marks		
11	Attendance	5
12	Assignment/Seminar	5
13	Assessment Test	10 (2 × 5 = 10)

9.2 Curriculum Structure

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.

9.5 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	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

9.6 CO – PSO Mapping

CO	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	1	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

10.1 Course Overview

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 Internal Marks		
11	Attendance	5
12	Assignment/Seminar	2
13	Assessment Test	8 (2 × 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-3	Students may get an elementary idea about the boron compounds and interhalogen compounds.
CO-4	Students may get fundamental ideas of organometallic 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

10.6 CO – PSO Mapping

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

11.1 Course Overview

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 Internal Marks		
11	Attendance	5
12	Assignment/Seminar	2
13	Assessment Test	8 (2 × 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 Products, Hormones, amino acids, proteins and nucleic acids"
CO-2	"Students may get a concept of the structure and functions of enzymes, proteins and nucleic acids "
CO-3	Students may get an elementary idea of supramolecular chemistry and Green Fluorescent Proteins
CO-4	"Students will be able to identify organic compound using 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

11.6 CO – PSO Mapping

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

12.1 Course Overview

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 Internal Marks		
11	Attendance	5
12	Assignment/Seminar	2
13	Assessment Test	8 ($2 \times 4 = 8$)

12.2 Curriculum Structure

Module	Module Title	Delivery Methods	Total 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 their applications.
CO-2	"Students will be able to derive Gibbs-Helmholtz, Clausius-Clapeyron, and Gibbs-Duhem equations "
CO-3	"Students will understand the laws of chemical equilibria 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 the phase diagrams of one and two component systems
CO-5	Students will be able to understand the theories of chemical kinetics

12.5 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	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	0	0	0	0	2	0	0	2

12.6 CO – PSO Mapping

CO	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

13.1 Course Overview

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 Internal Marks		
11	Attendance	5
12	Assignment/Seminar	2
13	Assessment Test	8 (2 × 4 = 8)

13.2 Curriculum Structure

Module	Module Title	Delivery Methods	Total 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 mixtures, CST, azeotropes, colligative properties"
CO-2	Students will recall the factors affecting solubility of gases in liquids
CO-3	Students will study electrical conductance and electromotive forces
CO-4	Students will understand elementary ideas in symmetry and group theory
CO-5	students will recognises the fundamentals of photochemistry

13.5 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	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

13.6 CO – PSO Mapping

CO	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

Course – XIV Semester – VI

Soil and Agricultural Chemistry

14.1 Course Overview

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 Internal Marks		
11	Attendance	5
12	Assignment/Seminar	2
13	Assessment Test	8 (2 × 4 = 8)

14.2 Curriculum Structure

Module	Module Title	Delivery Methods	Total 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
5	Pesticides, Fugicides and Herbicide	Chalk 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 properties
CO-2	Students will understand the physical properties of soil and other related aspects
CO-3	Students will understand the chemistry of nutrients that are present in soil
CO-4	Students will chemistry of pesticides and herbicides

14.5 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	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

14.6 CO – PSO Mapping

CO	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)

15.1 Course Overview

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)

15.2 Evaluation Methods

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 Analysis
CO-2	Students can apply the analytical techniques and graphical analysis to the experimental data related to Volumetric Analysis

15.4 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

15.5 CO – PSO Mapping

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

Course – II Semester – III & IV

Qualitative Organic Analysis(P)

16.1 Course Overview

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
Distribution of Internal Marks		
12	Attendance	2
13	Record	4
14	Assessment Test	4 (1 × 4 = 1)

16.2 Evaluation Methods

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 Organic Analysis
CO-2	Students can apply the analytical techniques to Qualitative Organic Analysis

16.4 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

16.5 CO – PSO Mapping

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

Course – III Semester – V & VI

Qualitative Inorganic Analysis(P)

17.1 Course Overview

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 Internal Marks		
12	Attendance	2
13	Record	4
14	Assessment Test	4 (1 × 4 = 1)

17.2 Evaluation Methods

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
CO-2	Students can apply the analytical techniques and graphical analysis to the experimental data related to Qualitative Inorganic Analysis

17.4 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

17.5 CO – PSO Mapping

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

Course – IV Semester – V & VI

Oraganic Preparations and Basic Laboratory Techniques(P)

18.1 Course Overview

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)

18.2 Evaluation Methods

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 Preparations And Laboratory Techniques
CO-2	Students can apply the analytical techniques and graphical 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

18.5 CO – PSO Mapping

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

Course – V Semester – V & VI

Physical Chemistry Practicals(P)

19.1 Course Overview

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)

19.2 Evaluation Methods

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 Chemistry experiments
CO-2	Students can apply the analytical techniques and graphical analysis to the experimental data related to Physical Chemistry experiments

19.4 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

19.5 CO – PSO Mapping

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

Course – VI Semester – V & VI

Gravimetric Analysis(P)

20.1 Course Overview

1	Course	Core
2	Course Type	Practical
3	Course Code	CH6CRP06
4	Credit	2
5	Duration of External Examination	3 hours
6	External Assessment	40
7	Internal Assessment	10
8	Total hours	72
9	Hours per Week	2
10	Number of Experiments	15
11	Total Week to complete	21
Distribution of Internal Marks		
12	Attendance	2
13	Record	4
14	Assessment Test	4 (1 × 4 = 1)

20.2 Evaluation Methods

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 experimental methods related to gravimetric analysis.
CO-2	Be able to apply the analytical techniques and graphical 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

20.5 CO – PSO Mapping

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

PAVANATMA COLLEGE
IN TRUTH IN LOVE
MURICKASSERY