



Course Syllabus  
Gyanmanjari Science College  
Semester-2 (B.Sc)

**Subject:** Principle of Chemistry – BSCCM12306

**Type of course:** Minor

**Prerequisite:** An introduction to the structure of atoms and matter, chemical bonding, simple chemical reactions, calculations involving the mole, acids and bases, reaction rates and equilibrium.

**Rationale:** The Fundamentals of Chemistry is an introduction to the Periodic Table, stoichiometry, chemical states, chemical equilibrium, acid & base, oxidation & reduction reactions, chemical kinetics, inorganic nomenclature and chemical bonding.

**Teaching and Examination Scheme:**

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P		C	SEE		CCE		
			Theory		Practical	MSE	LWA/V	ALA	
3	0	2	4	75	25	30	20	50	200

*Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; SEE - Semester End Evaluation; MSE- Mid Semester Examination; LWA - Lab Work Assessment; V – Viva voce; CCE-Continuous and Comprehensive Evaluation; ALA- Active Learning Activities.*

3 Credits \* 25 Marks = 75 Marks (each credit carries 25 Marks) Theory  
 1 Credits \* 25 Marks = 25 Marks (each credit carries 25 Marks) Practical  
 SEE 100 Marks will be converted in to 50 Marks  
 CCE 100 Marks will be converted in to 50 Marks  
 It is compulsory to pass in each individual component.



**Course Content:**

Unit No	Course content	Hrs	% Weightage
1	<p><b>Chapter – 1 Molecular weight determination of organic compounds:</b></p> <ul style="list-style-type: none"> <li>• Concept of molecular weight,</li> <li>• Molecular weight determination of volatile organic compound by Victor-Mayer's method including its apparatus experimental procedure and related calculations and sums.</li> <li>• Molecular weight determination of carboxylic acids by silver salt method including its procedure, calculations and sums.</li> <li>• Molecular weight determination of an organic base by Chloroplatinate method with its procedure, calculations and sums.</li> <li>• Introduction of empirical formula and molecular formula with numericals.</li> </ul> <p><b>Chapter – 2 Synthesis and uses of some important compounds:</b></p> <ul style="list-style-type: none"> <li>• Sulphanilamide</li> <li>• p-amino salicylic acid</li> <li>• adrenaline</li> <li>• 8-hydroxy quinolone</li> <li>• Indigo</li> <li>• methyl orange</li> <li>• vanillin</li> <li>• paracetamol and aspirin.</li> </ul>	15	25
2	<p><b>Chapter – 3 Adsorption</b></p> <ul style="list-style-type: none"> <li>• Introduction of surface chemistry concept of adsorption.</li> <li>• Difference between adsorption and absorption. Characteristics of adsorption.</li> <li>• Types of adsorption, Physical &amp; Chemical adsorption.</li> <li>• Freundlich's adsorption isotherm and its limitations.</li> </ul>	10	25



	<ul style="list-style-type: none"> <li>Langmuir's adsorption isotherm. Applications of adsorption.</li> </ul> <p><b>Chapter – 4 Alicyclic compounds</b></p> <ul style="list-style-type: none"> <li>Introduction.</li> <li>General methods for the preparation of cycloalkane compounds.</li> <li>General physical and chemical properties of cycloalkane compounds.</li> <li>Stability of cycloalkane compounds by Baeyer's strain theory and strain less ring theory.</li> </ul>		
3	<p><b>Chapter-5: Polymer chemistry</b></p> <ul style="list-style-type: none"> <li>Introduction, Classification of Polymers by various ways</li> <li>Synthesis and uses of following polymers: Polyethylene.</li> <li>Synthesis and uses of following polymers: Polyvinyl chloride.</li> <li>Synthesis and uses of the following fibers: Nylone-6.</li> <li>Synthesis and uses of the following fibers: Nylone-6,6.</li> <li>Synthesis and uses of the following rubbers: Polybutadiene.</li> <li>Synthesis and uses of the following rubbers Polyisoprene.</li> <li>Synthesis and uses of the following resins: Phenol formaldehyde.</li> <li>Synthesis and uses of the following resins: Melamine and Bakelite.</li> <li>Synthesis and uses of biodegradable polymers: PHBV</li> <li>Synthesis and uses of biodegradable polymers: Nylon-2-nylon-6.</li> </ul>	10	25
4	<p><b>Chapter- 6 Chemistry of Water</b></p> <ul style="list-style-type: none"> <li>Introduction, Source of water, Hard water and soft water.</li> <li>Salts cause water hardness, Unit of hardness, and simple numerical on water hardness.</li> <li>Problems caused by the use of hard water in boilers and its prevention.</li> <li>Scale and sludge, Foaming and Priming, Caustic embrittlement, Corrosion.</li> </ul>	10	25



	<ul style="list-style-type: none"> <li>• Water softening techniques: Soda-lime process, Zeolite process, Ion exchange process, Reverse Osmosis process.</li> <li>• Treatment of Municipal drinking water</li> <li>• Screening, Sedimentation, Coagulation, Filtration, Sterilization of water by chlorination, Break-point of Chlorination.</li> <li>• Enlist Indian standard specifications of drinking water.</li> </ul>		
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**Continuous Assessment:**

Sr. No	Active Learning Activities	Marks
1	<b>Poster Making</b> Faculty will assign a subject and students will prepare a poster and upload it to GMIU web Portal.	10
2	<b>Quiz</b> Faculty will assign 30 MCQs from all units on GMIU web Portal and students need to attempt it.	10
3	<b>Video Analysis</b> Faculty will assign the video and group of students will prepare a Report in 250 words And upload it to GMIU web Portal.	10
4	<b>Industrial area survey</b> A survey report on <b>Chemical Manufacturing companies nearby Bhavnagar</b> (in 250 words) and upload it to GMIU web Portal.	10
5	<b>Attendance</b>	10
<b>Total .</b>		<b>50</b>

**Suggested Specification table with Marks (Theory):75**

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	30%	40%	30%	-	-	-

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.



**Course Outcome:**

After learning the course the students should be able to:	
CO1	Explain the properties and application of synthetic rubbers and polymers.
CO2	Apply the different treatment methods for purification of water.
CO3	Know about adsorption, theorem of adsorption.
CO4	Comprehend cycloalkane compounds and its synthesis and stability Measurement.

**List of Practicals:**

Sr. No	Descriptions	Unit No	Hrs
1	Prepare polystyrene, Urea formaldehyde, Phenol formaldehyde & its characterization.	1	6
2	Prepare Polystyrene and Bakelite.	1	4
3	Estimate total hardness of given water sample using standard EDTA solution.	5	2
4	Inorganic Qualitative Analysis; <b>Inorganic Qualitative analysis of compounds having two radicals.</b> Positive radicals: $\text{Cu}^{+2}$ , $\text{Sb}^{+2}$ , $\text{Cd}^{+2}$ , $\text{As}^{+3}$ , $\text{Al}^{+3}$ , $\text{Fe}^{+3}$ , $\text{Fe}^{+2}$ , $\text{Zn}^{+2}$ , $\text{Mn}^{+2}$ , $\text{Ni}^{+2}$ , $\text{Co}^{+2}$ , $\text{Ca}^{+2}$ , $\text{Ba}^{+2}$ , $\text{Sr}^{+2}$ , $\text{Mg}^{+2}$ , $\text{Na}^{+}$ , $\text{K}^{+}$ , $\text{NH}_4^{+}$  Negative radicals : $\text{CO}_3^{-2}$ , $\text{O}^{-2}$ , $\text{Cl}^{-1}$ , $\text{Br}^{-1}$ , $\text{I}^{-1}$ , $\text{PO}_4^{-3}$ , $\text{S}^{-2}$ , $\text{SO}_3^{-2}$ , $\text{NO}_2^{-1}$ , $\text{NO}_3^{-1}$ , $\text{CrO}_4^{-2}$ , $\text{Cr}_2\text{O}_7^{-2}$ , $\text{SO}_4^{-2}$ (Maxi. 09)	All	18
<b>Total</b>			<b>30</b>

**Instructional Method:**

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.



Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

### Reference Books:

- 1) A Textbook of Engineering Chemistry Dr S. S. Dara & Dr S. S. Umare S. Chand & Co.(P) Ltd., New Delhi,
- 2) Textbook of Chemistry for Class XI & XII (Part-I & II) NCERT NCERT, New Delhi
- 3) Understanding Chemistry C.N.R. Rao C.N.R. Rao World scientific publishing Co.,
- 4) Applied Chemistry Laboratory Practices, Vol. I & II Dr. G.H. Hunger & Prof. A.N. Pathak NITTTR, Chandigarh, Publication
- 5) A Text Book of Applied Chemistry J. Rajaram Tata McGraw Hill Co. New Delhi

