FOUR-YEAR UNDER GRADUATE PROGRAMME (FYUGP)
BSc CHEMISTRY

Programme	B.Sc Chemistry				
Course Title	**ORGANIC CHEMISTRY AND POLYMERS**				
Type of Course	**MINOR**				
Semester	**III**				
Academic Level	**200-299**				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	4	3	-	2	75
Pre-requisites	1. Basic concepts of Organic Chemistry 2. Basic concepts of Polymer Chemistry				
Course Summary	This course ensure students to acquire a profound understanding of Organic Chemistry and Polymer Chemistry by emphasizing fundamental reactions and concepts.				

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	To understand the fundamental concepts of reaction mechanisms through the step by step processes involved in chemical reactions	U	C	Instructor-created exams / Assignments
CO2	To recognize the various types of organic reactions and reaction intermediates	Ap	P	Assignment / seminar/quizes
CO3	To understand how different functional groups confer distinct properties and reactivity, influencing the chemical behaviour of molecules.	U	C	Assignment/Seminar/Class test
CO4	To understand the significance of polymers in daily life by recognizing their ubiquitous presence in materials and products.	Ap	P	Group work /Assignment

CO5	To understand the applications of different polymers.	Ap	P	Group work /Assignment
CO6	To empower students to cultivate analytical skills in organic qualitative/quantitative analysis by emphasizing systematic approaches.	Ap	P	Observation of practical skill/Viva voce
* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C) # - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)				

Detailed Syllabus:

Module	Unit	Content	Hrs	Marks
I	**Basic concepts of Organic Chemistry**		**15**	**32**
	1	Homolytic and heterolytic fission with suitable examples. Curly arrow rules. Types of reagents -Electrophiles, Nucleophiles and Free radicals.	1	
	2	Electron Displacement Effects: Inductive effect, definition, Characteristics - +I and -I groups. Applications: Acidity of carboxylic acids-effect of substituents.	2	
	3	Electromeric effect: Definition, Characteristics - +E effect and -E effect. Addition of H^+ to ethene and addition of CN^- to acetaldehyde.	2	
	4	Mesomeric effect: Definition, Characteristics - +M and -M groups. Applications: Comparison of electron density in benzene, nitrobenzene, phenol and aniline.	2	
	5	Hyperconjugation effect: Definition, Characteristics. Applications: comparison of stability of But-1-ene and But-2-ene.	2	
	6	Steric effect and its importance in reactivity.	1	
	7	Reaction intermediate: Type, shape and stability of carbocations, carbanions and free radicals.	3	
	8	Types of organic reactions: Addition, Elimination, Substitution, Rearrangement and Redox reactions-Definition and example.	2	
II	**Chemistry of Alkyl halides, Alcohols and Phenols**		**10**	**22**
	9	Akyl halides- Preparation of alkyl halides from alkanes and alkenes- Wurtz reaction and Fittig's reaction. SN^1 and SN^2 reactions of alkyl halides-Mechanism and stereochemistry.	3	
	10	Alcohols: Preparation from Grignard reagent – Preparation of ethanol from molasses – Wash, rectified spirit, absolute alcohol, denatured spirit,	2	

		proof spirit and power alcohol (mention only).		
	11	Reactions of alcohols-Substitution, dehydration, oxidation and esterification. Haloform reaction - iodoform test -Luca's test-Chemistry of methanol poisoning, harmful effect of ethanol in human body.	3	
	12	Phenols: Preparation from chlorobenzene. Comparison of acidity of phenol, p-nitrophenol and p-methoxyphenol.	1	
	13	Preparation and uses of phenolphthalein.	1	
III	**Chemistry of Carbonyl compounds and Amines**		**10**	**22**
	14	Aldehydes & Ketones: Preparation from alcohols. Comparison of reactivity of aldehydes and ketones.	1	
	15	Nucleophilic addition reactions in aldehydes and ketone. Addition of HCN and bisulphite. Clemmensen reduction and Wolff Kishner reduction.	2	
	16	Carboxylic Acids: Preparation from Grignard reagent-Decarboxylation-Kolbe electrolysis.	2	
	17	Amines: Preparation from nitro compounds-Hofmann's bromamide reaction, Hofmann's carbylamines reaction. Basicity: Comparison of basicity of ammonia, methylamine and aniline.	3	
	18	Diazonium salts: Preparation and synthetic application of benzene diazonium chloride. Preparation and uses of methyl orange.	2	
IV	**Polymers**		**10**	**22**
	19	Classification based on origin (natural, semi synthetic and synthetic), synthesis (addition and condensation), structure (linear, branched chain and cross linked) and intermolecular forces (elastomers, fibres, thermoplastics and thermosetting polymers).	3	
	20	Tacticity- Types of Polymerisation. Chain and step growth polymerizations- Free radical, ionic and coordination polymerizations.	2	
	21	Structure and applications of synthetic rubbers (Buna-S, Buna-N and neoprene), synthetic fibres (Nylon 66, Nylon 6 and dacron), thermoplastics (polyethene, polystyrene, PVC and teflon) and thermosetting plastics (bakelite and melmac).	3	
	22	Uses of kevlar, nomex and lexan- Biodegradable polymers (PGA, PLA and PHBV) and their applications.	2	
V	**Organic Chemistry Practicals**		**30**	
	23	General Reactions of Organic Compounds	4	
	24	Study of the reactions of functional groups from the following list. 1. Phenols –(phenol) 2. Amines-(aniline)	20	

		3. Aldehydes and Ketones-(benzaldehyde, benzophenone). 4. Carboxylic acids (benzoic acid, cinnamic acid). 5. Carbohydrates (glucose). 6. Amides (benzamide, urea)		
	25	Organic Preparations.	6	

References

1. Morrison, R. T. & Boyd, R. N., Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
2. Bhal and Bhal, Advanced Organic Chemistry, 2nd Edition, S. Chand Publisher, 2012.
3. I. L. Finar, *Organic Chemistry*, Vol. I, 5th Edn., Pearson Education, New Delhi, 2013.
4. M. K. Jain, S. C. Sharma, *Modern Organic Chemistry*, 3rd Edn., Vishal Publishing Company Co., 2010.
5. K. S. Tewari, N. K. Vishnoi, S. N. Mehrotra, *A Textbook of Organic Chemistry*, 2nd Edn., Vikas Publishing House, New Delhi, 2004.
6. V.R Gowarikar. Polymer Chemistry, New Age International Pvt Ltd., New Delhi, 2010.
7. B.K. Sharma, Polymer Chemistry. Goel Publishing House, Meerut, 1989
8. Gowri Sankar Misra. Introductory Polymer Chemistry, New Age International, New Delhi, 1993.
9. B. S. Furniss, A. J. Hannaford, P. W. G. Smith, A. R. Tatchell, *Vogel's Textbook of Practical Organic Chemistry*, 5th Edn., Pearson Education, Noida, 2014.
10. F. G. Mann, B. C. Saunders, *Practical Organic Chemistry*, 4th Edn., Pearson Education, Noida, 2011.

Mapping of COs with PSOs and POs :

	PSO 1	PSO 2	PSO 3	PSO4	PS O5	PSO 6	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 1	2	-	2	-	1	-	2			1	2	1	
CO 2	2		2	-	-	1	2			2	1	1	
CO 3	2	-	2	-	-	2	2			2	1		
CO 4	2	-	2		2	2	2			2	1		
CO 5	2		-	-	2	-	2			2	1		
CO 6	2	-	2		-	2	2		1		2		1

Correlation Levels:

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

Assessment Rubrics:

- Quiz / Assignment/ Discussion / Seminar
- Midterm Exam
- Practical exam (20%)

Mapping of COs to Assessment Rubrics :

	Internal Exam	Assignment	Seminar/Group Discussion	Quizes/viva	Observation Of practical Skill	End Semester Examinations
CO 1	✓	✓				✓
CO 2	✓	✓		✓		✓
CO 3			✓			✓
CO 4		✓	✓			✓
CO 5		✓	✓			✓
CO 6				✓	✓	✓