INSTITUTE	**FACULTY OF SCIENCE**
PROGRAM	**BACHELOR OF SCIENCE (CHEMISTRY)**
SEMESTER	**4**
COURSE TITLE	**FUNDAMENTAL CHEMISTRY –IV**
COURSE CODE	**02CY0252**
COURSE CREDITS	**6**

Objective:

1 To study basics of the name reaction and the rearrangement.
2 To understand and preparation and reactions of the heterocyclic compounds of 5 and 6 membered rings.
3 To study the introduction of organometallic compounds, their preparations and their properties.
4 To study the details of the concept “phase” and to understand phase rule.

Course Outcomes: After completion of this course, student will be able to:

1 Understand the important name reactions in organic chemistry course and rearrangement.
2 Will know the basics of heterocyclic compounds and know the preparations.
3 Obtain the information regarding organometallic compounds.
4 Understand the basic of phase rule.

Pre-requisite of course: Understanding of basic organic name reactions, heterocyclic chemistry and Physical chemistry

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
5	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	**Name reactions and Rearrangements** Mechanism and applications of Arndt Eistert reaction, Barbier-Wieland reaction, Grignard reaction, Kolbe synthesis, Michael addition, Mannich reaction, Wurtz reaction, Beckmann rearrangement, Hoffmann rearrangement, Curtius rearrangement, Fries rearrangement	

DR. VICKY DEVENDRA JAIN
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DR. KANTHA DEVI ARUNACHALAM
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Contents : Unit	Topics	Contact Hours
2	**Heterocyclic compounds of 5 and 6 membered rings** Introduction, physical properties of pyrrole, furan and thiophene, synthesis of pyrrole (Knorr synthesis, Paal-knorr synthesis, Hantzsch synthesis), chemical reactions of pyrrole, synthesis of furan (Paal-Knorr synthesis, FiestBenary reaction, from other heterocyclic system), chemical reactions of furan, synthesis of thiophene (Paal-knorr synthesis, Simmon-smith reaction, from unsaturated compounds), chemical reactions of thiophene, Synthesis, physical and chemical properties of pyridine and Quinoline.	
3	**Organometallic compounds** Introduction Metallic Carbonyls: General methods of preparation, general properties, Structure and nature of M-CO bonding in carbonyls, Effective atomic number (EAN) rule as applied to metallic carbonyls, 18-electron rule as applied to metallic carbonyls, Some carbonyls, Metallic Nitrosyls: :metal nitrosyls, Effective atomic number (EAN) rule as applied to metallic nitrosyls.	
4	**Phase rule** Introduction, What is Meant by a 'Phase', What Is Meant by 'Components', Degrees of Freedom, Derivation of the Phase Rule, Derivation of the Phase Rule, Experimental Determination of Transition Point, The WaterSystem, The Sulphur System, Two-component Systems, The Silver-Lead System, The Magnesium-Zinc System, Three component system: Representation of triangular plot, partially miscible ternary liquid system.	
Total Hours		

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Experiments** Experiment 1, Experiment 2, Experiment 3, Experiment 4, Experiment 5, Experiment 6, Experiment 7	
Total Hours		

Textbook :

1 An Introduction to Organometallic Chemistry, A. W. Parkins , R. C. Poller, Red Globe Press London, 1986

2 A textbook of organic chemistry, Bahl Arun , S Chand & Company, 2016

References:

1 Physical Chemistry, Physical Chemistry, Castellan G. W., Narosa Publishing House, 2004

2 Organic Chemistry, Organic Chemistry, Morrison and Boyd, Pearson India, 2016

3 Organic Chemistry, Organic Chemistry, S.M. Mukherji , newagepublishers , 2017

4 Heterocyclic Chemistry, Heterocyclic Chemistry, John A. Joule, Keith Mills, Wiley, 2010

DR. VICKY DEVENDRA JAIN
Digitally signed by (Name of HOD)

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Digitally signed by (Name of Dean/ Principal)

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking**
20.00	30.00	25.00	15.00	10.00	0.00

Instructional Method:

1. 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.
2. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
3. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
4. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory
5. Use of hazardous/toxic chemicals should be avoided as far as possible in laboratory.
6. All students in the laboratory must wear safety goggles and lab coats during lab session.

Supplementary Resources:

1. https://www.youtube.com/user/TMPChem
2. http://ocw.mit.edu/courses/chemistry/
3. https://www.youtube.com/user/PradeepKshetrapal
4. https://www.youtube.com/playlist?list=PL166048DD75B05C0D
5. http://www.organic-chemistry.org/reactions.htm

DR. VICKY DEVENDRA JAIN
Digitally signed by (Name of HOD)

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