

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY

Estd. Under Punjab Technical University Act, 1996
(Punjab Act No. 1 of 1997)

Ref. No. : IKGPTU/Reg/N/

Dated :

NOTIFICATION

Sub: **Regarding Pre-Ph.D Course work.**

This is for information of all concerned that Pre-Ph.D course work from 2016-17 will be conducted in the IKGPTU main campus Kapurthala in regular mode. The PhD course work will consists of minimum 15 credits. The structure of the course work is as under.

Sr. No.	Nature of course	Name of course	Credits	Remarks
1.	Core	1. Research Methodology	4	The syllabus of RM should be formulated faculty wise such as Engineering, Science, Management/ Humanities and Life sciences
		2. Subject related theory paper	4	Discipline specific related to advancements in theoretical methods for research
		3. Presentation	3	Discipline specific
2.	Interdisciplinary	4. Elective	4	From list of subjects from allied fields
Total Minimum credits			15	

-Sc-
Registrar

Endorsement No: IKGPTU/REG/N/ 4244-4251

Dated: 22.08.2016

1. Secretary to Vice Chancellor: For kind information of Vice Chancellor
2. Dean (P&D)
3. Dean (RIC)
4. Dean (Academics)
5. Finance Officer
6. Controller of Examination
7. DR (Computers): For uploading on website
8. File Copy

[Signature]
Registrar

Annexure-A

01- Advanced Organic Chemistry

Total Hours: 45

LTP-3-0-0

1. **Pericyclic Reactions**

Molecular orbital symmetry, Frontier orbital of ethylene, 1, 3- butadiene, 1, 3, 5- hexatriene and allyl system. Classification of pericyclic reactions. Woodward-Hoffmann diagrams. FMO and PMO approach. Electrocyclic reactions, $4n$, $4n+2$ and allyl systems. Cycloaddition – antarafacial and suprafacial additions, $4n$ and $4n+2$ systems, 2+2 addition of ketenes, 1,3 dipolar cycloadditions and cheletropic reactions. Sigmatropic rearrangements–suprafacial and antarafacial shifts of Hydrogen, sigmatropic shifts involving carbon moieties, 3, 3- and – sigmatropic rearrangements. Claisen, Cope and aza-Cope rearrangements, ene reaction.

2. **Metal Salt Catalysis**

(a). Fundamental reaction steps of transition metal catalysed reaction.

oxidative-addition reactions, elimination reactions, cleavage of C-H bonds, migration reaction, insertion reaction.

(b). Homo/heterogeneous catalysis by transition metal complexes.

Hydrogenation reaction, alkene isomerization, hydrosilylation and hydroboration reaction, alkene hydrogenation, reaction of CO and hydrogen, hydroformylation of unsaturated compounds, carbonylation reactions, C-C cross coupling and related reaction, reaction of conjugated dienes, reaction of alkynes, , alkene and alkyne metathesis, phase transfer catalysis,

(c). C-H activation using metal salts, Suzuki reaction, Heck reaction, Negishi coupling, Stille reaction, Sonogashira coupling reactions.

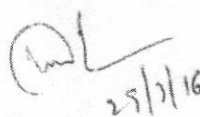
3. **Cycloaddition reaction in Organic Synthesis**

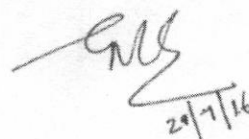
Cycloaddition reactions:- Brief introduction, types of cycloaddition reactions, diene , dienophiles, intra and inter-molecular Diels Alder reaction (Lewis acid catalysed and uncatalysed), , brief introduction to diene and heterodiene and their cycloaddition reaction ($2+2$ and $4+2$) with dienophiles, regiochemistry and stereochemistry in Diels alder reaction, poverov reaction, aza-diels alder reactions, normal and inverse electron demand cycloaddition reactions, heterodienophiles , Hetero Diels alder reactions (general introduction), 1,3-dipolar cycloaddition reactions

4. **Multicomponent cycloaddition reactions**, brief introduction to transition metal salts catalysed reactions, brief introduction to $(m+o)$, $(m+n+o)$ type reactions with emphasis on $3+2$; $4+3$, $2+2$, $4+2$, $5+2$, $2+2+2$, $3+2+2$, $5+2+1$ types of reactions.

Books

1. Advanced Inorganic Chemistry F.A Cotton 6th addition chapter 21 and 22, p. 1167-1294.
2. Cycloaddition reactions in organic synthesis by W. Carruthers in the Tetrahedron Organic Chemistry Series, edited by J. E. Baldwin and P. D. Magnus, Pergamon Press, Oxford, 1990.
3. S.M. Mukherji and S. P. Singh, Reaction Mechanism in Organic Chemistry.
4. Inorganic Chemistry: Principles of Structure and Reactivity by James E. Huheey, Ellen A. Keiter, Richard L. Keiter
5. Some Modern Methods of Organic Synthesis by W Carruthers, Cambridge University Press.
6. Smith M B , March J March's Organic Chemistry 5th ed (2001)(2103s), Wiley, New York.


25/1/16


29/1/16