20MSC507T					Inorganic Chemistry II					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	0	0	3	3	25	50	25	--	--	100

COURSE OBJECTIVES

- To understand the basic concepts of inorganic reaction mechanism
- To gain the knowledge of organometallic chemistry
- To learn the importance of organometallic chemistry for industrial applications
- To attain an understanding of inorganic photochemistry
- To develop the theoretical knowledge on nuclear chemistry

UNIT 1: Inorganic Reaction Mechanism. 10 Hrs.

Introduction to Inorganic Reaction Mechanism; Substitution in Octahedral and Square Planar Complexes; Lability; Trans-effect; Conjugate Base Mechanism; Racemisation; Electron Transfer Reactions: Inner Sphere and Outer Sphere Mechanism; Marcus theory.

UNIT 2: Organometallic Chemistry. 10 Hrs.

18-electron Rule; Metal Carbonyls; Nitrosyls; Carbonyl Hydrides; Isolobal Analogy; Dioxygen and Dinitrogen Compounds; Metal Alkyls; Carbenes; Carbynes; Alkenes; Alkynes; and Allyl Complexes. Hydrides; Metallocenes; Metal Arene Complexes; Carbonylate Anions; Agostic Interaction; Oxidative Addition and Reductive Elimination; Insertion and Elimination Reactions; Homogeneous and Heterogeneous Catalysis; Fluxional Molecules; Metal-Metal bonding.

UNIT 3: Inorganic Photochemistry. 10 Hrs.

Introduction to Inorganic Photochemistry; Photochemical Laws and Photochemical Kinetics; Photochemical Reactions: Substitution, Decomposition and Fragmentation, Rearrangement, and Redox Reactions; Electronic absorption spectra of Metal Complexes; Characteristics of the Electronically Excited States of Inorganic Compounds; Photophysical Processes; Photosensitization; Photo-electrochemistry of Excited State Redox Reactions.

UNIT 4: Nuclear Chemistry. 10 Hrs.

Radioactive Decay Processes: Multipole Radiation and Selection Rules; Isomeric Transition; Internal Conversion and Auger Effect; Nuclear Structure; Nuclear Energy Levels; Nuclear Models; Nuclear Reactions; Labelling; Nuclear Reactors; Radioanalytical Techniques.

Nuclear Processes in Geology, Geochemistry & Astrophysics: Ages of Rocks and Minerals; Age of earth-Radioactive Dating; Threshold; Nuclear Reactions in Stars and Nucleogenesis; Nuclear Fusion and Stellar Energy (Cosmo chemistry).

Max. 40 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 – Understand different types of inorganic reactions and their mechanism.
CO2 – Demonstrate the theoretical knowledge of organometallic chemistry.
CO3 – Illustrate the importance of organometallic chemistry towards current industrial applications**.**
CO4 – Explain different photophysical and photochemical processes of inorganic compounds.
CO5 – Apply the concept of inorganic photochemistry in predicting their potential applications.
CO6 – Learn the advanced concepts of nuclear chemistry and applications thereof.

TEXT/REFERENCE BOOKS

1. The organometallic Chemistry of transition metals, R.H. Crabtree, John Wiley, 1994.

2. Organometallic chemistry: A unified concept, R C Melhotra, New Age International, 2007

3. G. L.Geoffrey and M. S. Wrighton, Organometallic Photochemistry, Academic Press, 1979.

4. K. K. Rohatagi-Mukherjee, Fundamentals of Photochemistry, Wiley Eastern, 1978.

5. M. S. Wrighton, Inorganic and Organometallic Photochemistry, ACS Pub.,1978.

6. H. J. Arnikar, Essentials of Nuclear chemistry, 4thEd., Wiley-Eastern Ltd. New Delhi.

7. G. Friedlander, J. W. Kennedy, E. S. Macias and J. M. Miller, Nuclear and Radiochemistry, 3rd Ed., John-Wiley & Sons, New York.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100	**Exam Duration: 3 Hrs**
Part A/Question: 10 multiple choice questions 1 mark each	10 Marks
Part B/Question: 10 short answer type questions of 2 marks each with internal choice	20 Marks
Part C/Question: 4 Questions of 15 marks each with internal choice	60 Marks
Part D/Question: 1 Questions of 10 marks with internal choice	10 Marks