

BHAGWANT UNIVERSITY
Sikar Road, Ajmer
Rajasthan



Syllabus

Institute Life Sciences & Applied Sciences
M. Phil
(Chemistry)

ANNUAL SCHEME OF EXAMINATION:

1. Every candidate shall be required to offer three written papers and one dissertation (equivalent to one paper). Within this frame work the Board of Studies shall recommend the course of study for the M. Phil examination.
2. The course of study for the M. Phil degree shall extend over a period of one academic year. There shall be a continuous internal assessment and as external assessment. The proportion of internal and external assessment shall be 30:70. There will be no internal assessment in the dissertation. Total marks for M. Phil will be 400. Dissertation may be written by the candidates under the supervision of any teacher who is registered as M. Phil Supervisor. Supervisor can guide normally five dissertations. However, the maximum limit may be relaxed by the permission of Vice-Chancellor on the recommendation of Head. The internal Supervisor can guide five candidates and workload of six hours is admissible for each M. Phil course for dissertation. The Supervisor will sign and issue a certificate counter signed by the Head of department concerned.
3. The internal assessment may be evaluated on the basis of:
 - (a) Mid Terms : 15 Marks
 - (b) Assignments /Seminar Presentation /Group Discussion: 15 Marks
4. Each theory paper shall consist of 100 marks. The dissertation shall also consist of 100 marks. For a pass, a candidate shall be required to obtain (a) at least 40% marks in each paper separately (b) a minimum of 50% marks in the aggregate of all the papers prescribed for the examination. In the mark sheet, successful candidates shall be classified as under

First Division	65% or more.
Second Division	50-65%
- 6- A candidate will have to pass individually both in the Internal as well as external examination and it should be shown separately in the marks sheet.
- 7- The placement of every candidate under a Supervisor/Guide shall be decided within two months from the last date for admission.
- 8- A candidate who fails at the examination even in one paper/dissertation shall be required to reappear at the examination in a subsequent year in all the papers/dissertation prescribed for the examination, provided that a candidate who obtains at least 50% marks in dissertation shall be exempted from the submitting a fresh dissertation and the marks obtained by him shall be carried forward for working out his result.
- 9- For each theory paper 10 questions will be set for the final examination and the candidate will have to attempt at least five questions. All the questions will carry equal marks.
- 10- Workload distribution: There will be a teaching of four periods of one hour duration per week for each theory paper and six hours for dissertation.
i.e. 4X3 = 12 hours for theory papers and six hours for dissertation per week.

Papers Number	Paper Code	Papers Name	TEACHING PERIOD			External Marks	Internal		G. Total
			L	T			Mid Terms carrying 15 marks	Assignments /Seminar Presentation /Group Discussion	
Paper I, II, III	01MPL03101	Research Methodology	3	1	0	70	15	15	100
		ANY TWO							
	01MPL03102	Advanced Concept in Inorganic Chemistry	3	1	0	70	15	15	100
	01MPL03103	Advanced Analytical Chemistry	3	1	0	70	15	15	100
	01MPL03104	Advanced Concept in Organic Chemistry							
Paper IV	01MPL03201	Dissertation	4	2	0	70	--	--	100
		TOTAL	13	5	0				400

Paper I RESEARCH METHODOLOGY

Paper Code: 01MPL03101

Unit I : Research Methods

Problem selection – Literature survey – Familiarity with ideas and concepts of investigation – acquiring technical skills – drawing inferences from data – qualitative and quantitative analysis – accessing the problems – results and conclusions – presenting a scientific seminar – publication of research paper – art of writing of thesis.

Unit II : Errors Analysis Limiting Errors, Types of errors –

Gross, systematic and random – central value Statistical treatments of data – rejection of data – method of least squares – variance and standard deviation – of combination components – uncertainty analysis and treatment of single sample data – linear regression – Polynomial regression.

Unit-III

Sources of data collection: Primary and Secondary.

Methods and techniques :Survey, case study, Probability and Sampling.

Mean, Standard Deviation, Coefficient of Variation.

Correlation, chi-square test. Analysis, Q test, Interpretation and Report writing.

Unit-IV

Nanotechnology: Introduction, types of nanotechnology, Top down and bottom up techniques, Synthesis of nanomaterials; Plasma arc, Chemical Vapor Deposition, Sol-gel Techniques, Advanced Characterisation tools for nanomaterials ; scanning electron microscopy (SEM) and Transmission Electron Microscopy (TEM).

CHOOSE ANY TWO

PAPER II- ADVANCED CONCEPTS IN INORGANIC CHEMISTRY

Paper Code: 01MPL03102

COMPLEXES- REACTION MECHANISM

(a) Electron Transfer Mechanism

Outer sphere reaction

Inner sphere reaction

Mechanism criteria

Two electron transfer and other redox reactions

(b) Stereo-chemical Non rigid coordination compounds

Isomerisation and racemisation of tris chelate compounds

Metal carbonyl compounds

CERAMICS AND SOLID STATE

CERAMIC COMPOUNDS (CUPRATE OXIDE)

Introduction

Family of cuprate oxide compounds

214 La-Pa-Cu-O

123 Y-Ba-Cu-O

2021 A₂Co - X B_x Cu O_m 1-4

1021 A=B_{1n-1} or T₁= Sr or Ba

Structure

Bond structure

Chemistry of ceramic compounds

Doping effect

Application – Super Conductivity

SOLID STATE CHEMISTRY

Structure imperfection and properties of solids such as ionic conductivity, diffusion Ferroelectric properties and luminescence optical and thermal excitation in solids phosphorescence and laser properties of inorganic compounds. Methods of analyzing solid state dislocations, their mechanism and reactions.

POLYMERS

High Polymers and Macromolecules:

Nature of Macromolecules, Forces involved in high polymers interaction, methods for studying size and shapes of high polymers by various experimental techniques, sedimentation, ultracentrifuge, Viscosity, Electrophoretic and diffraction methods, configuration of polymer molecules, Rubber, elasticity and crystallinity of polymer structure. Transition Helix Xoil Transition, Optical methods for studying transitions and ORD Mechanism of coordination on catalytic compounds.

PHYSICO CHEMICAL ASPECT OF AIR AND WATER POLLUTION

Air Pollution : General consideration, Air pollution, type of pollution and unit of measurement, Air quality standards, Sampling and monitoring, Source and effects of air pollution caused by carbon monoxide, oxide of nitrogen, sulphur dioxide, ozone, water vapours. Aerosols and minor pollutant gases, Indoor pollution, Composition of atmosphere- Troposphere Stratosphere Mesosphere and Thermosphere **Water Pollution: Pollution** cycle in environment, aquatic environment water pollutants, Trace element in water, specification with special reference to copper, lead mercury and arsenic, water quality parameters and standards, sample presentation. Role of bulk and trace metals in biological systems, microelements, active transport of Na, Mg and Ca across the biological membrane. Iron storage and transport, copper proteins, metalloenzymes, general discussion of enzymes functions of metal ions, inhibition (Exploration based on coordination chemistry) vitamins B12 and B12 coenzymes.

Paper III

ADVANCED ANALYTICAL CHEMISTRY

Paper Code:

01MPL03103

Unit I : Gas Chromatography

Principles – classification of chromatography – TLC, Column chromatography – Ion exchange, Gas chromatography.

Unit II: HPLC

Principles of high performance liquid chromatography

The liquid Chromatography

The requirements of solvent coming and different pumping system, gradient elution Isoerotic elution sampling.

Detectors for liquid chromatography

The mobile Phase in H.P.L.C (i) Polarity (ii) Solvent degassing

Column technology

Column selection in H.P.L.C

Electron diffraction scattering of electron by atoms, procedure of obtaining electron diffraction, Analysis of results and application

Unit III : Emission spectra Flame Emission spectroscopy / Flame photometry :

Principles of Flame photometry, Inferences in Flame photometry. Plasma Emission spectroscopy: Introduction, direct current Plasma (DCP) inductively coupled Plasma (ICP), LCP instrumentation.

Unit IV : NMR Spectroscopy

Interpretation of ^{13}C spectra (peak assignments)

Chemical shifts

Spin – Spin coupling

Peak assignment problems

Second order effect. NO

PAPER IV- ADVANCED CONCEPTS IN ORGANIC CHEMISTRY

Paper Code: 01MPL03104

PRINCIPLES OF ORGANIC SYNTHESIS

Classification of organic reaction planning and synthesis, role of molecular history, key intermediates and starting materials, molecular size, linear convergent and relay approach problems of complexity of carbon skeleton and diverse functionality: activating and protecting groups, static growing and stereo selectivity. Evaluation of the above factors by application to specific examples.

MODERN REAGENTS IN ORGANIC SYNTHESIS

Sodium Cyanoborohydride, Osmium tetroxide, Lithium dimethylcuperate, thallium trifluoroacetate, sodium hydrogentelluride, silver hexafluoroantimonate, thiobenzoyl chloride, Trichlorosilane, Vanadium oxytrifluoro-phosphonitrilechloride, Ruthenium tetroxide, Barium Manganate-benzene selenic acid, benzene sulphonylbromide/ chloride, aluminium chloride/phosphoryl chloride

ORGANIC SYNTHESIS

Synthesis with organometallic compounds of Mg, Li, Rh and Ni, Rearrangements catalysed by metal ion and complexes.

OXIDATION REDUCTION

OXIDATION : Oxidation of the following class of organic compound with transition metals particularly with Cr, Mn, V and Co: Alkanes, Alcohols, glycols, carbonyl compounds, carboxylic acids, Amino acids, Thiocompounds, Aromatic hydrocarbons.

REDUCTION: Catalytic, metal hydrides, dissolving metal, Reduction of specific functional groups: alkenes, carbonyl, unsaturated carbonyls reductive ring opening of epoxides, reduction of aromatic and heterocyclic compounds.

Biosynthetic pathway of natural products Acetate hypothesis, poly-beta-ketoacids, their aldol type cyclisation and metaorientation of hydroxyl groups in naturally occurring phenols, biogenesis of muscone. Isoprene rule, mechanism of formation of mevalonic and from acetyl coenzyme Biotin isoprene rule, Geranyl Pyrophosphate and its conversion into alpha-pinene, uvaol and bornol. Farnesyl and geranyl-pyrophosphates and mechanistic consideration their conversion into cadonones and abietic acid.

Chemistry of following chemotherapeutic agents and their mode of action:

Antipyretics & Analgesics- Phenacetin, salicylic acid, cinchophen

Anesthetics – Procaine, methohexital

Hypnotics & Sedatives- Barbiturates & Phenobarbitone

CNS stimulants- caffeine, amphetamine

Paper V

M. Phil Dissertation

Paper Code:
01MPL03201.

Each student will submit dissertation on any one topic related to chemistry (According to the subject choice in paper I). Dissertation will be guided by supervisor of the university and will be examined by external.
