



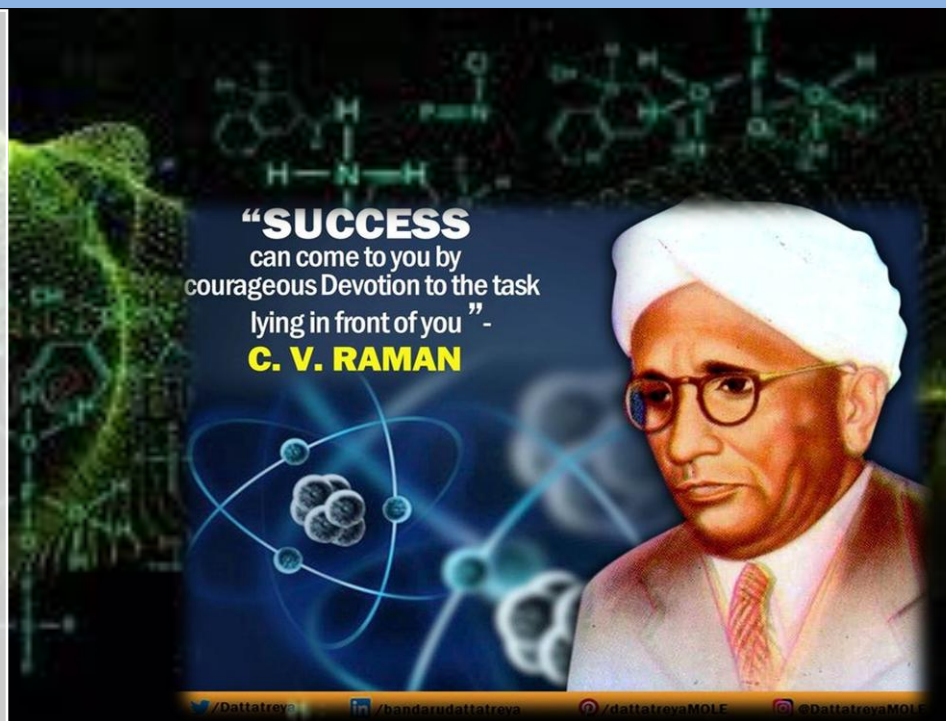
**M.Sc. I & II Semester  
COURSE OUTCOME  
CALENDAR  
SESSION 2024-25**

**DEPARTMENT OF CHEMISTRY  
GOVT. M. H. COLLEGE OF HOME SCIENCE AND SCIENCE  
FOR WOMEN, JABALPUR**

## COURSE OUTCOMES

### MCH 101 – PAPER I INORGANIC CHEMISTRY

### M. Sc. I Semester



## FIRST PAPER (MCH 101) INORGANIC CHEMISTRY

By the end of this course students will learn the following aspects of chemistry:

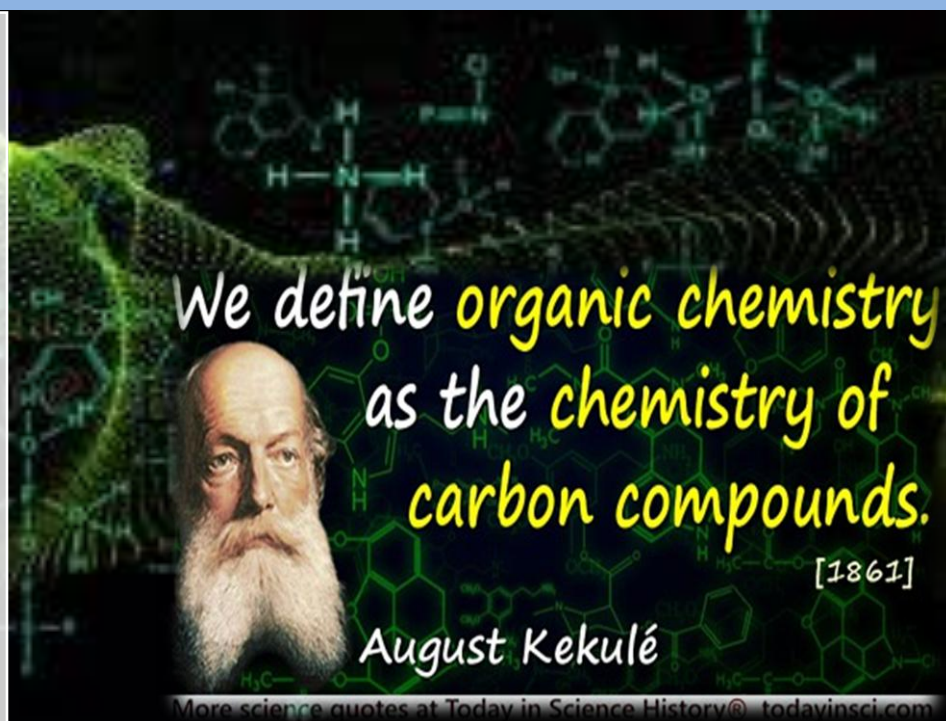
- ✓ Stereochemistry, bonding, VSEPR theory, MO treatment.
- ✓ Reaction mechanism of Substitution inertness and liability.
- ✓ Electronic spectra of transition metal complexes.
- ✓ Metal carbonyls, Di - oxygen Complexes.
- ✓ Wilkinson's Catalyst, borane chemistry including topology, nomenclature, reactivity and bonding.



## COURSE OUTCOMES

MCH 102 – PAPER II  
ORGANIC CHEMISTRY

M. Sc. I Semester



## SECOND PAPER (MCH 102) ORGANIC CHEMISTRY

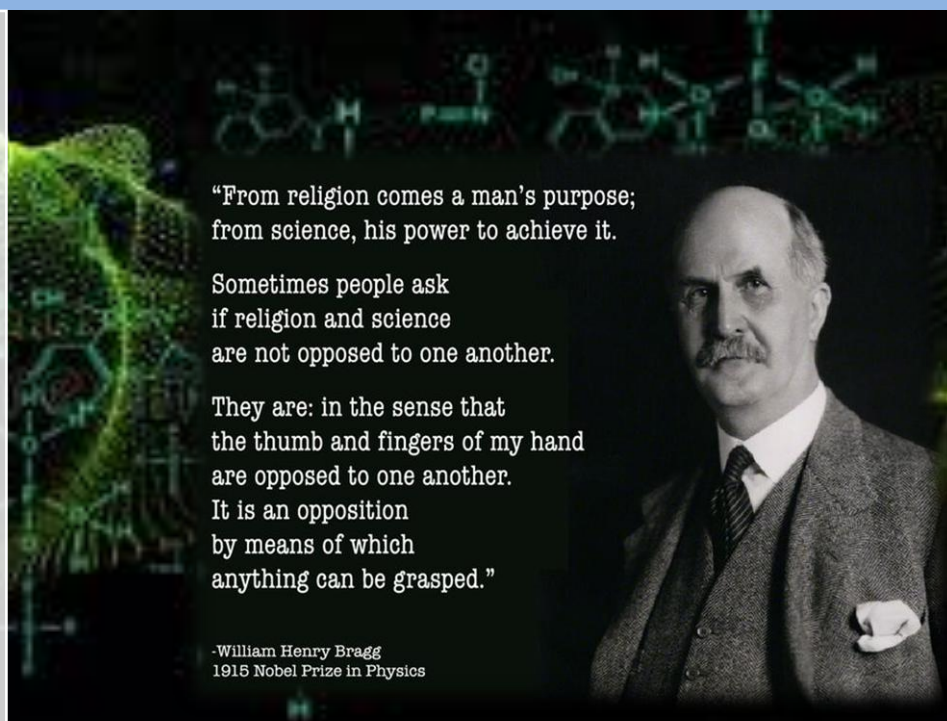
By the end of this course students will learn the following aspects of chemistry:

- ✓ Structure and bonding in organic molecules
- ✓ Aromaticity, antiaromaticity, homo aromaticity including weaker bonds.
- ✓ Stereochemistry, symmetry, chirality, optical activity and conformational analysis.
- ✓ Reaction mechanism, Hammett equation, SN1, SN2 and SET mechanism.
- ✓ UV-VIS, ORD & CD Spectroscopy.

## COURSE OUTCOMES

### MCH 103 – PAPER III PHYSICAL CHEMISTRY

### M. Sc. I Semester



## THIRD PAPER (MCH 103) PHYSICAL CHEMISTRY

By the end of this course students will learn the following aspects of chemistry:

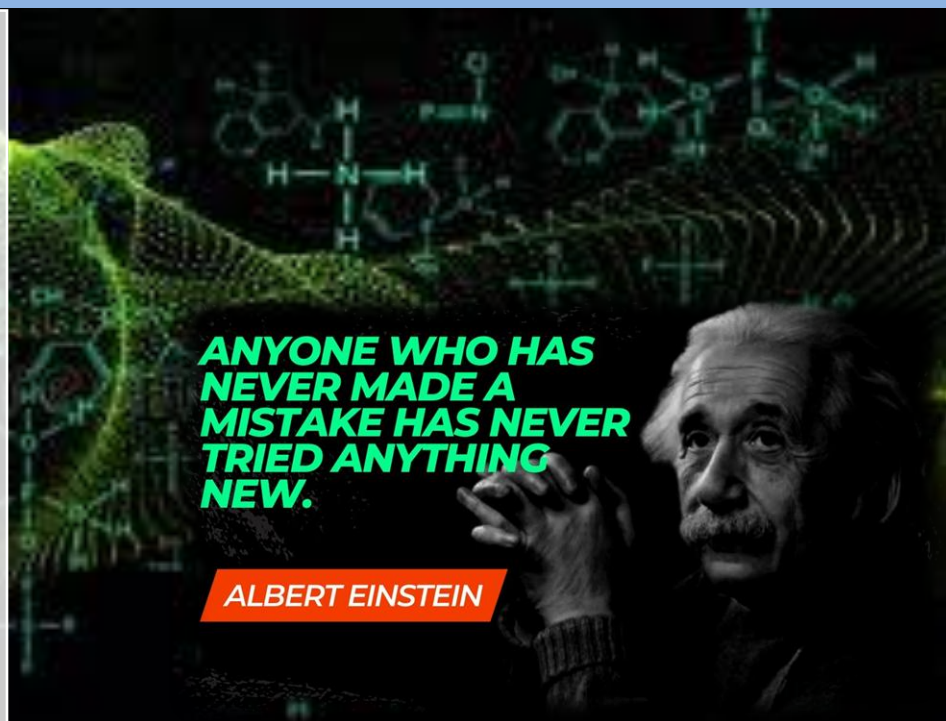
- ✓ Schrodinger Wave equation, variation and perturbation theory.
- ✓ Classical thermodynamics.
- ✓ Phase rule, chemical dynamics, Arrhenius Equation.
- ✓ Theory of reaction rate and application of rate law on dynamic chain reaction.
- ✓ Reaction catalysts.



## COURSE OUTCOMES

### MCH 104 – PAPER IV SPECTROSCOPY

#### M. Sc. I Semester



## FOURTH PAPER (MCH 104) SPECTROSCOPY

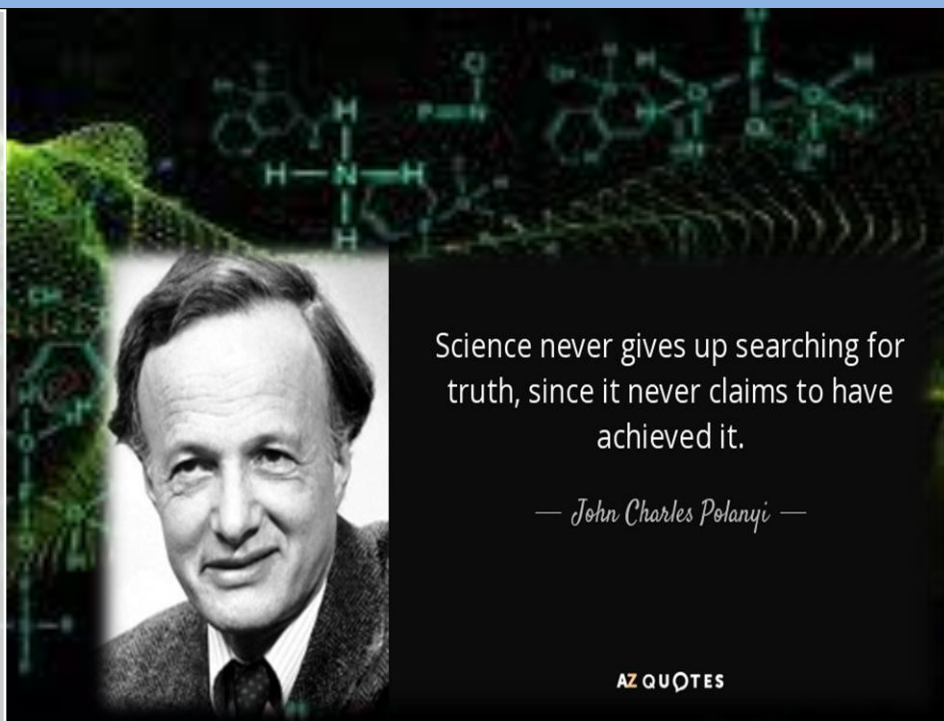
By the end of this course students will learn the following aspects of chemistry:

- ✓ Electromagnetic spectrum
  - ✓ Microwave spectroscopy
  - ✓ Infrared Spectroscopy
  - ✓ Raman and Electronic spectroscopy.
  - ✓ CARS (Coherent and Stokes Raman Spectroscopy)
- and application of these spectral techniques in structure determination of molecule.

## COURSE OUTCOMES

**MCH 105A – PAPER VA  
MATHEMATICS FOR CHEMIST**

**M. Sc. I Semester**



Science never gives up searching for truth, since it never claims to have achieved it.

— John Charles Polanyi —

AZ QUOTES

## **FIFTH PAPER (MCH 105A) MATHEMATICS FOR CHEMIST**

By the end of this course students will learn the following aspects of chemistry:

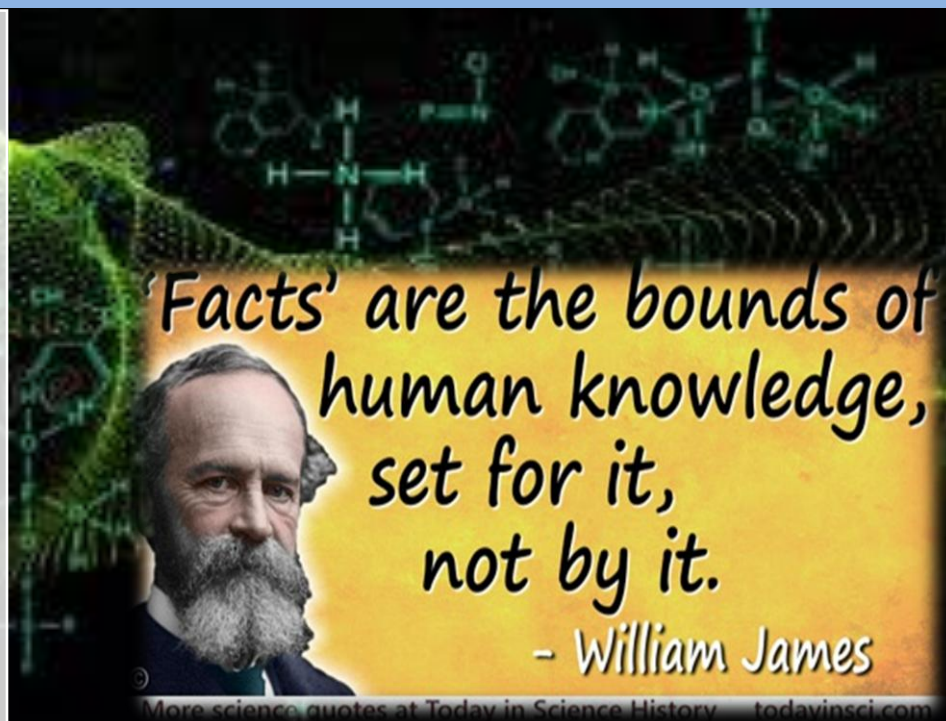
- ✓ Basic concept of mathematical technique involved in Chemistry like Mathematics Algebra.
- ✓ Differential calculus, integral calculus.
- ✓ Elementary differential equation.
- ✓ Permutation.
- ✓ Probability.



## COURSE OUTCOMES

**MCH 105B – PAPER VB  
BIOLOGY FOR CHEMIST**

**M. Sc. I Semester**



### **FIFTH PAPER (MCH 105B) BIOLOGY FOR CHEMIST**

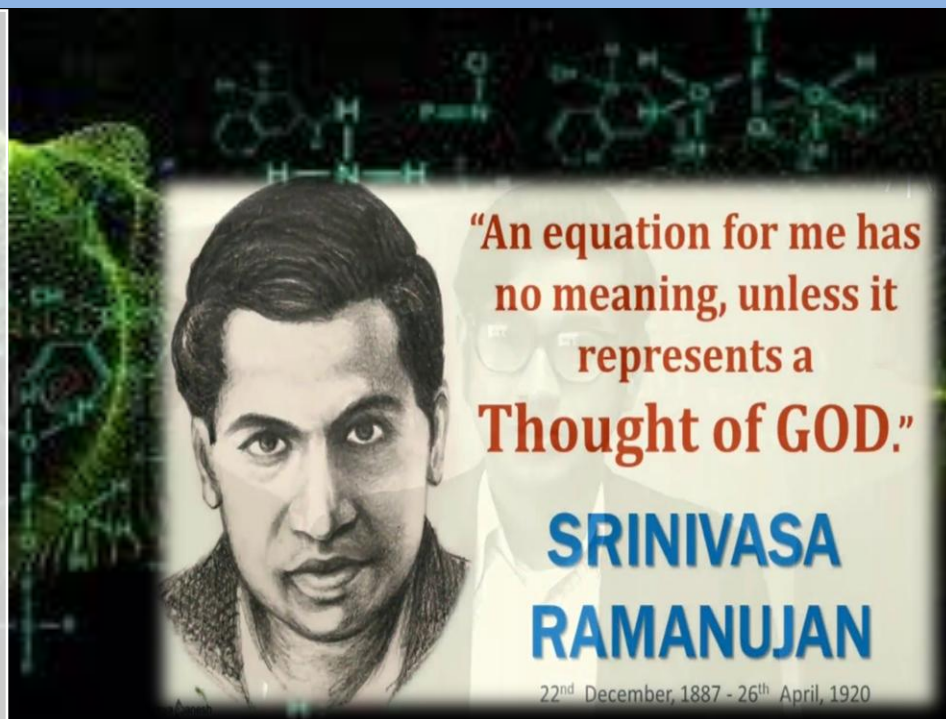
By the end of this course students will learn the following aspects of chemistry:

- ✓ **Cell structure**
- ✓ **Cell organs, and their function**
- ✓ **Carbohydrates**
- ✓ **Lipids and fats, amino acids**
- ✓ **Nucleic acids.**

## COURSE OUTCOMES

**MCH 201 – PAPER I  
INORGANIC CHEMISTRY**

**M. Sc. II Semester**



### **FIRST PAPER (MCH 201) INORGANIC CHEMISTRY**

By the end of this course students will learn the following aspects of chemistry:

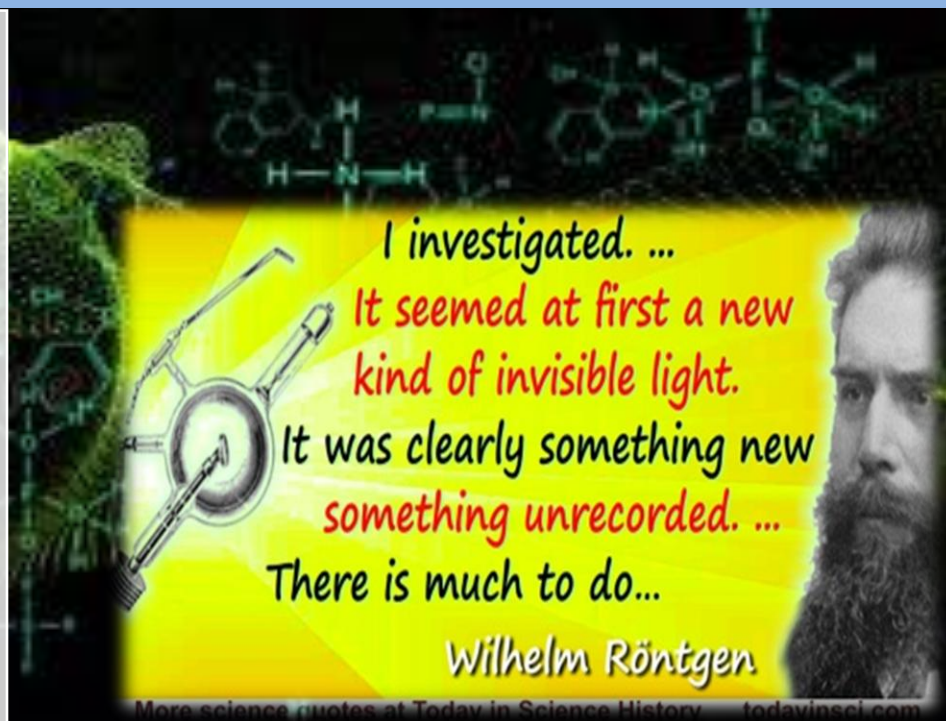
- ✓ Metal ligand equilibrium, reaction mechanism, base hydrolysis, conjugate base mechanism in octahedral and mechanism of square planar complexes.
- ✓ Metal-ligand bonding.
- ✓ Calculations of  $Dq$ ,  $B$  and beta parameters.
- ✓ Preparation, properties, structure and applications of metal nitrosyls.
- ✓ Symmetry elements, symmetry operations and the principle involved in group theory.



## COURSE OUTCOMES

MCH 202 – PAPER II  
ORGANIC CHEMISTRY

M. Sc. II Semester



## SECOND PAPER (MCH 202) ORGANIC CHEMISTRY

By the end of this course students will learn the following aspects of chemistry:

- ✓ Mechanism- aromatic/aliphatic electrophilic substitution.
- ✓ Free radical, allylic halogenation reaction.
- ✓ Addition to carbon-carbon and carbon-hetero atom multiple bond and aromatic nucleophilic substitution, SE1, SE2, SN1 SN2 & SRN1 reactions.
- ✓ ESR Spectroscopy
- ✓ IR and Raman spectra and their application in characterization of organic compounds.

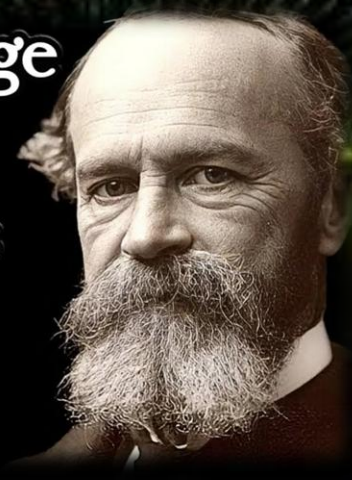
## COURSE OUTCOMES

**MCH 203 – PAPER III  
PHYSICAL CHEMISTRY**

**M. Sc. II Semester**

**Man can Change  
his Life by  
Changing his  
Thoughts.**

**WILLIAM JAMES**



### **THIRD PAPER (MCH 203) PHYSICAL CHEMISTRY**

By the end of this course students will learn the following aspects of chemistry:

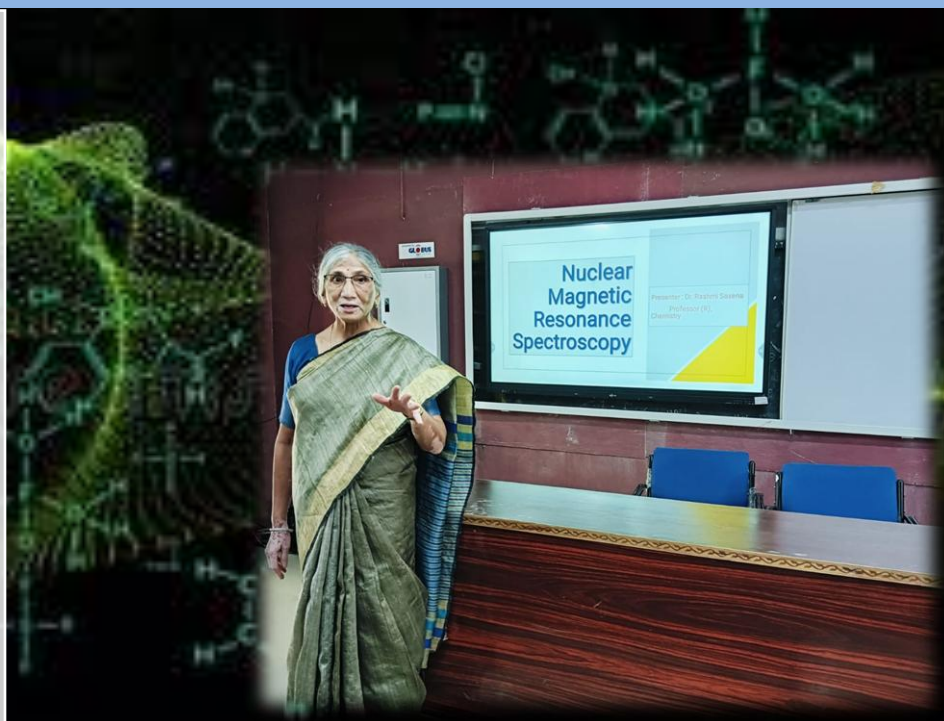
- ✓ Chemical dynamics.
- ✓ Adsorption and electro kinetic phenomenon.
- ✓ Micellization, DHO equation.
- ✓ Lipmann electro-capillary phenomenon including different models.
- ✓ Macromolecules and colloid including their types, emulsification, irreversible electrode phenomenon including decomposition voltage overlaps.



# COURSE OUTCOMES

## MCH 204 – PAPER IV SPECTROSCOPY & DIFFRACTION METHODS

### M. Sc. II Semester



## FOURTH PAPER (MCH 204) - SPECTROSCOPY & DIFFRACTION METHODS

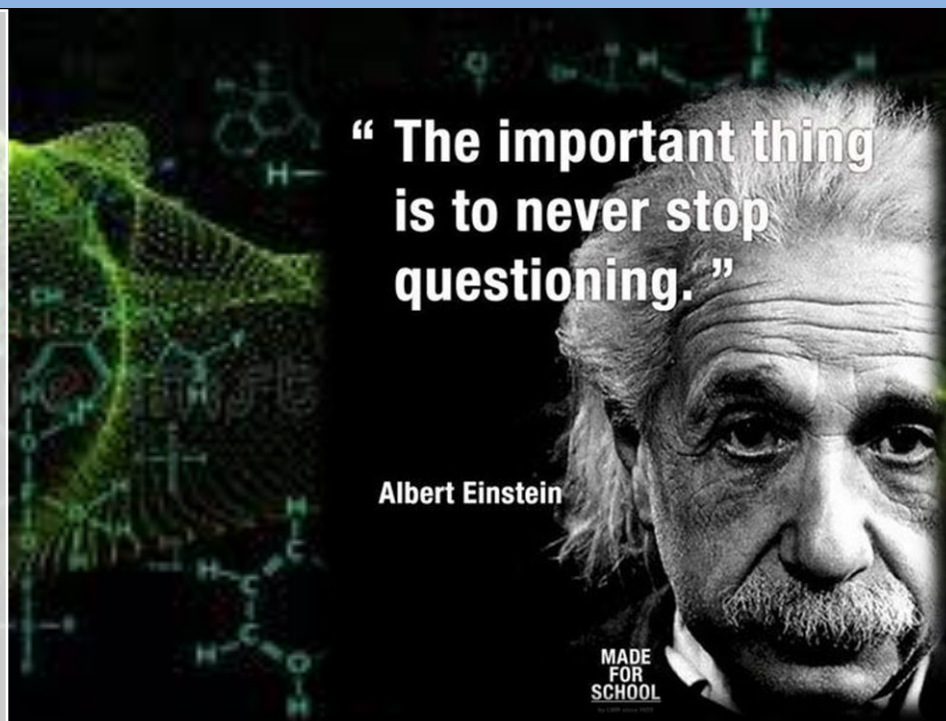
By the end of this course students will learn the following aspects of chemistry:

- ✓ Photoelectron spectroscopy, photoacoustic spectroscopy.
- ✓ X ray Diffraction, Neutron Diffraction.
- ✓ Biological cell, constituents.
- ✓ Bioenergetics.
- ✓ Thermodynamics of biopolymer solution and transport of ion through the cell membrane.

## COURSE OUTCOMES

**MCH 205 – PAPER V  
COMPUTER FOR CHEMIST**

**M. Sc. II Semester**



### **FIFTH PAPER (MCH 205) COMPUTER FOR CHEMIST**

By the end of this course students will learn the following aspects of chemistry:

- ✓ Basic knowledge of computer and computing.
- ✓ BASIC and FORTRAN based programming with especial reference to programming in chemistry.
- ✓ Rerunning of standard program in MS Word and MS Excel.
- ✓ Search engines and various types of files like PDF, RTF, and JPG.
- ✓ OMR & Webcam.





**M.Sc. I & II Semester  
CHEMISTRY PRACTICAL  
COURSE OUTCOME  
CALENDAR**

**SESSION 2024-25**

**DEPARTMENT OF CHEMISTRY  
GOVT. M. H. COLLEGE OF HOME SCIENCE AND SCIENCE  
FOR WOMEN, JABALPUR**

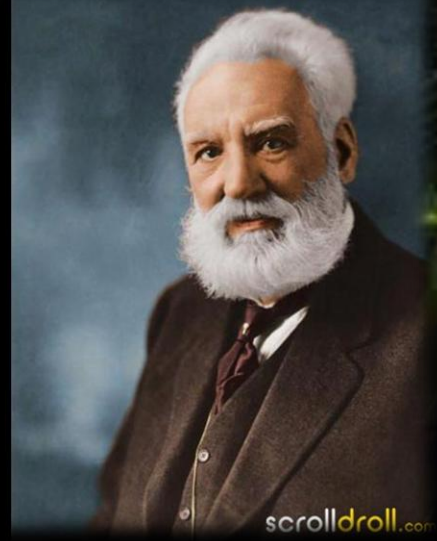
## COURSE OUTCOMES

**MCH 106 – PRACTICAL  
INORGANIC CHEMISTRY**

**M. Sc. I Semester**

When one door closes  
another door opens;  
but we so often look  
so long and so  
regretfully upon the  
closed door, that we  
do not see the ones  
which open for us.

*- Alexander Graham Bell*



## **PRACTICAL (MCH 106) INORGANIC CHEMISTRY**

By the end of this course students will learn the following aspects of chemistry:

- ✓ Qualitative and Quantitative Analysis.
- ✓ Chromatography.
- ✓ Preparations- Preparation of selected inorganic complexes and their studies by measurements of decomposition temperature, molar conductance, IR and electronic spectra.



## COURSE OUTCOMES

### MCH 107 – PRACTICAL ORGANIC CHEMISTRY

### M. Sc. I Semester



## PRACTICAL (MCH 107) ORGANIC CHEMISTRY

By the end of this course students will learn the following aspects of chemistry:

- ✓ **Qualitative Analysis: Separation, purification and identification of compounds of binary mixture. Emphasis should be placed on physical principles, reaction chemistry and the technique involved in analysis.**
- ✓ **Organic Synthesis-Purification of compounds by TLC and column chromatography.**
- ✓ **Aromatic electrophilic substitutions, Reduction reaction in an organic compound by acetylation method.**



## COURSE OUTCOMES

**MCH 108 – PRACTICAL  
PHYSICAL CHEMISTRY**

**M. Sc. I Semester**



## **PRACTICAL (MCH 108) PHYSICAL CHEMISTRY**

By the end of this course students will learn the following aspects of chemistry:

- ✓ **Adsorption**
- ✓ **Phase Equilibria**
- ✓ **Chemical Kinetics**
- ✓ **Solutions**

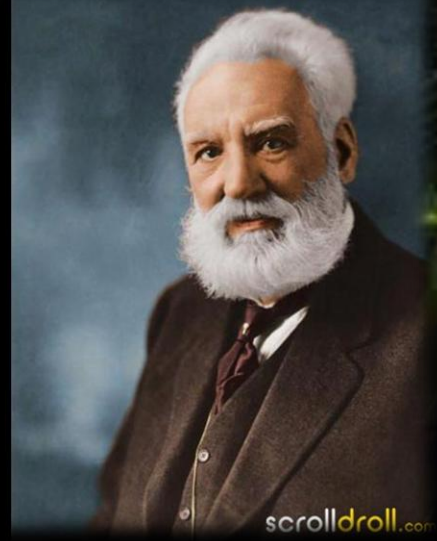
## COURSE OUTCOMES

**MCH 206 – PRACTICAL  
INORGANIC CHEMISTRY**

**M. Sc. II Semester**

When one door closes  
another door opens;  
but we so often look  
so long and so  
regretfully upon the  
closed door, that we  
do not see the ones  
which open for us.

*- Alexander Graham Bell*



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## **PRACTICAL (MCH 206) INORGANIC CHEMISTRY**

By the end of this course students will learn the following aspects of chemistry:

- ✓ **Chromatography Separation of cations and anions by Column Chromatography.**
- ✓ **Estimation of Ni – Fe, Ni (Gravimetrically), Fe (Volumetrically).**
- ✓ **Preparations- Preparation of selected inorganic complexes and their studies by measurements of decomposition temperature, molar conductance, IR and electronic spectra.**
- ✓ **Interpretation of TG and NMR spectra of some known compounds**

## COURSE OUTCOMES

### MCH 207 – PRACTICAL ORGANIC CHEMISTRY

### M. Sc. II Semester



## PRACTICAL (MCH 207) ORGANIC CHEMISTRY

By the end of this course students will learn the following aspects of chemistry:

- ✓ Qualitative Analysis: Separation, purification and identification of compounds of binary mixture. Emphasis should be placed on physical principles, reaction chemistry and the technique involved in analysis.
- ✓ Preparation of phenyl azo –  $\beta$  – naphthol from aniline.
- ✓ Aromatic electrophilic substitutions, Reduction reaction
- ✓ Quantitative Analysis-*Determination of the percentage or number of hydroxyl groups in an organic compound by acetylation method*



## COURSE OUTCOMES

**MCH 208 – PRACTICAL  
PHYSICAL CHEMISTRY**

**M. Sc. II Semester**



## **PRACTICAL (MCH 208) PHYSICAL CHEMISTRY**

By the end of this course students will learn the following aspects of chemistry:

- ✓ **Electrochemistry**
- ✓ **Conductometry**
- ✓ **Potentiometry/pH merry**
- ✓ **Polarimetry**



# **M.Sc. III & IV Semester COURSE OUTCOME CALENDAR**

**SESSION 2024-25**

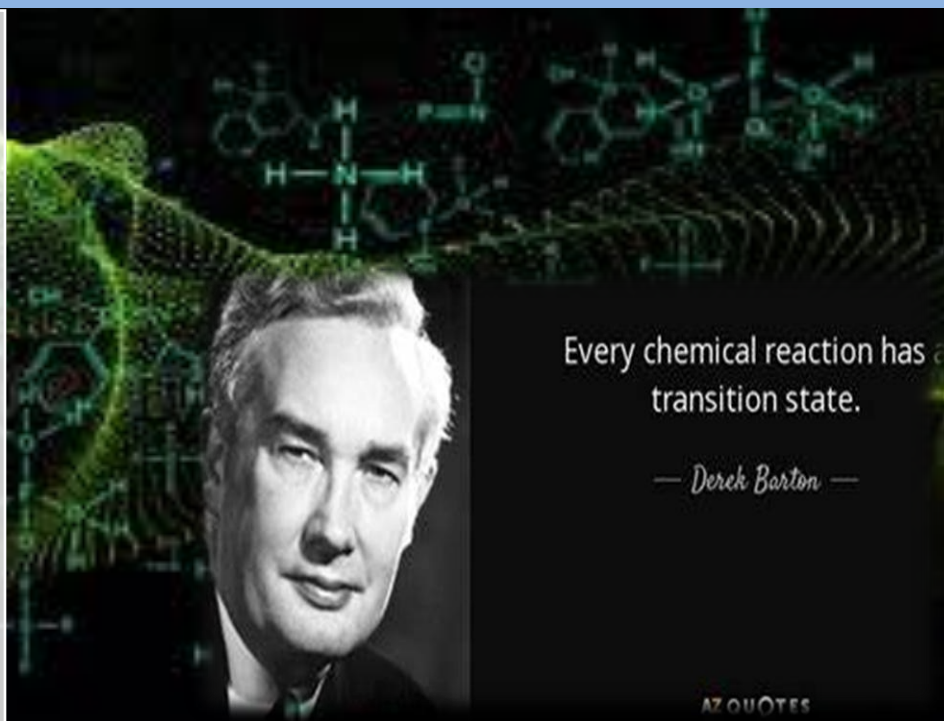
***DEPARTMENT OF CHEMISTRY  
GOVT. M. H. COLLEGE OF HOME SCIENCE AND SCIENCE  
FOR WOMEN, JABALPUR***



## COURSE OUTCOMES

**MCH 301 – PAPER I  
INORGANIC CHEMISTRY**

**M. Sc. III Semester**



## **FIRST PAPER (MCH 301) INORGANIC CHEMISTRY**

By the end of this course students will learn the following aspects of chemistry:

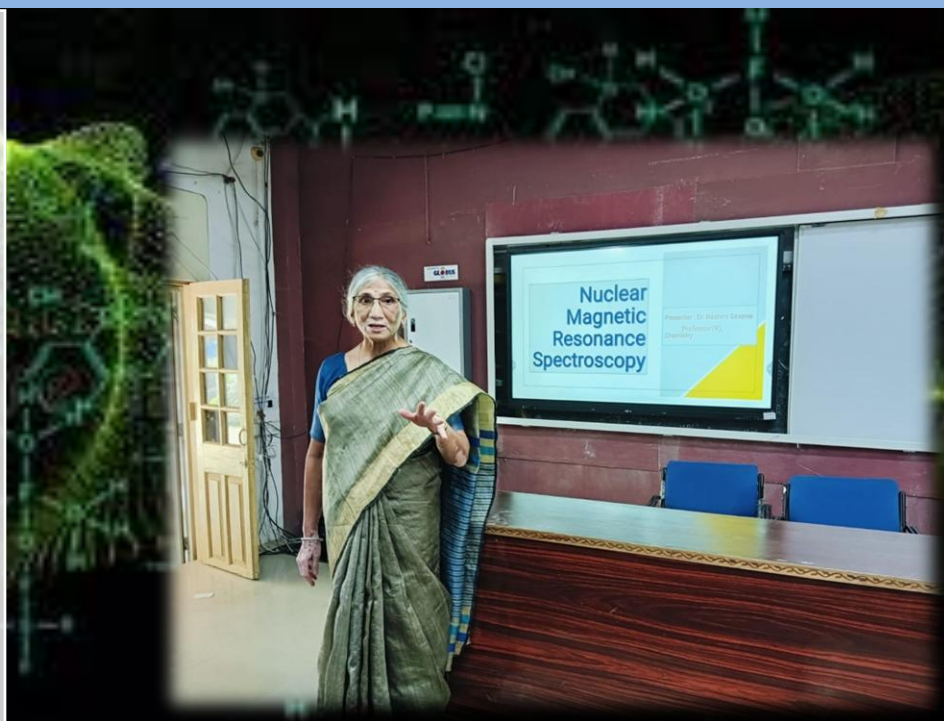
- ✓ Group theory, Character tables, orthogonality theorem, applications for  $C_{2v}$  and  $C_{3v}$  point groups.
- ✓ Correlation of vibrational spectroscopy with group theory. They will also understand molecular energy levels and M.O. Diagrams, bonding of multidentate ligands, characterization by IR & Raman spectroscopy.
- ✓ Shift reagents in NMR spectroscopy.
- ✓ Structure and functioning of metalloenzymes e.g., carboxypeptidase, carbonic anhydrase.
- ✓ Structure and functioning of biomolecules like Hemoglobin.



## COURSE OUTCOMES

### MCH 302 – PAPER II ORGANIC CHEMISTRY

### M. Sc. III Semester



## SECOND PAPER (MCH 302) ORGANIC CHEMISTRY

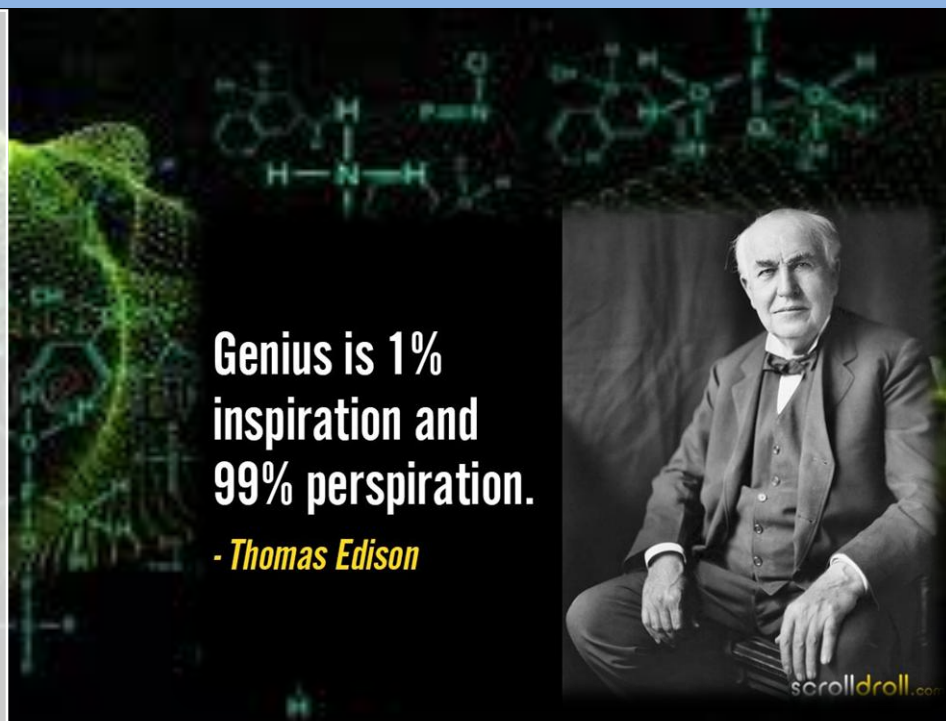
By the end of this course students will learn the following aspects of chemistry:

- ✓ Basic theory of NMR spectroscopy, Organic applications to characterize.
- ✓ Photochemical reactions.
- ✓ Mechanism of pericyclic reaction.
- ✓ Woodward Haffmann, FMO &PMO approach.
- ✓ Sigma tropic rearrangements.

## COURSE OUTCOMES

**MCH 303 – PAPER III  
PHYSICAL CHEMISTRY**

**M. Sc. III Semester**



### **THIRD PAPER (MCH 303) PHYSICAL CHEMISTRY**

By the end of this course students will learn the following aspects of chemistry:

- ✓ Atomic concepts, Russell-Saunders terms and coupling. Molecular Orbitals, Huckel theory of conjugated systems like ethylene, butadiene
- ✓ Homo and heterogeneous catalysis.
- ✓ Crystal defects, Schottky and Frankel defects.
- ✓ Solid state reactions. Metallic bond.
- ✓ Conductors, semiconductors, insulators and superconductors.

## COURSE OUTCOMES

**MCH 304B – PAPER  
ANALYTICAL CHEMISTRY**

**M. Sc. III Semester**



When one door closes  
another door opens;  
but we so often look  
so long and so  
regretfully upon the  
closed door, that we  
do not see the ones  
which open for us.

*- Alexander Graham Bell*

### **FOURTH PAPER (MCH 304B) – ANALYTICAL CHEMISTRY**

By the end of this course students will learn the following aspects of chemistry:

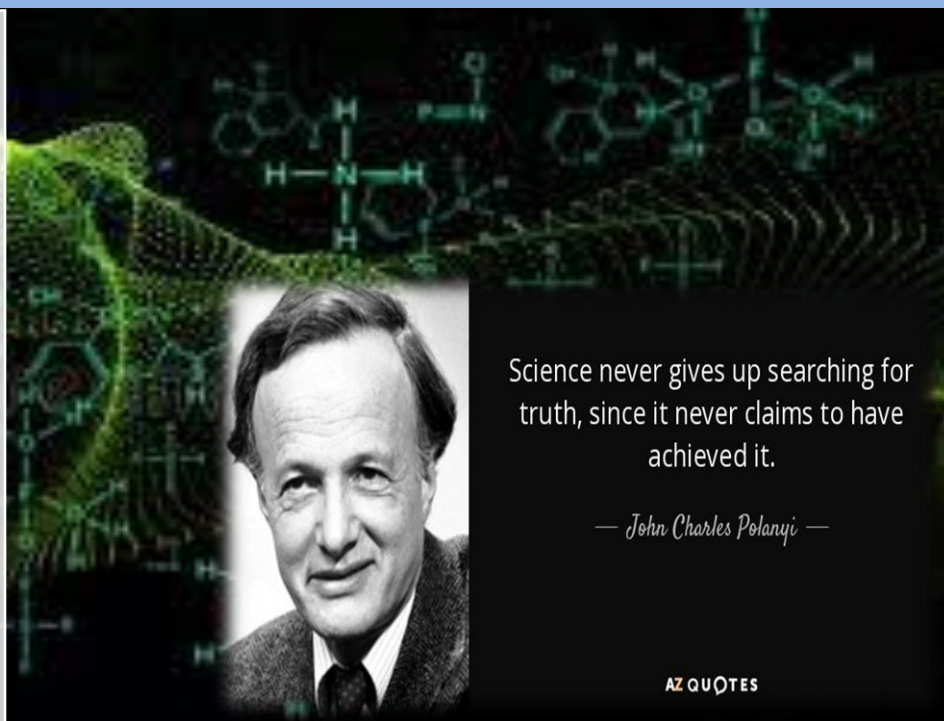
- ✓ Statistical Analysis., Sample Preparation for Chromatography.
- ✓ Chromatography. Theory of Chromatography, Gas Chromatography, High-Performance Liquid Chromatography, Capillary Electrophoresis.
- ✓ Ion Exchange, Solvent Extraction
- ✓ Atomic Absorption Spectrometry, Electrolytic Methods
- ✓ Acid-Base Titrations, Precipitation Titrations, Complexometric Titrations, Redox Titrations.



## COURSE OUTCOMES

MCH 304C – PAPER V  
PHOTOCHEMISTRY

M. Sc. III Semester



## FIFTH PAPER (MCH 304 C) PHOTOCHEMISTRY

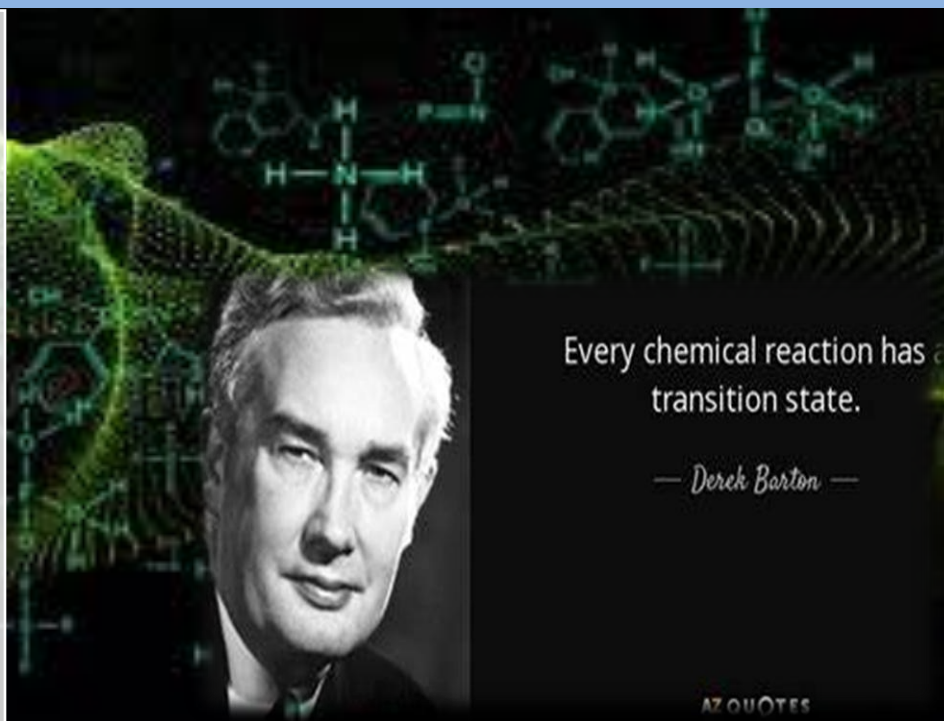
By the end of this course students will learn the following aspects of chemistry:

- ✓ **Photochemical Reactions.**
- ✓ **Determination of Reaction Mechanism.**
- ✓ **Photochemistry of Alkene.**
- ✓ **Photochemistry of Carbonyl.**
- ✓ **Miscellaneous Photochemical Reactions, Photo degradation. Photochemistry of vision.**

## COURSE OUTCOMES

**MCH 401 – PAPER I  
INORGANIC CHEMISTRY**

**M. Sc. IV Semester**



## **FIRST PAPER (MCH 401) INORGANIC CHEMISTRY**

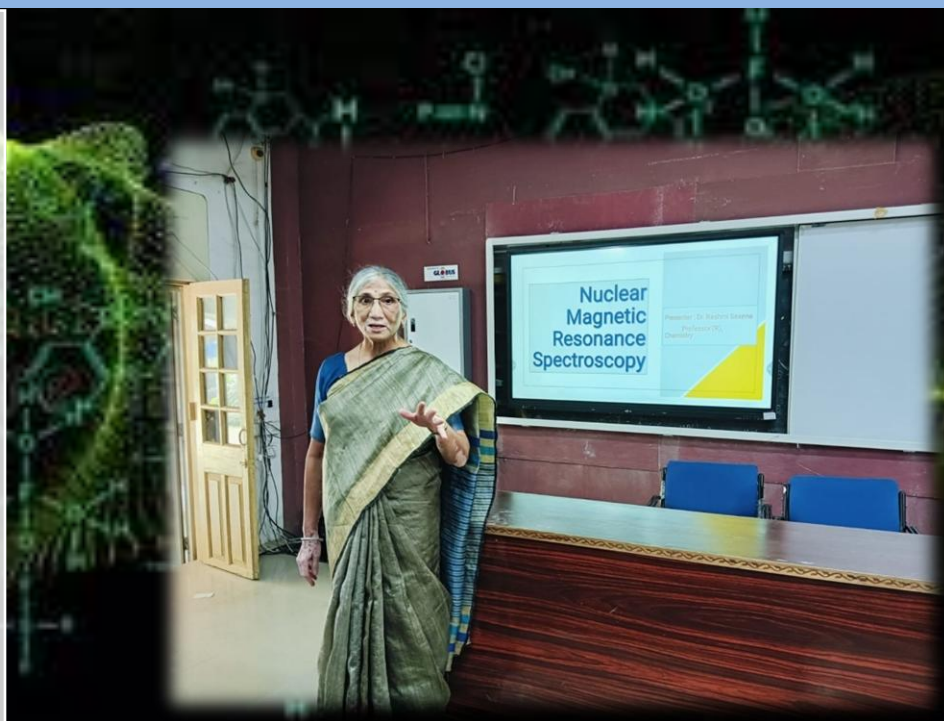
By the end of this course students will learn the following aspects of chemistry:

- ✓ ESR Spectroscopy.
- ✓ Mossbauer, IR, Raman spectroscopy.
- ✓ Point groups and vibrational spectroscopy.
- ✓ Bio-inorganic chemistry, chlorophyll, photo systems one and two.
- ✓ Metallo protein scytochromes, iron Sulphur protein, Nitrogen fixation.

## COURSE OUTCOMES

**MCH 402 – PAPER II  
ORGANIC CHEMISTRY**

**M. Sc. IV Semester**



## **SECOND PAPER (MCH 402) ORGANIC CHEMISTRY**

By the end of this course students will learn the following aspects of chemistry:

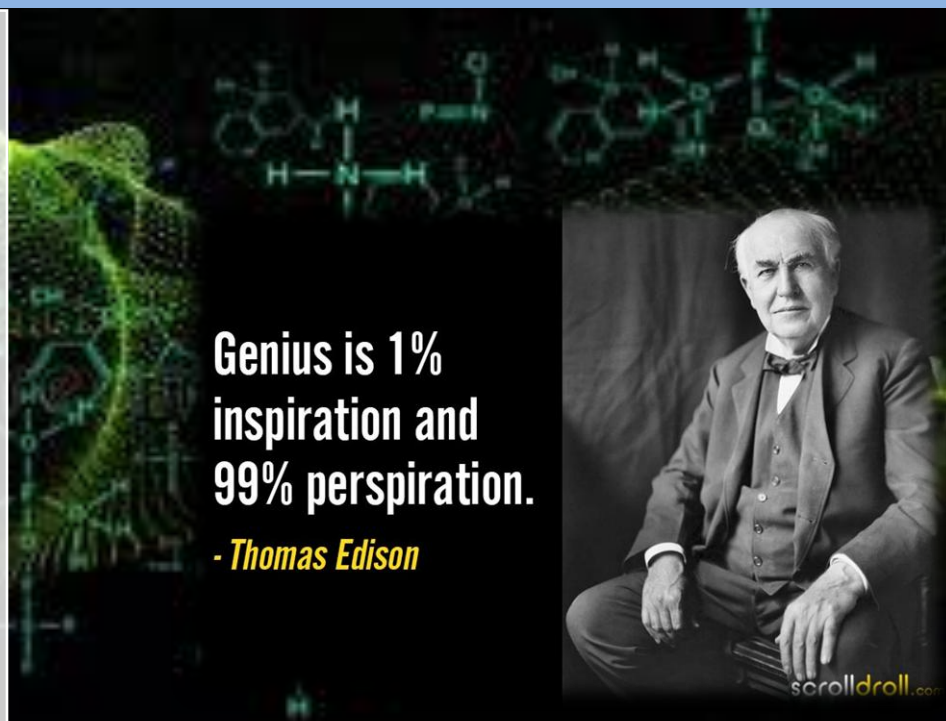
- ✓ **CNMR Spectroscopy.**
- ✓ **Mass spectroscopy.**
- ✓ **Reaction mechanism of elimination, E1, E2 & E1CB type.**
- ✓ **Substitution reactions.**
- ✓ **Enzymes, structure and functioning.**



## COURSE OUTCOMES

**MCH 403 – PAPER III  
PHYSICAL CHEMISTRY**

**M. Sc. IV Semester**



### **THIRD PAPER (MCH 403) PHYSICAL CHEMISTRY**

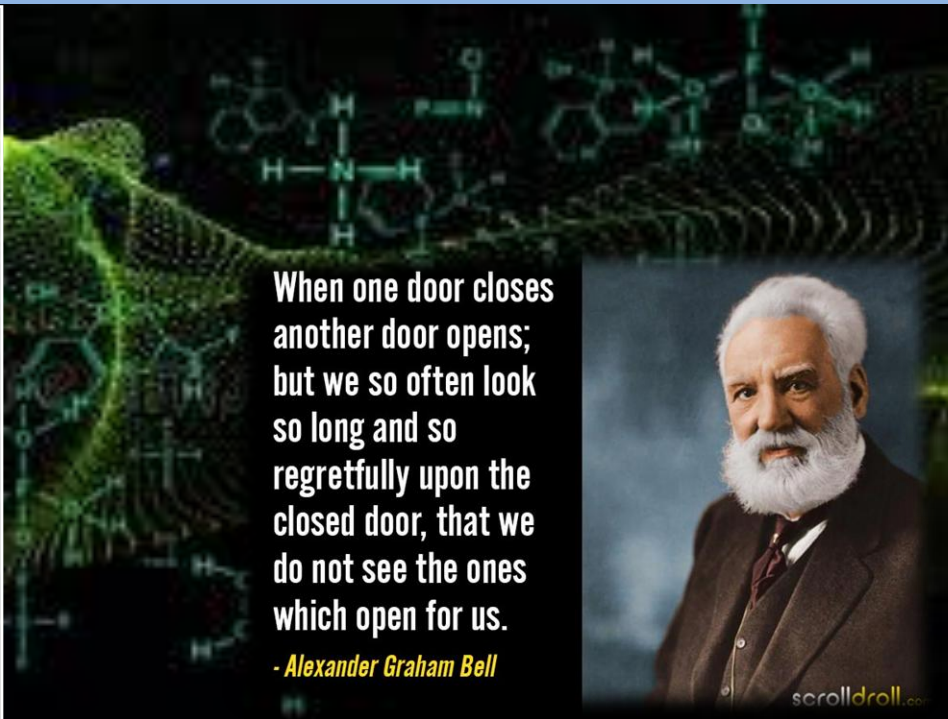
By the end of this course students will learn the following aspects of chemistry:

- ✓ NMR, ESR spectroscopy.
- ✓ Laws of photochemistry, fluorescence.
- ✓ Steric and conformational properties of molecules.
- ✓ Winstein-Holmer and Curtin-Hammett Equations.
- ✓ Electronic effects involved in SN1 and SN2 type of reactions, and curve crossing model.

## COURSE OUTCOMES

MCH 404 – PAPER  
POLYMER

M. Sc. IV Semester



When one door closes  
another door opens;  
but we so often look  
so long and so  
regretfully upon the  
closed door, that we  
do not see the ones  
which open for us.

- Alexander Graham Bell

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### FOURTH PAPER (MCH 404) – POLYMER

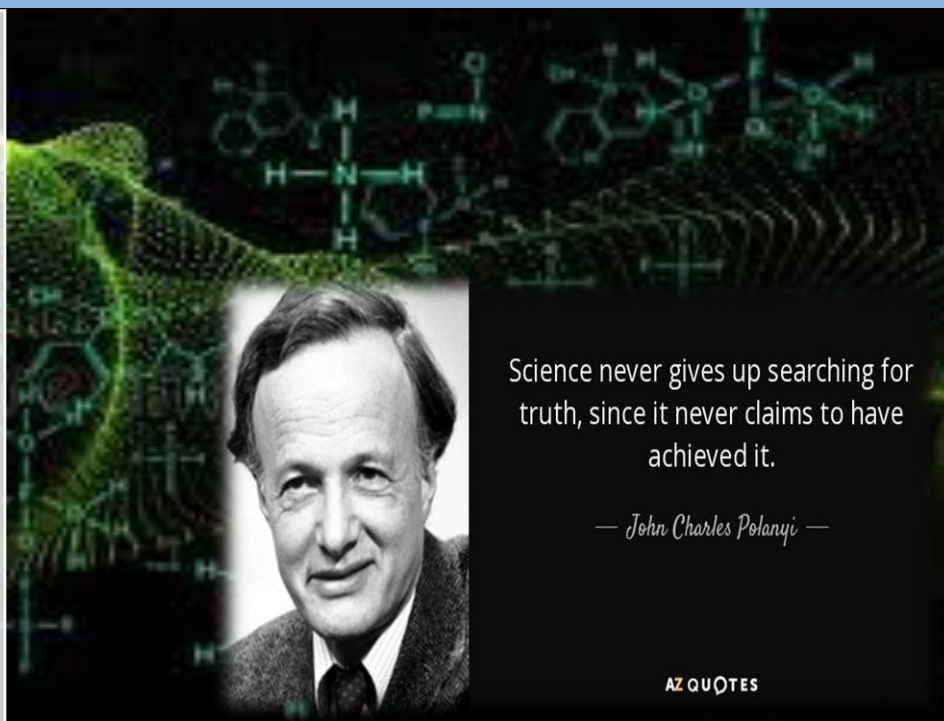
By the end of this course students will learn the following aspects of chemistry:

- ✓ Basic theory, classification of polymers.
- ✓ Characterization, important properties of polymers.
- ✓ Commercial importance of polymers.
- ✓ Processing to understand different types of casting like die-rotational, film.
- ✓ Methods for designing variety of polymers.

## COURSE OUTCOMES

MCH 405 – PAPER V  
CHEMISTRY OF NATURAL PRODUCTS

M. Sc. IV Semester



Science never gives up searching for truth, since it never claims to have achieved it.

— John Charles Polanyi —

AZ QUOTES

## FIFTH PAPER (MCH 405) CHEMISTRY OF NATURAL PRODUCTS

By the end of this course students will learn the following aspects of chemistry:

✓ *Terpenoids*

✓ *Alkaloids*

✓ *Steroids*

✓ *Plant Pigments. Carotenoid, Flavonoids, Chlorophyll*

✓ *Vitamins and Antibiotics, Antibiotics.*





**M.Sc. III & IV Semester  
CHEMISTRY PRACTICAL  
COURSE OUTCOME  
CALENDAR**

**SESSION 2024-25**

**DEPARTMENT OF CHEMISTRY  
GOVT. M. H. COLLEGE OF HOME SCIENCE AND SCIENCE  
FOR WOMEN, JABALPUR**

## COURSE OUTCOMES

**MCH 306 – PRACTICAL  
INORGANIC CHEMISTRY**

**M. Sc. III Semester**



Every great and deep difficulty bears in itself its own solution. It forces us to change our thinking in order to find it.

(Niels Bohr)

## **PRACTICAL (MCH 306) INORGANIC CHEMISTRY**

By the end of this course students will learn the following aspects of chemistry:

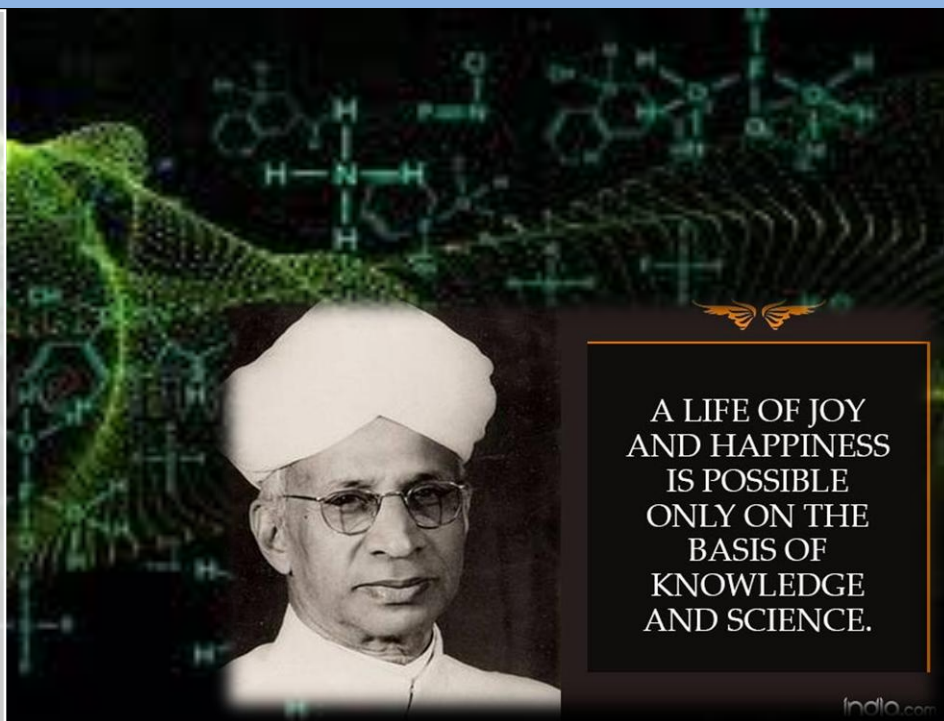
- ✓ Synthesis of selected inorganic compounds and their studies by measurements of decomposition temperatures and molar conductance, magnetic and IR electronic spectra.
- ✓ Qualitative test of suitable anion and determination of metal content gravimetrically in the above compounds.
- ✓ Interpretation of ESR and mass spectra of some known coordination compounds.



## COURSE OUTCOMES

**MCH 307 – PRACTICAL  
ORGANIC CHEMISTRY**

**M. Sc. III Semester**



A LIFE OF JOY  
AND HAPPINESS  
IS POSSIBLE  
ONLY ON THE  
BASIS OF  
KNOWLEDGE  
AND SCIENCE.

## **PRACTICAL (MCH 307) ORGANIC CHEMISTRY**

By the end of this course students will learn the following aspects of chemistry:

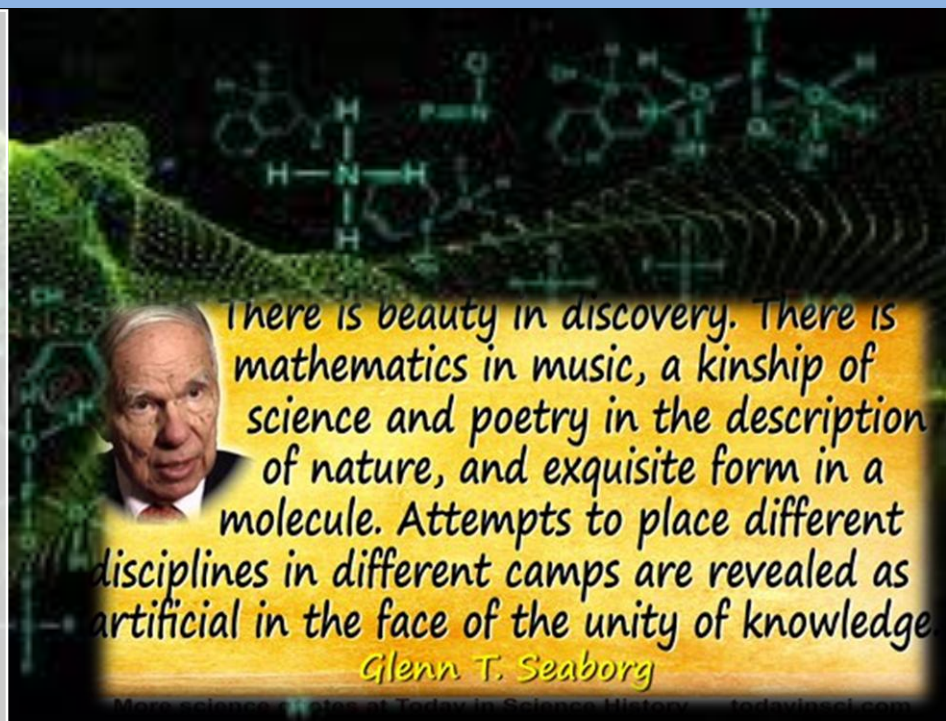
- ✓ Qualitative Analysis.
- ✓ Separation, purification and systematic identification of the components of a mixture of three organic compounds (solids and liquids). Preparation of one derivative of each.
- ✓ Multi-step Synthesis - This exercise should illustrate the use of organic reactions/ diverse conditions and principles.



## COURSE OUTCOMES

**MCH 308 – PRACTICAL  
PHYSICAL CHEMISTRY**

**M. Sc. III Semester**



## **PRACTICAL (MCH 308) PHYSICAL CHEMISTRY**

By the end of this course students will learn the following aspects of chemistry:

- ✓ Potentiometry
- ✓ Conductivity
- ✓ Spectrophotometry
- ✓ Molecular Modeling

## COURSE OUTCOMES

**MCH 406 – PRACTICAL  
INORGANIC CHEMISTRY**

**M. Sc. IV Semester**



Every great and deep difficulty bears in itself its own solution. It forces us to change our thinking in order to find it.

(Niels Bohr)

## **PRACTICAL (MCH 406) INORGANIC CHEMISTRY**

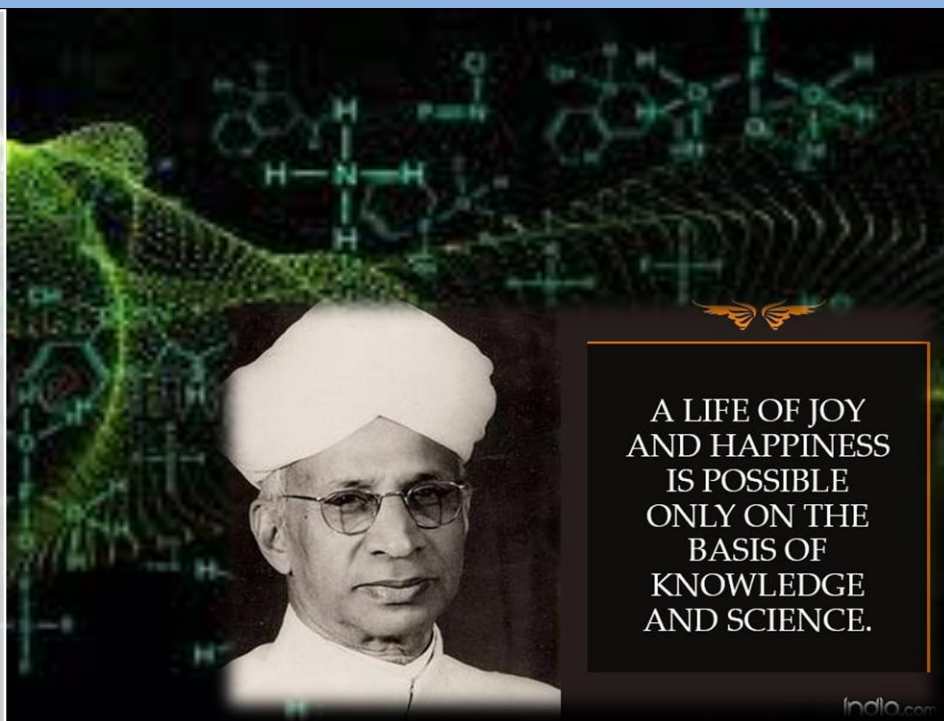
By the end of this course students will learn the following aspects of chemistry:

- ✓ **Spectrophotometric Determination.**
- ✓ **Flame photometric determination.**
- ✓ **Model Experiments on Cyclic Voltammetry.**
- ✓ **Interpretation of ESR, NMR and Thermogravimetric pre-recorded results of known compounds**

## COURSE OUTCOMES

**MCH 407 – PRACTICAL  
ORGANIC CHEMISTRY**

**M. Sc. IV Semester**



A LIFE OF JOY  
AND HAPPINESS  
IS POSSIBLE  
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BASIS OF  
KNOWLEDGE  
AND SCIENCE.

## **PRACTICAL (MCH 407) ORGANIC CHEMISTRY**

By the end of this course students will learn the following aspects of chemistry:

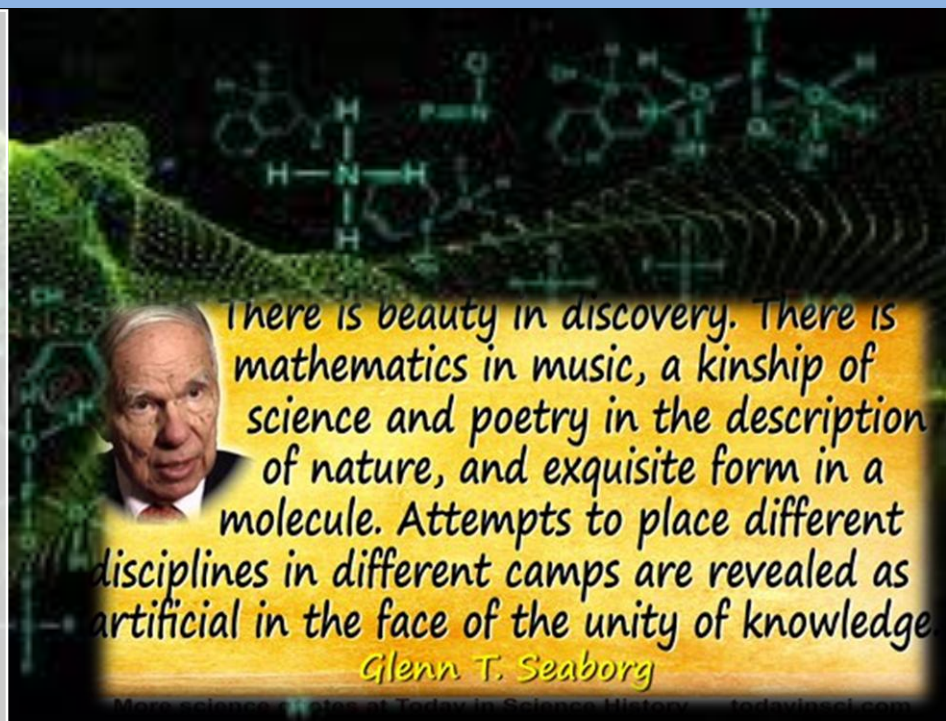
- ✓ **Multi-step Synthèses - Qualitative & Quantitative.**
- ✓ **Quantitative Analysis.**
- ✓ **Spectral Analysis: Interpretation of pre-recorded UV-Vis, IR, NMR, Mass, Raman spectrum and characterization of one organic compound.**



## COURSE OUTCOMES

**MCH 408 – PRACTICAL  
PHYSICAL CHEMISTRY**

**M. Sc. IV Semester**



## **PRACTICAL (MCH 408) PHYSICAL CHEMISTRY**

By the end of this course students will learn the following aspects of chemistry:

- ✓ Chemical Kinetics
- ✓ Spectrophotometry
- ✓ Molecular Modeling
- ✓ Electronics