

**Rashtrapita Mahatma Gandhi Arts, Commerce &  
Science College, Saoli Dist- Chandrapur-441225**



## **BRIDGE COURSE IN CHEMISTRY**

**Session 2021-22**

**Prepared By**  
Department of Chemistry

## Bridge Course

- Bridge courses aim to accelerate the students, knowledge in the subject acquired at 10+2 level; and also bridge the gap between the school science syllabus and the level needed to understand their applications to B.Sc. First year Chemistry concepts.

## Objectives

- To provide solid foundation for students in basic Chemistry so that they do not struggle when university programmes begin.
- To bridge the gap between subjects studied in high school and subjects they will study in B.Sc. programmes.
- This course provides a better transition period for students to prepare for the first semester of classes.

Such types of courses are the needs of current situation. As we all know that due to Covid-19 every school and colleges in India were closed for a long time, and as per the government policy Students are promoted directly to higher class without facing any examination. Therefore they are not in a position to grasp a higher level Chemistry concept. So to overcome this gap we have taken initiative to start this bridge course for the newly admitted first year students.

## **Instructions:**

1. This course will run by online mode from **1<sup>st</sup> November 2021**.
2. The basic requirement for this course is android mobile with good internet facility.
3. This course is compulsory to all the students who have admitted in B.Sc. first year.
4. Link of pre-recorded videos will be provided on college website (<https://rmgcollege.com>) as well as on your whatsapp group.
5. After completion of the course assignment will be given to you and you have to submit the assignment on time.
6. After completion of this bridge course you have to attempt final examination and this is compulsory to all the admitted students.
7. Certificate will be issued to those students who will score minimum 40% marks in final examination.

# Syllabus

## 1. Inorganic Chemistry

### Total lecture-10

Course Coordinator: Sandeep R. Deshmukh

**1. Structure of Atom:** Atomic Structure, Electronic configuration, quantum numbers, shapes of s, p and d orbitals, Pauli's exclusion principle, Hund's rule, Aufbau principle.

**2. D-block elements:** transition elements, general properties, electronic configuration

**3. F- block elements:** General introduction of lanthanides and actinides, electronic configuration, general properties of lanthanides and Actinides.

**4. Coordination compounds:** Ligands, types of ligands, coordination compounds, double salt, coordination numbers, IUPAC nomenclature of coordination compounds.

**5. Theories of bonding in coordination compounds:** Valence bond theory, crystal field theory

## 2. Organic Chemistry

**Total Lecture: 10**

**Course Coordinator:** Dr. Ragini C. Patil

### 1. Hydrocarbon

**Alkanes:** General introduction, Isomerism in alkane, IUPAC nomenclature of alkane, Chemical properties of alkane. **Alkene:** General introduction, Isomerism in alkene, IUPAC nomenclature of alkene, Chemical properties of alkene. **Alkyne:** General introduction, Isomerism in alkyne, IUPAC nomenclature of alkyne, Chemical properties of alkyne. **Benzene:** Structure of benzene, Aromatic character (Huckel rule), properties of benzene.

### 2. Isomerism

Structural isomerism, Position isomerism, functional isomerism, metamerism, tautomerism.

### 3. Theoretical basic of organic reactions:

Homolytic cleavage, heterolytic cleavage, electrophiles, nucleophiles, inductive effect, resonance effect, electromeric effect, hyperconjugation.

## 3. Physical Chemistry

**Total Lecture: 10**

**Course Coordinator:** Dr. Rajashree A. Markandewar

### 1. States of Matter

Solid State, Liquid State, Gaseous State. Physical and chemical properties of each state.

### 2. Ionic Equilibria :

Types of electrolytes, Acids and bases, Ph scale, types of buffer solutions, properties of buffer solutions, applications of buffer solutions.

### 3. Thermodynamics:

Basic terms used in thermodynamics, nature of heat and work, concept of maximum work, internal energy, first law of thermodynamics, second law of thermodynamics. Entropy, Gibb's energy.

## 1. Inorganic Chemistry

Sr. No.	Module	Lecture
1	Structure of Atom	2
2	D-block elements	2
3	F- block elements	2
4	Coordination compounds	2
5	Theories of bonding in coordination compounds	2

## 2. Organic Chemistry

Sr. No.	Module	Lecture
1	Hydrocarbon	4
2	Isomerism	2
3	Theoretical basic of organic reactions	4

## 3. Physical Chemistry

Sr. No.	Module	Lecture
1	States of Matter	1
2	Ionic Equilibria	1
3	Thermodynamics	2

# Lecture based module for bridge course in Physics



**RASHTRAPITA MAHATMA GANDHI  
ARTS, COMMERCE AND SCIENCE  
COLLEGE, SAOLI, CHANDRAPUR**

# Physics modules



Prepared by

**Department of Physics,  
Rashtrapita Mahatma Gandhi Arts,  
Commerce and Science College, Saoli**



# Content

<b>Sr. No.</b>	<b>Module</b>	<b>Lecture Required</b>
<b>1</b>	Mechanics and Properties of solids and fluids	04
<b>2</b>	Electrostatics and Magnetostatics	04
<b>3</b>	Kinetic theory of Gases and thermodynamics	04
<b>4</b>	Optics	04
<b>5</b>	Modern Physics	04
<b>6</b>	Semiconductor Electronics	04

# Syllabus

**Module 1: Mechanics and Properties of Solids and Fluids-** Newton's laws of motion and its limitations Centre of mass, Linear momentum about centre of mass, Conservation of momentum. Work and energy, Conservation of Energy, Moment of inertia, radius of gyration, physical significance of Moment of inertia, Elasticity, Hooke's law , Stress-strain diagram, viscosity, Streamline and Turbulent flow, Coefficient of viscosity, Surface tension and its molecular interpretation, Angle of contact.

**Module 2: Electrostatics and Magneto statics-** Definitions of electric field, electric field intensity, electric potential, electric dipole, electric dipole moment, electric quadrupole, concept of magnetic field, Gauss's theorem of electrostatics, electrostatics field energy. Flux of electric field. Biot Savart Law, Ampere Law, Magnetic intensity, magnetic induction, permeability, magnetic susceptibility, Para, Dia and ferromagnetic substances.

**Module 3: Kinetic theory of Gases and Thermodynamics** -Assumptions of Kinetic theory of Gasses, Pressure exerted by gas, Degree of freedom-mono, dia and polyatomic, Law of equipartition of energy, mean free path, Thermodynamic system, thermodynamic variables, First second and third law of thermodynamics, Zeroth law of thermodynamics and its importance.

**Module 4: Optics-** Interference of light, Principle of superposition and interference of light, basic concept of diffraction, diffraction grating, Concept of polarization, Brewster's law, Uniaxial and biaxial crystal, positive and negative crystal, Nicol prism, LASER and its properties

**Module 5: Modern Physics, Atomic and Nuclear Physics-** Planck's constant and light as a collection of photons; De Broglie wavelength and matter waves; Davisson-Germer experiment, Wave-particle duality, Heisenberg uncertainty principle, Atomic masses, isotopes, isobars, Constituents of nucleus and their Intrinsic properties, facts about size, mass, charge density (matter energy), binding energy, average binding energy, radioactivity- alpha, beta and gamma particles and their properties

**Module 6: Semiconductor Electronics-** Insulator, conductor, semiconductors, Types of semiconductors, PN junction diode, forward and reversed biasing in PN junction diode, Characteristics of PN junction diode, Zener diode and its characteristics. half wave rectifier, Full wave rectifier, Bridge rectifier

### Course organization:

<b>Sr. No</b>	<b>Faculty</b>	<b>module</b>	<b>Course content</b>
<b>1</b>	<b>Dr. P.R. Modak</b>	<b>5 and 6</b>	<b>5 Modern Physics, Atomic and Nuclear Physics</b> <b>6. Semiconductor Electronics</b>
<b>2</b>	<b>Mr. Ashish Shende</b>	<b>1 and 2</b>	<b>1. Mechanics and Properties of Solids and Fluids</b> <b>2. Electrostatics and Magneto statics</b>
<b>3</b>	<b>Mr. Mukesh Nikhade</b>	<b>3 and 4</b>	<b>3. Kinetic theory of Gases and Thermodynamics</b> <b>4. Optics</b>

**RASHTRAPITA MAHATMA GANDHI ARTS, COMMERCE & SCIENCE COLLEGE,  
SAOLI, DIST- CHANDRAPUR**

**Subject: - Botany [2 periods per Unit]**

**Unit I Plant diversity and Taxonomy:**

Plant biodiversity with respect to major groups of Plant kingdom, Plant taxonomy or Systematic Botany. Importance and function of Taxonomy

**Unit II Plant anatomy:**

Study of tissues – a. Meristematic, b. Simple tissue- Parenchyma, Collenchyma and Sclerenchyma, Complex Tissue – Xylem and Phloem

**Unit III Cytology:**

Types of cell and its Organization. (Prokaryotic and Eukaryotic), Mitosis and Meiosis

**Unit IV Plant:**

Mineral nutrition (a. Macronutrients b. Micronutrients), Photosynthesis and Respiration, (a) Photosynthesis- Ultra structure of Chloroplast, Light and Dark reaction, ( b) Respiration – Types - Aerobic and Anaerobic, Ultra structure of Mitochondria, Cellular, Respiration

**Unit V:**

Plant Ecology: Ecological factors – Abiotic and Biotic, Biogeochemical cycles –Nitrogen cycle and Water cycle

**Unit VI Biotechnology:**

History and Application of Biotechnology, Vectors, Basics of Tissue culture

**RASHTRAPITA MAHATMA GANDHI ARTS, COMMERCE &  
SCIENCE COLLEGE, SAOLI, DIST-CHANDRAPUR**

**Bridge Course Syllabus 2021 – 2022**

**Subject: Zoology**

**UNIT I: Animal diversity of Non-chordates**

Kingdom – Animalia

Criteria for Animal classification.

Salient features of Non - Chordates.

General characters of Phylum – Porifera, Cnidaria, Platyhelminthes, Nematelminthes, Annelida, Arthropoda, Mollusca, Echinodermata, Hemichordata and Examples.

**UNIT II: Animal diversity Chordates**

Salient features of Chordates.

General characters of – Pisces, Amphibia, Reptiles, Aves, Mammals.

**UNIT III: Cell Biology**

Cell an introduction.

Prokaryotic cell and Eukaryotic cell.

Cell organelles – Mitochondria, Golgi complex, Endoplasmic reticulum, Nuclear organization.

**UNIT IV: Genetics and Evolution**

Mendelian inheritance, Deviations from Mendelian Ratio.

DNA as genetic material, RNA general structure.

Origin of life and Evolutionary theories.

Fossils.

Natural selection, Artificial selection.

Species concept.

