



**VIVEK P.G. COLLEGE**  
**KALWAR, JAIPUR**

(Affiliated to University of Rajasthan & Govt. of Rajasthan)

F4(179/60)AAKASHI/ANU/2003/89

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**PROGRAM: BACHELOR OF SCIENCE**  
**(THREE YEARS COURSE)**

**2019-20 TO 2023-24**

**PROGRAM EDUCATION OBJECTIVE (PEOs)**

**PROGRAMME OUTCOMES (POs)**

**PROGRAMME SPECIFIC OUTCOMES (PSOs)**

**COURSE OUTCOMES (COs) AND TEACHING PLAN**

**PRINCIPAL**  
**VIVEK PG COLLEGE**  
**KALWAR, JAIPUR-303706**



# VIVEK P.G. COLLEGE

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S.NO.	PARTICULAR
1.	VISION
2.	MISSION
3	Program educational objectives
4	Program outcomes
5	Program specific outcome
6	<b>B.SC Part -1</b>
6.1	Course outcomes
6.2	Co-Po mapping
7	<b>B.SC Part-2</b>
7.1	Course outcome
7.2	CO-PO Mapping
8	<b>B.SC Part-3</b>
8.1	Course outcome
8.2	CO-PO Mapping

  
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## **Vision of the institution**

We strive to create a dynamic learning environment and encourage high quality research in the thrust areas of regional and social relevance and aspire to be known as an institution where academics are combined with a holistic approach to quality education.

## **Mission of the institution**

To foster a dynamic learning environment that equips students to lead as morally upright, creative, and internationally aware individuals.

To ensure intellectual stimulation and best support for quality education. .

To improve society and further the common good by fostering sustainable practices and civic engagement.

To equip personal development and change in addition to the acquisition of knowledge.

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## Program Educational Objectives (PEOs)

<b>Program Educational Objectives (PEOs) for SCIENCE</b>	
<b>PEO-1</b>	<b>PEO1:</b> Graduate students should be familiar with the fundamental ideas and procedures of botany, chemistry, physics, geography, and zoology.
<b>PEO-2</b>	<b>PEO2:</b> Graduates should use their understanding of botany, chemistry, physics, geography, and zoology to assess and solve problems in a variety of fields, such as environmental challenges, medical research, and healthcare.
<b>PEO-3</b>	<b>PEO3:</b> Graduates should be equipped with the knowledge and abilities needed to carry out both solo and group research in the disciplines of botany, chemistry, physics, geography, and zoology.
<b>PEO-4</b>	<b>PEO4:</b> Graduates in the fields of botany, chemistry, physics, geography, and zoology should understand the value of professional development and lifelong learning.
<b>PEO-5</b>	<b>PEO5:</b> Graduates should conduct themselves in a scientifically ethical and professional manner, showing respect for diversity, integrity, and appropriate research practices.

  
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## Programme Outcomes

PO1:	<b>PO1: Knowledge acquisition:</b> Gain in-depth knowledge in important areas of science and mathematics as well as a full comprehension of the underlying theories, ideas, and principles.
PO2	<b>PO2: Problem Analysis:</b> Examination of Issues Gain the capacity to recognize, comprehend, evaluate, and use scientific approaches to address challenging challenges. Develop a scientific mindset for a range of everyday occurrences.
PO3:	<b>PO3: Designing Solutions:</b> Provide answers for difficult problems and create parts or procedures that satisfy the criteria while taking the environment, culture, and social issues into account.
PO4	<b>PO4: Problem solving and critical thinking:</b> Use your critical thinking abilities to examine and resolve issues in research, environmental protection, healthcare, and other related areas.
PO5:	<b>PO5: Experimental design and data analysis:</b> Designing experiments, gathering data, and using statistical analysis to analyze findings and reach reliable conclusions.
PO6:	<b>Communication Skills:</b> Effectively convey scientific ideas to a variety of audiences using written reports, oral presentations, and visual media.
PO7:	<b>Ethical and professional conduct:</b> Recognize and abide by ethical standards in scientific research, and act professionally in both academic and professional contexts.
PO8:	<b>Teamwork and Collaboration:</b> Effectively collaborate with colleagues, instructors, and professionals from a variety of backgrounds to accomplish shared objectives in problem solving and scientific inquiry.
PO9:	<b>Research skills:</b> Learn how to do research by reviewing the literature, formulating hypotheses, designing experiments, and gathering, analysing, and interpreting data.

  
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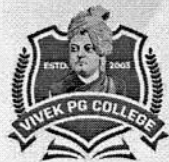
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	<b>PO10:</b>	<b>Applied knowledge and practical Applications:</b> Utilize concepts and methods to solve practical issues in the domains of biological, chemical, Physical, mathematical and environmental sciences.
	<b>P011:</b>	<b>The science and society:</b> Understand the importance of modern branches of science for the improvement of society by participating in various social and cultural.
	<b>P012:</b>	<b>Life-long Learning:</b> Develop a practice of ongoing education and professional growth to stay current with industry advancements and adjust to changing possibilities and difficulties in science.

  
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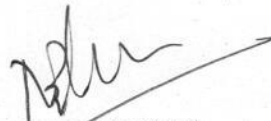
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## Program Specific Outcomes (PSOs)

PSO1	Adapt mathematical modelling tools to solve practical issues in a variety of topics, including economics, science, and engineering.
PSO2	Figure an extensive understanding of the essential concepts of physical, analytical, inorganic, and organic chemistry.
PSO3	Use concepts to solve problems in environmental science, production processes, and research to show how physics and chemistry are used in practical scenarios.
PSO-4	Depending on their career goals, students should be adequately prepared for either entering the workforce or extending their education.

  
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## COURSE OUTCOME

B. Sc. Semester I Zoology	
Course	students should be able to
<b>PAPER I- CZ101</b> <b>Animal Diversity</b>	<b>CO1:</b> To learn morpho-taxonomy and structural organization of non-chordate and chordate groups. <b>CO2:</b> To acquire knowledge of diversity of non-chordate and chordate groups. <b>CO3:</b> To learn evolutionary relationships and phylogeny of non-chordates and chordates through functional and structural similarities. <b>CO4:</b> To understand the economic importance of non-chordates and chordates and their significance in the ecosystem. <b>CO5:</b> To promote shared learning through practical classes, class room presentations and project

### 6.2 Mapping B. Sc. Semester I Zoology

Paper I	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

  
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## COURSE OUTCOME

B Sc II Semester Zoology	
Course	Course outcomes: After completion of these courses students should be able to
<p><b>PAPER I- CZ201</b> <b>Comparative Anatomy and Developmental Biology of Vertebrates</b></p>	<p><b>CO1:</b> To know about the levels of organization among different groups of vertebrates.</p> <p><b>CO2:</b> To understand that different organs and organ systems integrate with each other to impart proper regulation of a particular function.</p> <p><b>CO3:</b> To understand how the various organs evolved during the course of evolution through succession</p> <p><b>CO4:</b> To know the evolution of different concepts in developmental biology.</p> <p><b>CO5:</b> To understand the process of gamete formation from stem cell population to mature ova and sperm.</p>

### 7.2 Mapping B. Sc. Semester II Zoology

Paper I	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

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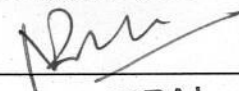
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## 8.1 Course Outcomes

B Sc II Year (Annual) Zoology	
Course	Course outcomes: After completion of these courses students should be able to
<b>PAPER I- Z201</b> <b>Structure and Function of Invertebrates Types</b>	<b>CO1:</b> To study habit, habitat, morphology, structure and organ systems of arthropoda <b>CO2:</b> To create deep knowledge of habit, habitat, morphology, structure and organ systems of mollusca, echinodermata and hemichordata <b>CO3:</b> To analyze canal system, parasitic adaptation and social organization in invertebrates <b>CO4:</b> To design concept on direct and indirect development, larva and mouth parts in insects <b>CO5:</b> To develop knowledge on water vascular system in starfish
<b>PAPER II- Z202</b> <b>Animal Physiology and Physiology</b>	<b>CO1:</b> To Study physiological aspects of digestion, circulation, respiration and excretion in mammals <b>CO2:</b> To Create model study of nerve impulse, muscle contraction, reproduction in mammals <b>CO3:</b> To analyze structure, function and significance of carbohydrate <b>CO4:</b> To design structure, function and significance of proteins <b>CO5:</b> To develop deep knowledge in structure, function and significance of lipids
<b>PAPER III- Z203</b> <b>Immunology, Microbiology and Biotechnology</b>	<b>CO1:</b> To Study types of immunity, concept of antigen and antibody and immunity regulating cells types

  
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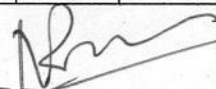
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	<p><b>CO2:</b> To elaborate microbial structural organization, genetic material, reproduction, nutrition and medical importance</p> <p><b>CO3:</b> To analyze scope and application of biotechnology</p> <p><b>CO4:</b> To design cell, tissue, organ and embryo culture for practical use</p> <p><b>CO5:</b> To develop practical knowledge in recombinant DNA technology, monoclonal antibodies, food and dairy biotechnology</p>
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### 8.2 Mapping B. Sc II Year (Annual) Zoology

Paper I	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1												
CO2												
CO3												
CO4												
CO5												

Paper II	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1												
CO2												
CO3												
CO4												
CO5												

  
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Paper III	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1												
CO2												
CO3												
CO4												
CO5												

  
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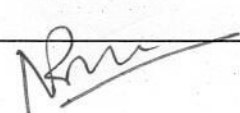
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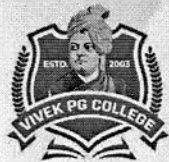
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## 9.1 Course Outcomes

B Sc III Year (Annual) Zoology	
Course	Course outcomes: After completion of these courses students should be able to
<b>PAPER I- Z301</b> <b>Structure and Function of</b> <b>Chordate Types</b>	<b>CO1:</b> To compare general characters, anatomy, affinities and larva of lower chordates <b>CO2:</b> To relate structure and different organ systems of higher chordates <b>CO3:</b> To discover adaptations in pisces and amphibia <b>CO4:</b> To develop knowledge in reptelia, aves and mammal adaptations
<b>PAPER II- Z302</b> <b>Ecology, Environmental</b> <b>Biology and Evolution</b>	<b>CO1:</b> To study basic concepts of ecology <b>CO2:</b> To develop knowledge about concept of population, community and ecosystem types <b>CO3:</b> To discuss about natural resources, pollution, urbanization and conservation <b>CO4:</b> To explain Darwinism, mutation, speciation, and evolution
<b>PAPER III- Z303</b> <b>Applied Zoology, Ethology and</b> <b>Biostatistics</b>	<b>CO1:</b> To study principle and practices of vermiculture, sericulture, lac culture, apiculture, prawn culture and poultry <b>CO2:</b> To develop knowledge in economic importance of invertebrates <b>CO3:</b> To implement concepts and methods of ethology, pheromones, society formation, biological rhythms and clocks <b>CO4:</b> To apply concepts of descriptive and inferential statistics

  
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## 9.2 Mapping B. Sc III Year (Annual) Zoology

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CO1												
CO2												
CO3												
CO4												
CO5												

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CO1												
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CO1												
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## Programme: Master Of Science

### (Two Years Course)

2018-19 TO 2022-23

Programme Educational Outcomes (PEOs)

Programme Outcomes (POs)

Programme Specific Outcomes (PSOs)

Course Outcomes (Cos)

## **Programme: M. Sc. Zoology**

1	Vision
2	Mission
3	Programme Educational Outcomes (PEOs)
4	Programme Outcomes (POs)
5	Programme Specific Outcomes (PSOs)
6	<b>Year I</b>
6.1	Course Outcomes (Cos)
6.2	CO-PO Mapping
7	<b>Year II</b>
7.1	Course Outcomes (Cos)
7.2	CO-PO Mapping

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- To foster a dynamic learning environment that equips students to lead as morally upright, creative, and internationally aware individuals.
- To ensure intellectual stimulation and best support for quality education.
- To improve society and further the common good by fostering sustainable practices and civic engagement.
- To equip personal development and change in addition to acquiring knowledge.

## 3. Programme Educational Outcomes (PEOs)

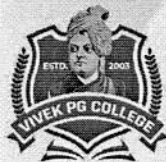
**PEO 1:** Our graduates obtain useful experience in scientific research, biotechnology, environmental studies, surveying, and cognitive testing. They comprehend the value of diversity, ecology, and evolution, as well as the interconnection of all life.

**PEO 2:** Our graduates will be knowledgeable on significant and cutting-edge ideas that will address contemporary zoological demands and advancements.

**PEO 3:** Our alumni use their knowledge of several zoological fields to advance their study and research in an ethical, spiritual, and holistic way.

  
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**PEO 4:** Our graduates will receive training in labs and courses for skill development.

**PEO 5:** Our graduates will gain exposure to a wide range of skills that can assist them advance their professions or find work.

**PEO 6:** Our graduates will continue to serve society and the country with their unselfish efforts.

**PEO 7:** Our graduates will be aware of spirituality and use education to contribute to the building of the nation.

## 4. Programme Outcomes (POs)


**PO1:** Use your knowledge of zoology, the life sciences, and related fields to comprehend complicated biological processes and events.

**PO2:** Examine the principles of biology, including genetics, biochemistry, animal physiology, taxonomy, classification, and diversity.

**PO3:** Recognize how biological procedures are applied to different areas of biology and use this understanding while using different scientific instruments, creating, and carrying out lab experiments.

**PO4:** Recognize the differences in the anatomy, physiology, behavior, and evolution of many animals.

**PO5:** Gain a greater comprehension of the fundamental ideas of physiology, reproduction at the organism level, and zoology at the molecular and cellular levels.

  
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**PO6:** Recognize the many genetic principles and how important they are to human health. Understand the theory, mechanism, physiology, and molecular underpinnings of animal development.

**PO7:** Recognize the value of biodiversity, ecological aspects, pollution prevention, environmental conservation procedures, and the preservation of endangered species to society.

**PO8:** Adhere to professional ethics, duties, and work/research practice norms while putting ethical principles into practice.

**PO9:** Use a broad range of topic-based abilities in a variety of domains to lay the groundwork for future employment in sectors like biotechnology, environmental management, health sciences, agriculture, publishing, teaching, and research.

**PO10:** Carry out, evaluate, and put into practice useful methods and strategies to address biological issues as well as evaluate, assess, and quantify data gathered during any project.

**PO11:** Develop their scientific temperament and scientific thinking; show originality in planning, organizing, addressing issues, and creating models for a range of scientific ideas.

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## 5. Programme Specific Outcomes (PSOs)

**PSO1:** Recognize the environment, natural resources, and their conservation; comprehend animal taxonomy, structure, and behavior; comprehend human genetics; comprehend cell and molecular biology; comprehend biochemistry; and comprehend evolution.

**PSO2:** Recognize the idea and tenets of animal physiology, developmental biology, bioinformatics, biosystematics, and statistical analytic methods and instruments in biology.

**PSO3:** Utilize the broad range of subject-based abilities in a variety of professions to lay the groundwork for future jobs in fields like biotechnology, publishing, education, environmental management, health sciences, and agriculture.

**PSO4:** Students would possess the necessary knowledge and abilities to tackle issues in zoology and related fields.

  
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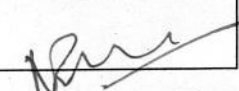
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## 6.1 Course Outcomes

M Sc Previous Zoology	
Course	students should be able to
<b>PAPER I</b> <b>Biosystematics and Taxonomy</b>	<b>CO1:</b> To define basic concepts and trends of biosystematics and taxonomy <b>CO2:</b> To explain dimensions and mechanism of speciation <b>CO3:</b> To evaluate procedure keys in taxonomy <b>CO4:</b> To calculate different biodiversity indices
<b>PAPER II</b> <b>Structure and Function of Invertebrates</b>	<b>CO1:</b> To study organization of coelom <b>CO2:</b> To demonstrate organs of locomotion, nutrition and digestion in invertebrates <b>CO3:</b> To evaluate organs of respiration, excretion, and nervous system in invertebrates <b>CO4:</b> To explain invertebrate larva and minor phyla
<b>PAPER III</b> <b>Molecular Biology and Biotechnology</b>	<b>CO1:</b> To study different DNA structures with their packaging pattern <b>CO2:</b> To explain detailed replication, transcription and translation mechanism <b>CO3:</b> To know recombination and repairing mechanism in DNA <b>CO4:</b> To practice upon molecular mapping of genome, human genome project and embryo technology
<b>PAPER IV</b> <b>General Physiology</b>	<b>CO1:</b> To study thermoregulation, osmotic balance and acid base balance in mammals

  
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	<p><b>CO2:</b> To evaluate muscle function, nervous system and sensory transduction in mammals</p> <p><b>CO3:</b> To explain digestion and metabolism compile with endocrinology</p> <p><b>CO4:</b> To know about concepts and effects of stress biology</p>
<p><b>PAPER V</b> <b>Biochemistry</b></p>	<p><b>CO1:</b> To study covalent properties of proteins and their secondary and tertiary structures</p> <p><b>CO2:</b> To study protein folding and their thermodynamics</p> <p><b>CO3:</b> To know detail about fats and vitamins</p> <p><b>CO4:</b> To illustrate nucleic acids, RNA catalysis and enzyme mechanism</p>
<p><b>PAPER VI</b> <b>Biostatistics and Population Genetics</b></p>	<p><b>CO1:</b> To study theoretical aspects of biostatistics and representation of data through various modes</p> <p><b>CO2:</b> To apply different aspects of statistics in calculation</p> <p><b>CO3:</b> To examine concepts and theories of evolution along with molecular population genetics</p> <p><b>CO4:</b> To demonstrate genetics of speciation, molecular evolution and molecular phylogenetics</p>

  
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## 6.2 Mapping M Sc Previous Zoology

Paper I	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1												
CO2												
CO3												
CO4												
CO5												

Paper II	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
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Paper IV	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1												
CO2												
CO3												
CO4												
CO5												

Paper V	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
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Paper VI	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
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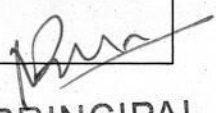
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## 7.1 Course Outcomes

<b>M Sc Final Zoology</b>	
<b>Course</b>	<b>Course outcomes: After completion of these courses students should be able to</b>
<b>PAPER I</b> <b>Biology of Chordates</b>	<b>CO1:</b> To identify different characters and classification of different classes of chordates <b>CO2:</b> To examine origin, evolution adaptive and radiation in chordates <b>CO3:</b> To analyze organogenesis with proper mechanism <b>CO4:</b> To demonstrate metamorphosis and regeneration mechanism
<b>PAPER II</b> <b>Environmental Biology and Ethology</b>	<b>CO1:</b> To define basic concepts of ecology including ecosystem dynamics <b>CO2:</b> To explain organization and dynamics of different ecological communities <b>CO3:</b> To discuss concepts of ethology with neurological aspects <b>CO4:</b> To develop knowledge about learning, imprinting, communication and sociology
<b>PAPER III</b> <b>Genes and Differentiation</b>	<b>CO1:</b> To explain basic concepts of development biology focusing comparative cleavage, gastrulation and early vertebrate development <b>CO2:</b> To develop knowledge about determination, specification and axis formation <b>CO3:</b> To study role of hormone and environment in animal development

  
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	<b>CO4:</b> To elaborate cell diversification in early embryo
<b>PAPER IV</b> <b>Tools and Techniques in</b> <b>Biology</b>	<b>CO1:</b> To get practical knowledge of different types of microscopes, their principle and application <b>CO2:</b> To analyze basic principle and applications of ultra centrifugation, electrophoresis, chromatography, freezing techniques, X ray diffraction and spectrophotometer <b>CO3:</b> To demonstrate different assays and cytological techniques <b>CO4:</b> To implement different cell culture techniques, cryo-techniques and genetic engineering
<b>SPECIAL PAPER: ENVIRONMENTAL BIOLOGY</b>	
<b>PAPER V</b> <b>Environment Science,</b> <b>Ecological Principle, Wildlife</b> <b>and Conservation Biology</b>	<b>CO1:</b> To study different types of biomes, flora and fauna <b>CO2:</b> To demonstrate biological communities and species interactions <b>CO3:</b> To apply the concept of restoration ecology, conservation of biodiversity and population dynamics <b>CO4:</b> To examine habitat analysis and evaluation, environment monitoring, wildlife techniques and impact of tourism
<b>PAPER VI</b> <b>Ecotoxicology, Environmental</b> <b>Microbiology and</b> <b>Microbiology</b>	<b>CO1:</b> To study environmental health and toxicology <b>CO2:</b> To discuss different types of pollution in detail <b>CO3:</b> To examine biodeterioration control with soil, waste and water management <b>CO4:</b> To monitor bioremediation of xenobiotic pollutants

  
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SPECIAL PAPER: ENTOMOLOGY	
<b>PAPER V</b> <b>Morphology and Physiology</b>	<b>CO1:</b> To study integument, appendages and muscular systems <b>CO2:</b> To discuss circulatory, respiratory and excretory systems <b>CO3:</b> To examine nervous, endocrine and reproductive systems <b>CO4:</b> To analyze different embryological aspects
<b>PAPER VI</b> <b>Systematics, Ecology and Applied Entomology</b>	<b>CO1:</b> To study detailed classification, origin and evolution <b>CO2:</b> To examine social tire and life cycle of selected insects <b>CO3:</b> To evaluate detail concept of pest control <b>CO4:</b> To enhance knowledge in chemistry and mode of insecticides and forensic entomology

## 6.2 Mapping M Sc Final Zoology

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CO1												
CO2												
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## COURSE OUTCOME(COs)

B.SC –SEM—I (MATHS)			
MATHS-Discrete AND OPTIMIZATION	CO1: To examine the principal of the inclusion—exclusion. CO2: To determine the solution of a linear recurrence relation with the help of generating function. CO3: To learn about the degree of a vertex in a graph and hand shaking theorem. CO4: Identify the hyperplane, line, convex set and the extreme points of convex set		
MATHS-CALCULUS	<table border="1"><thead><tr><th>B.SC-(SEM—II) MATHS</th></tr></thead><tbody><tr><td>CO1: To determine the curvature in various form and center of curvature and chord of the curvature CO2: To find the method of finding of maxima and minima of two variable function. CO3: Determine the relation between beta and gamma function and the properties. CO4: With the help of gauss's theorem find the relation between the surface integral and volume integral.</td></tr></tbody></table>	B.SC-(SEM—II) MATHS	CO1: To determine the curvature in various form and center of curvature and chord of the curvature CO2: To find the method of finding of maxima and minima of two variable function. CO3: Determine the relation between beta and gamma function and the properties. CO4: With the help of gauss's theorem find the relation between the surface integral and volume integral.
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## COURSE OUTCOME(COs)

B.SC –II (MATHS)	
MATH PAPER 1 REAL ANALYSIS	<p>CO1: Learn about number system and study about closed and open set.</p> <p>CO2: Determine the properties of continuous function on the closed interval, Darboux and Rolle theorem</p> <p>CO3: Explain the continuity of two variable function, fundamental theorem of the integral calculus</p> <p>CO4: Study about the sequences and series, function of bounded variation, Abel test, M-test for check convergence of series and sequence of the function.</p> <p>CO5: Study about the convergence of the sequences in the metric space and product of the spaces, Cauchy sequences in the metric space</p>
MATHS PAPER –II DIFFERENTIAL EQUATION	<p>CO1: Solve the numerical on the homogeneous equation with the help of the Euler Formula.</p> <p>CO2: Determine the solution of the higher order differential equation by finding CF and PI.</p> <p>CO3: Solve the simultaneous D.E, EXACT D.E, of Nth order.</p> <p>CO4: Solve the D.E of 2<sup>nd</sup> order find the L.I solution by using the method of variation of parameters.</p> <p>CO5: BY using Charpit's method find the general solution of the partial Differential equation</p>
MATHS PAPER-III NUMERICAL ANALYSIS AND VECTOR CALCULUS	<p>CO1: Determine Newton's formulae for forward and backward by using the polynomial of the nth degree.</p> <p>CO2: Examine the derivative from interpolation formulae, numerical integration by trapezoidal rule.</p> <p>CO3: Find the solution of cubic equation by Cardan method and relation of roots of polynomial with coefficient.</p> <p>CO4: Solve system of linear algebraic equation by Jacobi and Gauss-Seidel method.</p> <p>CO5: Determine the use of the differential operator, Gradient, Divergence, and Curl.</p>

  
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## COURSE OUTCOMES(COs)

B.Sc –III (MATHS)	
MATH PAPER-I ABSTRACT ALGEBRA	CO1: Learn about the property of the function and group. CO2: Understand the concept of the subgroup and normal a normal Subgroup CO3: Determine the concept of ring ,integral domain and field. CO4: identify the concept of subring, field of quotient, ideal and quotient rings CO5: Learn about the vector spaces and Boolean algebra.
MATHS PAPER:-II COMPLEX ANALYSIS	CO1: Learn about analytic function and its property. CO:2 DETERMINE THE C—R equation and harmonic function CO3: Find out the in the detail about the pole and different types of the Singularities of the function. CO4: Determine the conformal ,bilinear ,fixed points transformation CO5: determine the mapping by exponential, trigonometric function in complex.
MATHS PAPER :-III MECHANICS	CO1: determine the velocity and acceleration in Cartesian form and their components. Co2: Derive the analytically condition of equilibrium of the coplanar forces. Co3: Determine the moment of inertia and its properties, simple harmonic motion. CO4: Examine the condition for equilibrium of forces in 3d at a point of the Rigid body. CO5: determine tension in the strings.

  
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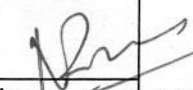
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## COURSE OUTCOMES(COs)

M.Sc (previous) Mathematics	
MATH PAPER-I ADVANCED ABSTRACT ALGEBRA	CO1: Learn about the property of the isomorphism and related theorms. CO2: Understand the concept of the ring theory and dual spaces , dual maps. CO3: Determine the concept of field theory and galois theory. CO4: identify the concept of matrix and their properties CO5: Learn about the inner product spaces and orthogonality.
MATHS PAPER:-II ANALYSIS AND ADVANCED CALCULUS	CO1: Learn about metric spaces , compact and connected . CO:2 understand normed linear space and linear transformation. CO3: Find out the in the detail about the hahn banach theorem and dual spaces . CO4: Determine the inner product spaces and Hilbert space and their properties. CO5: determine the mapping by Pythagoras therom and bessell 's inequality.
MATHS PAPER :- 3 DIFFERENTIAL EQUATION AND SPECIAL FUNCTION	CO1: determine the non linear differential equation and Total differential equation. CO2: The classification of linear partial differential equation and canonical form. CO3: gauss hyper geometric function and its properties and legendary polynomial,. CO4: Examine the calculus of variations and euler ' theoem. CO5: determine the besell , hermite and lagueree polynomial.
MATH PAPER-4 DIFFERENTIAL GEOMETRY AND TENSOR ANALYSIS	CO1: Learn about the property of the space curves involute and evolute.. CO2: Understand the concept of the ruled surfaces and developable surface. CO3: Determine the concept of principle curvature and normal curvature. CO4: Study of the concept of tensor analysis and geodesics. CO5: Learn about the ricci 's theorem and chirstoffel symbol .
MATHS PAPER-5	CO1: Study about D'Alembert principle and motion of center of inertia.

  
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MECHENICS	<p>CO:2 Determined the concept of motion in three dimensions.</p> <p>CO3: Find out the details about Lagrange' s equation for holonomus dynamical system.</p> <p>CO4:Determine the concept of kinematics ideal fluid.</p> <p>CO5: Learn about motion due to impulsīve forces and motion in two dimensions.</p>
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G.No.	Particulars
1	Vision
2	Mission
3	Program Educational Objectives (PEOs)
4	Program Specific Outcomes (PSOs)
5	Program Outcomes (POs)
	Course outcomes (CO)
	M.SC. BOTANY
	PREVIOUS
	FINAL

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## Vision of the Institute

We strive to create a dynamic learning environment and encourage highquality research in the thrust areas of regional and social relevance. We aspire to be known as an institution where academics are combined with a holistic approach to quality education.

## Our Mission


- To foster a dynamic learning environment that equips students to lead as morally upright, creative, and internationally aware individuals.
- To ensure intellectual stimulation and best support for quality education.
- To improve society and further the common good by fostering sustainable practices and civic engagement.
- To equip personal development and change in addition to the acquisition of knowledge.
- To enable each and every one of our students to realize their greatest potential and lead honest, fulfilling lives.

## Program Educational Objectives (PEOs) OF MSC BOTANY

**PEO:1 Critical Thinking And Problem Solving:** Graduates will possess critical thinking skills and logical abilities to detect, analyze, and solve problems related to plant biology and biodiversity conservation

**PEO:2 Advanced Knowledge and Expertise:** Graduates will possess a deep understanding of plant biology, including plant physiology, genetics, ecology, and taxonomy, enabling them to contribute effectively to research and application in the field of botany.

**PEO:3 Research and Analytical Skills:** Graduates will demonstrate the ability to conduct rigorous scientific research, utilize advanced

  
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methodologies, analyze data critically, and interpret results to address complex botanical questions and challenges.


**PEO:4 Professional and Ethical Practice:** Graduates will apply ethical principles and professional standards in their work, demonstrating a commitment to integrity, sustainability, and social responsibility in their botanical practices and research.

**PEO:5 Communication and Collaboration:** Graduates will effectively communicate scientific information to diverse audiences, including peers, policymakers, and the public, and work collaboratively within interdisciplinary teams to address botanical and environmental issues.

- **PEO:6 Lifelong Learning and Adaptability:** Graduates will engage in continuous professional development and stay abreast of emerging trends and advancements in botany, adapting their skills and knowledge to evolving scientific and societal needs.

## **Master of Science (M.Sc.)- Botany Programme Specific Outcome (PSO's)**

- PSO1 Students will learn about many plant groups, from the most basic to the most advanced.
- PSO2 Students will acquire a thorough understanding of plant life, reproduction, and survival in nature, as well as the function of both living and extinct plants in our daily lives.
- PSO3 The student will learn good laboratory methods, safety procedures, and field-based studies.
- PSO4 Students will put their knowledge of biodiversity protection, sustainable use, and agriculture to use.
- PSO5 Students will be familiar with cutting-edge methods in horticulture and plant sciences, such as tissue culture, phytoremediation, plant disease

  
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## Program Outcomes (PO)

PO-1 Holistic approach: The programme gives an insight into the holistic concept of Botany.

PO-2 Critical Thinking: identifying the assumptions that frame our actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational and personal) from different perspectives.

PO-3 Effective Communication: Read, Write, Speak and listen clearly in English and Hindi (Bilingual).

PO-4 Ethics: Recognize different value and moral systems and correlate them with present environment and plant system.


PO-5 Effective Citizenship: Demonstrate social concern and 'equity centered national development' and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

PO-6 Environment and sustainability: understand the impact of the professional solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development

PO-7 Plant Resource: To understand the value of plant resource and the importance in Biodiversity conservation' for future generation

## Course Outcome (CO)

M.SC.BOTANY (PREVIOUS)		
S.NO.	PAPER NAME	COURSE OUTCOME
1	cell & molecular biology of plants	1 <b>Advanced Understanding of Plant Cellular Processes:</b> Students will gain a comprehensive understanding of cellular organization and functions in plants, including cell signaling, cell cycle regulation, and organelle function. They will be able to analyze and interpret complex cellular

  
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		<p>mechanisms involved in plant growth, and development.</p> <p><b>2. Proficiency in Molecular Techniques:</b> Students will acquire proficiency in a variety of molecular biology techniques used in plant research, such as PCR, gene cloning, sequencing, and gene expression analysis. •</p> <p><b>3 Knowledge of Plant Genetic Engineering:</b> Students will understand the principles and applications of genetic modification in plants, including transgenic technologies, gene editing, and the development of genetically modified crops.</p> <p><b>4 Analytical and Research</b> Students will be able to critically evaluate scientific literature and contribute to research projects in the field of plant cell and molecular biology.</p> <p><b>•5 Application of Knowledge to Practical Problems:</b> Students will be able to apply their knowledge of plant cell and molecular biology to address real-world problems, such as improving crop yield, developing stress-resistant plants, and understanding plant-pathogen interactions. They will be able to propose and implement solutions based on their scientific understanding and research findings.</p>
2	Cytology, Genetics, and Cytogenetics	<p>1. <b>Comprehensive Knowledge of Cell Structure and Function:</b> Students will understand the structure and function of cell organelles,</p>

  
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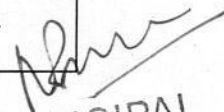
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		<p>cell division (mitosis and meiosis), and cellular processes essential for growth and reproduction.</p> <p>2. <b>Fundamental Principles of Genetics:</b> Students will grasp key concepts in classical and molecular genetics, including inheritance patterns, gene mapping, genetic variation, and the role of genetic material in heredity.</p> <p>3. <b>Understanding of Cytogenetic:</b> Students will acquire knowledge about chromosomal structure, function, and abnormalities. They will be able to analyze karyotypes and understand the genetic basis of chromosomal disorders.</p> <p>4. <b>Practical Laboratory Skills:</b> Students will develop proficiency in laboratory techniques for studying cells and genes, including microscopy, staining, DNA extraction, and genetic assays, enabling them to conduct and analyze experiments effectively.</p> <p>5. <b>Application of Genetic Principles:</b> Students will apply their understanding of genetics and cytogenetic to real-world scenarios, such as solving genetic problems, understanding human genetic disorders, and using genetic information in research and clinical settings.</p>
3	<b>Biology and Diversity of Lower Plants: Cryptogams</b>	<b>• Understanding of Cryptogam Diversity:</b> Students will gain

  
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		<p>knowledge of the taxonomy, classification, and ecological roles of cryptogams, including algae, fungi, bryophytes, and pteridophytes.</p> <ul style="list-style-type: none"><li>• <b>Recognition and Identification Skills:</b> Students will develop skills to identify and classify different cryptogam species using morphological, anatomical, and molecular techniques.</li><li>• <b>Ecological and Evolutionary Insights:</b> Students will understand the ecological significance and evolutionary history of cryptogams, including their roles in various ecosystems and their adaptation strategies.</li><li>• <b>Laboratory Techniques and Field Methods:</b> Students will acquire practical skills in collecting, preserving, and studying cryptogams, as well as using laboratory techniques for their analysis.</li></ul> <p><b>Application of Knowledge:</b> Students will be able to apply their knowledge of cryptogams to environmental monitoring, conservation efforts, and research in plant biology, addressing real-world issues related to biodiversity and ecosystem health.</p>
4	Taxonomy and Diversity of Seed Plants	<ol style="list-style-type: none"><li>1. <b>In-depth Understanding of Seed Plant Classification:</b> Students will acquire comprehensive knowledge of the taxonomy, classification systems, and phylogenetic relationships among seed plants, including</li></ol>

  
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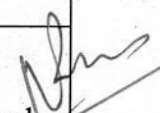
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		<p>gymnosperms and angiosperms.</p> <p>2. <b>Identification and Classification Skills:</b> Students will develop the ability to identify and classify seed plant species using morphological, anatomical, and molecular criteria, and will be proficient in using taxonomic keys and field guides.</p> <p>3. <b>Knowledge of Plant Diversity and Evolution:</b> Students will understand the evolutionary history, diversity, and adaptive strategies of seed plants, including their ecological roles and significance in various environments.</p> <p>4. <b>Practical Laboratory and Field Techniques:</b> Students will gain hands-on experience in laboratory techniques for plant specimen preparation, as well as field methods for plant collection, observation, and documentation.</p> <p>5. <b>Application to Conservation and Research:</b> Students will apply their knowledge to address practical issues related to plant conservation, biodiversity assessment, and ecological research, contributing to efforts in preserving plant diversity and understanding ecological interactions.</p>
5	Plant Physiology and Metabolism	<p>1. <b>Understanding of Plant Physiological Processes:</b> Students will gain a thorough</p>

  
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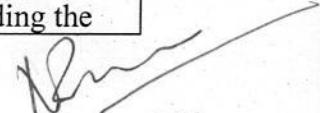
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		<p>understanding of key physiological processes in plants, including photosynthesis, respiration, and nutrient uptake, and their roles in plant growth and development.</p> <ol style="list-style-type: none"><li><b>2. Knowledge of Metabolic Pathways:</b> Students will learn about the major metabolic pathways in plants, such as primary and secondary metabolism, including the synthesis of carbohydrates, lipids, proteins, and secondary metabolites.</li><li><b>3. Application of Physiological Principles:</b> Students will be able to apply physiological principles to solve practical problems related to plant performance, stress responses, and adaptation to environmental changes.</li><li><b>4. Laboratory Skills and Techniques:</b> Students will develop practical skills in conducting experiments related to plant physiology and metabolism, including measurements of physiological parameters, enzyme activities, and metabolic analyses.</li><li><b>5. Integration of Physiology with Plant Health and Productivity:</b> Students will integrate their knowledge of plant physiology and metabolism to address issues in crop management, plant health, and productivity, including understanding the</li></ol>
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		impacts of biotic and abiotic stresses on plant function.
6	Microbiology and Plant Pathology	<ol style="list-style-type: none"><li><b>1. Foundational Knowledge in Microbiology:</b> Students will gain a solid understanding of microbial diversity, structure, function, and physiology, including the roles of bacteria, fungi, viruses, and other microorganisms in various environments.</li><li><b>2. Understanding of Plant Pathogens:</b> Students will learn about the types, life cycles, and modes of infection of plant pathogens, including bacteria, fungi, viruses, and nematodes, and their impact on plant health and crop yield.</li><li><b>3. Diagnostic and Analytical Skills:</b> Students will develop skills in diagnosing plant diseases through various methods, including microscopy, molecular techniques, and biochemical assays, enabling them to identify and understand pathogen-related issues.</li><li><b>4. Integrated Disease Management:</b> Students will be able to design and implement integrated pest management strategies that combine biological, chemical, and cultural practices to manage and control plant diseases effectively.</li><li><b>5. Application of Microbiological and Pathological Knowledge:</b> Students will apply their knowledge to practical</li></ol>

  
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S.NO	PAPER	COURSE OUTCOME
7	Plant Morphology, Developmental Anatomy, and Reproductive Biology	<p>scenarios in agriculture, horticulture, and environmental management, addressing issues related to plant health, disease prevention, and the development of disease-resistant plant varieties.</p> <ol style="list-style-type: none"><li><b>1. Comprehensive Understanding of Plant Morphology:</b> Students will gain detailed knowledge of plant structure and form, including the various organs (roots, stems, leaves, flowers) and their adaptations to different environments.</li><li><b>2. Insight into Plant Developmental Anatomy:</b> Students will understand the principles of plant development and the anatomical changes that occur throughout different stages of growth, from embryogenesis to maturity.</li><li><b>3. Knowledge of Reproductive Structures and Processes:</b> Students will learn about the reproductive biology of plants, including the structure and function of reproductive organs, pollination mechanisms, fertilization, and seed development.</li><li><b>4. Practical Skills in Morphological and Anatomical Techniques:</b> Students will develop hands-on skills in techniques for</li></ol>

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		<p>studying plant morphology and anatomy, such as microscopy, sectioning, and staining, to analyze and document plant structures.</p> <p>5. <b>Application to Plant Growth and Breeding:</b> Students will be able to apply their understanding of morphology, development, and reproduction to practical issues in plant growth, breeding, and improvement, including the development of new cultivars and the study of plant adaptations.</p>
8	PLANT ECOLOGY	<p>1. <b>Understanding of Plant-Environment Interactions:</b> Students will gain knowledge of how plants interact with their physical environment, including soil, climate, and other abiotic factors, and how these interactions influence plant distribution and community structure.</p> <p>2. <b>Knowledge of Plant Community Dynamics:</b> Students will understand the principles of plant community dynamics, including succession, competition, and ecological interactions among plant species and with other organisms (e.g., herbivores, pollinators).</p> <p>3. <b>Application of Ecological Methods:</b> Students will develop practical skills in field and laboratory techniques used in plant ecology, such as vegetation sampling, statistical analysis,</p>

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		<p>and ecological modeling, to study plant populations and communities.</p> <p>4. <b>Insights into Ecosystem Functioning:</b> Students will learn about the role of plants in ecosystem functioning, including their contributions to nutrient cycling, primary productivity, and habitat structure, and how these processes affect overall ecosystem health and stability.</p> <p>5. <b>Application to Conservation and Management:</b> Students will apply their knowledge of plant ecology to real-world problems related to conservation, habitat restoration, and sustainable land management, addressing issues such as invasive species, climate change, and biodiversity loss.</p>
9	PLANT RESOURCE UTILIZATION & CONSERVATION	<ul style="list-style-type: none"><li>• <b>Knowledge of Plant Resource Utilization:</b> Students will understand the various ways in which plant resources are used, including for food, medicine, textiles, and industrial applications, and how these resources contribute to human well-being and economic development.</li><li>• <b>Awareness of Conservation Principles:</b> Students will gain insights into the principles of plant conservation, including the importance of preserving plant biodiversity, protecting endangered</li></ul>

  
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		<p>species, and maintaining healthy ecosystems.</p> <ul style="list-style-type: none"><li>• <b>Skills in Resource Management:</b> Students will develop practical skills in managing plant resources sustainably, including techniques for assessing resource availability, optimizing use, and implementing conservation strategies to prevent overexploitation and habitat loss.</li><li>• <b>Application of Conservation Strategies:</b> Students will be able to apply various conservation strategies and practices, such as the establishment of protected areas, habitat restoration, and sustainable harvesting methods, to address specific conservation challenges and promote biodiversity.</li><li>• <b>Evaluation of Conservation Policies and Practices:</b> Students will critically evaluate existing conservation policies and practices, considering their effectiveness, challenges, and implications for plant resources and ecosystems, and propose improvements based on scientific evidence and stakeholder input.</li></ul>
10	BIOTECHNOLOGY&GENETIC ENGINEERING OF PLANTS& MICROBES	<ul style="list-style-type: none"><li>• <b>Understanding of Biotechnology Principles:</b> Students will gain a solid understanding of the fundamental principles of biotechnology and genetic engineering, including genetic manipulation techniques, recombinant DNA technology, and their applications in plants and microbes.</li></ul>

  
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		<ul style="list-style-type: none"><li>• <b>Proficiency in Genetic Engineering Techniques:</b> Students will develop practical skills in genetic engineering techniques, such as gene cloning, transformation, gene editing (e.g., CRISPR/Cas9), and the creation of genetically modified organisms (GMOs) for research and commercial purposes.</li><li>• <b>Knowledge of Applications in Plant Biotechnology:</b> Students will understand the applications of biotechnology in plant science, including the development of transgenic crops with improved traits (e.g., disease resistance, increased yield, abiotic stress tolerance) and the use of plant cell cultures for secondary metabolite production.</li><li>• <b>Insights into Microbial Biotechnology:</b> Students will learn about the applications of biotechnology in microbial systems, including the production of biofuels, antibiotics, enzymes, and the use of microbes in bioremediation and industrial processes.</li><li>• <b>Ethical, Safety, and Regulatory Considerations:</b> Students will be able to assess the ethical, safety, and regulatory issues associated with genetic engineering and biotechnology, including the impact on the environment, human health, and society, and the development of policies and guidelines to address these concerns.</li></ul>
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11&12 PLANT	PLANT PATHOLOGY	<ol style="list-style-type: none"><li><b>1. Understanding of Plant Pathogen Types and Disease Mechanisms:</b> Students will gain a thorough understanding of the different types of plant pathogens (bacteria, fungi, viruses, nematodes) and the mechanisms by which they cause diseases in plants.</li><li><b>2. Knowledge of Disease Identification and Diagnosis:</b> Students will develop skills in identifying and diagnosing plant diseases using various methods, including visual symptoms, laboratory assays, and molecular techniques.</li><li><b>3. Application of Disease Management Strategies:</b> Students will be able to design and implement effective disease management strategies, including integrated pest management (IPM), cultural practices, chemical controls, and biological control methods.</li><li><b>4. Understanding of Disease Epidemiology:</b> Students will learn about the principles of disease epidemiology, including disease cycles, spread, and environmental factors influencing disease development, to better predict and manage plant disease outbreaks.</li><li><b>5. Evaluation and Implementation of Plant Health Strategies:</b> Students will critically evaluate existing plant health management practices and policies, and apply their</li></ol>
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		knowledge to develop and implement strategies aimed at improving plant health and minimizing the impact of diseases on crops and ecosystems.

  
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Vivek PG College Kalwar

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Programme: M.Sc. Chemistry

S.No.	Particulars
1	Vision
2	Mission
3	Program Educational Objectives
4	Program Outcomes
5	Program Specific Outcomes
6	Year-1
6.1	Course Outcomes
6.2	CO-PO Mapping
7	Year-2
7.1	Course Outcomes
7.2	CO-PO Mapping

1. Our Vision

We strive to create a dynamic learning environment and encourage high quality research in the thrust areas of regional and social relevance and aspire to be known as an institution where academics are combined with a holistic approach to quality education.

2. Our Mission

\* To foster a dynamic learning environment that equips students to lead as morally upright, creative, and internationally aware individuals.

\* To ensure intellectual stimulation and best support for quality education.

\*To improve society and further the common good by fostering sustainable practices and civic engagement. \*To equip personal development and change in addition to the acquisition of knowledge.

\*To enable each and every one of our students to realize their greatest potential and lead honest, fulfilling lives.

  
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## 3. Program Educational Objectives

**PEO:1 Develop Advanced Knowledge:** Equip graduates with a comprehensive understanding of advanced concepts in chemistry, including physical, organic, inorganic, and analytical chemistry.

**PEO:2 Foster Research Skills:** Prepare graduates to conduct independent research, design experiments, and analyse data effectively, contributing to scientific knowledge and innovation.

**PEO: 3 Promote Problem-Solving Abilities:** Enhance graduates' abilities to apply chemical principles and methodologies to solve complex problems in various scientific and industrial contexts.

**PEO: 4 Encourage Professional Development:** Prepare graduates for successful careers in academia, industry, or government by developing their skills in communication, teamwork, and ethical practices.

**PEO: 5 Support Lifelong Learning:** Instil a commitment to continuous learning and professional growth, enabling graduates to stay current with emerging trends and advancements in the field of chemistry.

## 4. Program Outcomes

**PO:1 Advanced Knowledge:** Demonstrate a deep understanding of core concepts and theories in physical, organic, inorganic, and analytical chemistry.

**PO:2 Research Skills:** Ability to design, conduct, and interpret experiments, including data analysis and critical evaluation of results.

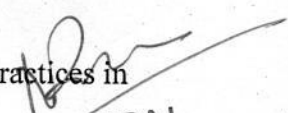
**PO:3 Problem-Solving:** Apply chemical principles to solve complex problems and address challenges in various scientific and industrial settings.

**PO;4 Technical Proficiency:** Utilize advanced laboratory techniques, instrumentation, and software tools effectively.

**PO: 5 Critical Thinking:** Analyse and synthesize scientific literature and research findings to make informed decisions and contribute to the field.

**PO: 6 Communication Skills:** Present scientific ideas clearly and effectively through written reports, oral presentations, and discussions.

**PO:7 Ethics and Professionalism:** Adhere to ethical standards and professional practices in research, experimentation, and communication.

  
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**PO:8 Teamwork and Collaboration:** Work effectively both independently and as part of a team in research projects and scientific endeavours.

**PO: 9 Lifelong Learning:** Engage in continuous learning to stay current with advancements in chemistry and related fields.

**PO:10 Global Perspective:** Understand and address global challenges related to chemistry, including sustainability and environmental impact.

## 5. Programme Specific Outcomes

**PSO:1 Depth Knowledge of Chemical Disciplines:** Graduates will demonstrate advanced understanding and application of core areas in chemistry, including physical, organic, inorganic, and analytical chemistry.

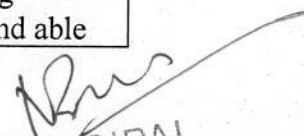
**PSO:2 Research and Analytical Proficiency:** Graduates will be skilled in designing and conducting scientific research, employing advanced techniques for data analysis, and interpreting complex experimental results.

**PSO:3 Application of Chemistry in Real-World Problems:** Graduates will apply their chemical knowledge and problem-solving skills to address practical challenges in industrial, environmental, and pharmaceutical contexts.

**PSO:4 Professional and Ethical Practices:** Graduates will exhibit professionalism and adhere to ethical standards in their scientific work, including responsible conduct of research and effective communication within the scientific community.

## 6.1 Course Outcomes

M.Sc. Previous Chemistry	
course	Course Outcomes:- After completion the courses students should be able to
M.Sc. Previous Chemistry Paper- I Inorganic Chemistry	CO:1 Students should learn how to apply group theory concepts to determine molecular symmetries and predict molecular properties, including spectroscopy, reactivity and use of character tables to analyse the behaviour of molecules under various symmetry operations.  CO:2 Students should be proficient in predicting and rationalizing molecular shapes and stereochemistry based on VSEPR theory and able

  
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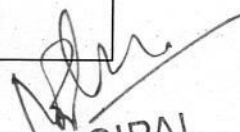
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	<p>to apply CFT, LFT in metal ligand bonding and 18 electron rule to clusters.</p> <p>CO:3 Develop a comprehensive understanding of the electronic spectra and magnetic properties of transition metal complexes, and apply this knowledge to interpret and predict their behaviour.</p> <p>CO:4 Develop a deep understanding of the mechanisms by which transition metal complexes undergo chemical reactions, and be able to predict these mechanisms based on the principles of coordination chemistry.</p> <p>CO:5 To make the student conversant with concepts like half-life, decay constants, and decay series to predict and nuclear processes.</p>
Paper- II Organic Chemistry	<p>CO:1 Students should grasp the concept of aromaticity, including the criteria for aromaticity (e.g., Huckel's rule, planar structure, cyclic conjugation), chirality, including the concepts of enantiomers, diastereomers, and the use of R/S and E/Z nomenclature.</p> <p>CO:2 Students should comprehend the different mechanistic pathways for aliphatic nucleophilic substitution reactions, including the SN1 and SN2 mechanisms, Kc and Tc path and all about intermediates formed during the reaction.</p> <p>CO:3 Develop a thorough understanding of the mechanisms, reactivity patterns, and applications of electrophilic and nucleophilic substitution reactions, as well as free radical reactions in organic chemistry.</p> <p>CO:4 Learners will get knowledge about addition to Carbon-Carbon multiple Bonds and Addition to Carbon- Hetero Atom Multiple bond and elimination reactions.</p> <p>CO:5 Rationalize the mechanisms of various type of pericyclic reactions and their theories.</p>
Paper- III physical Chemistry	<p>CO:1 Demonstrate a strong understanding of quantum chemistry concepts, including Schrödinger's equation, their use in particle in one - D, 2-D and 3-D box and, Rigid rotor and molecular orbital theory.</p>

  
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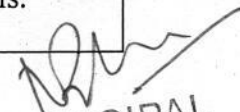
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	<p>CO:2 The objectives are <i>to understand key thermodynamic concepts</i> like the laws of thermodynamics, entropy, enthalpy, cycles, and their real-world applications.</p> <p>CO:3 Interpret reaction rates and mechanisms using principles of chemical kinetics, including the different method of rate determining laws, activation energy, and collision theory.</p> <p>CO:4 Comprehend the principles of adsorption, including Freundlich and Langmuir isotherms, and factors affecting adsorption, CMC and chemistry of macromolecules.</p> <p>CO:5 Students should be proficient in analysing and interpreting data from electrochemical experiments, such as half wave potential, polarography, Tafel plot and current density.</p>
Paper- IV Spectroscopy and Diffraction Method	<p>CO1: Demonstrate the interaction of electromagnetic radiation, selections rules and interpret molecules on the basis of Microwave spectroscopy.</p> <p>CO:2 Understanding of vibrational aspect of molecules in IR and Raman region.</p> <p>CO:3 Interpret spectroscopic electronic transition using atomic, molecular and photoelectron spectroscopy in molecules.</p> <p>CO:4 Students will be able to interpret NMR spectra, including chemical shifts, splitting patterns, coupling constants, and integration to determine the structure of organic and inorganic compounds and also the analysis of ESR spectra.</p> <p>CO:5 Integrate diffraction techniques as X-ray, Electron, Neutron to elucidation of structure of different phase molecules.</p>
Paper- V Green and Sustainable Chemistry	<p>CO:1 Explain the principles of green chemistry and apply these principles to design chemical processes that minimize environmental and health impacts.</p> <p>CO:2 Learners will get knowledge about the green reagent as Nano catalysts, phase transfer catalysts and their use in organic synthesis.</p>

  
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	<p>CO:3 Develop the skills to evaluate the microwave induced, ultraassisted and electrochemical synthesis organic transformation.</p> <p>CO:4 Design and propose green and sustainable chemical processes and products, incorporating methods such as catalysis, renewable green solvent, green solvents, and waste reduction techniques.</p> <p>CO:5 students will able to learn the synthesis of nano materials using bacteria, yeast, algae and fungus.</p>
Paper-VI Analytical chemistry	<p>CO:1 Aims to provide the students a broad <b>overview of analytical chemistry</b>. This <b>unit will introduce</b> a wide variety of <b>chemometric</b> analyses including basic <b>statistics to minimize errors, precision linear regression</b>.</p> <p>CO:2 Develop the ability to interpret sampling of analytical data, including high pressure aching techniques and solvent extraction methods.</p> <p>CO:3 students will be able to learn about the conductometric analysis and principles of potentiometry.</p> <p>CO:4 Helps in developing and optimizing analytical methods of coulometry and principles of atomic absorption spectroscopy.</p> <p>CO:5 Apply fundamental principles of analytical chemistry in food analysis and use of chromatography techniques for organic phosphates.</p>
CH-407 M.Sc. Previous Practical chemistry 1.Inorganic chemistry	<p>CO: - 1 The students have hands on experience in the qualitative analysis of mixtures of Inorganic Compounds containing 8 radicals and use of chromatographic techniques in separation of cations and anions.</p> <p>CO: - 2 The students are trained to develop skill of estimation of quantitative analysis involving volumetric and gravimetric methods and also trained to form inorganic preparation</p>

  
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2. Practical Organic Chemistry	<p>CO: - 1. The students have hands on experience in the organic preparations using multistep synthetic protocol including the function group analysis and separation of organic compounds.</p> <p>CO: - 2 Students will be able to illustrate the determination of COD, DO, BOD of water sample, % of OH group by acetylation method and saponification value of an oil sample.</p>
3. Practical Physical Chemistry	<p>CO: - 1 This practical course give training to students on important physical experiments related to phase equilibria, chemical kinetics, conductometry, potentiometry and PH-Metry.</p> <p>CO: - 2 Students have hands on determination of activity coefficient, degree of dissociation and experiment of polarimetry.</p>

## 7.1 Course Outcomes

M.Sc. Final Chemistry	
Course	Course Outcomes: -After completion of these courses students should be able to
CH-501 Paper-I Applications of Spectroscopy, Photochemistry and Solid State Chemistry	<p>CO: - 1 Develop the skills of classification, principles and application of UV, IR and vibrational spectroscopy.</p> <p>CO: - 2 Interpret the spectral principles of Mossbauer, electron microscopy, ORD, CD and magnetic properties of transition metal complexes.</p> <p>CO: - 3 Learn detail spectroscopic techniques of NMR and MASS spectrometry in organic compounds.</p> <p>CO: - 4 Students will familiar with chemistry of photon, photochemical reactions (in alkenes, carbonyls, aromatic compounds) and energy states.</p> <p>CO: -5 Students will be able to analyse and interpret the structure of crystalline materials, identify various types of crystal defects and understand band theory and all about the organic solids.</p>

  
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<p>Paper-II CH- 502 Bioinorganic Chemistry Bioorganic Chemistry Biophysical Chemistry</p>	<p>CO: -1 Students will be able to learn the application of metals ion in biological system, transport and storage of oxygen, electron transfer in biological system and about the nitrogen fixation.</p> <p>CO: - 2 Student will <b>interact to facilitate biochemical reactions.</b>" This involves understanding how enzymes accelerate chemical reactions, the structure-activity relationship of these molecules, and their role in metabolic pathways.</p> <p>CO: -3 It involve understanding and representing how enzymes interact with substrates and catalyse reactions, studying enzyme mechanisms, substrate binding, and the transition states of reactions and understanding how these coenzymes, such as vitamins or metal ions, are involved in the enzyme's function by participating directly in the chemical reactions.</p> <p>CO: - 4 It explore how energy dynamics influence the behaviour and function of biopolymers, impacting processes such as enzyme activity, protein folding, and molecular recognition including processes like ATP production and energy transfer.</p> <p>CO: - 5 Student will learn the laws of thermodynamics apply to the behaviour of biopolymers (e.g., protein folding and DNA structure), the dynamics of cell membranes, and the mechanisms of ion transport.</p>
<p>Paper-III CH- 503 Environmental Chemistry</p>	<p>CO: - 1 Student will familiar with solar radiation initiates and influences chemical reactions in the troposphere, including processes like ozone formation and degradation, smog formation, and the overall chemical balance.</p> <p>CO: - 2 Understand and analyse the chemical processes and environmental impacts of acid rain, air pollution, Greenhouse effect including their sources, effects on ecosystems, and strategies for mitigation.</p> <p>CO: - 3 <b>Analyse the chemical processes in aquatic environments and assess the sources, impacts, and management strategies for water pollution.</b></p> <p>CO: - 4 Assess the effects of pollutants and toxic substances on ecosystems and human health, and evaluate strategies for risk management and remediation.</p> <p>CO: - 5 Evolute the composition of soil and some disaster like Bhopal gas tragedy, Minamata disease, London smog.</p>

  
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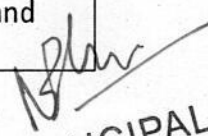
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Group- I Elective paper-1 CH-504 Organo transition Metal Chemistry	<p>CO: - 1 Understand the reactivity and applications of alkyl and aryl transition metal compounds in organic synthesis.</p> <p>CO: -2 Examine the role of transition metal-carbon multiple bonds in organic synthesis and the reaction of ligands.</p> <p>CO: - 3 Discuss the chemical properties and preparation of transition metal <math>\pi</math> complexes.</p> <p>CO: - 4 Detail about the stereo chemistry and olefinic polymerization.</p> <p>CO: - 5 To understand the depth knowledge of allyl and dienyl metal complexes.</p>
Elective Paper- 2 CH-505 Bioinorganic and Supramolecular Chemistry	<p>CO: - 1 Demonstrate the function of metal ion in cell membrane and use of metal complexes in biological systems.</p> <p>CO: - 2 Discuss the role of Ca-ion in biological system and their significance.</p> <p>CO: - 3 Analysis of the metalloenzyme and their role in enzymic reactions.</p> <p>CO: - 4 To explain the enzyme containing metal ion and their effect on protein and nucleic acids.</p> <p>CO: - 5 Demonstrate the behavior of supramolecular compounds, their chemical reactions and physical properties.</p>
Elective paper-3 CH-506 Photo inorganic Chemistry	<p>CO: - 1 Explain the basic principles of photo chemistry and radiative process.</p> <p>CO: - 2 learn the kinetic of photochemistry and the state multiplicity.</p> <p>CO: - 3 To describe the energy states, charge transfer spectra and comparison of metal complexes with organic compounds</p> <p>CO: - 4 To explain all type of photochemical reactions as photoaddition, photo substitution etc.</p> <p>CO: - 5 Gives detail information of excited metal complexes and their redox reaction.</p>

  
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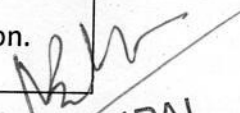
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Elective paper-4 CH-507 Polymers	<p>CO: - 1 Describe the term polymer, polymerization and type of inorganic polymers.</p> <p>CO: - 2 Student will able to explain Structure elucidation of polymer and methods of determination of molecular weight and measurement.</p> <p>CO: - 3 Discuss the application of inorganic polymers.</p> <p>CO: - 4 learn the preparation, properties and chemical reaction of Phosphorus and Sulphur containing compounds.</p> <p>CO: - 5 Students will able to characterized Boron containing inorganic compounds and Silicones.</p>
Group-II Elective paper-1 CH- 504 Organic Synthesis- I	<p>CO: - 1 Student will revive the concept of various type of organometallic compounds and their chemical properties and preparations.</p> <p>CO: - 2 Describe the oxidation of functional groups as alcohols, carbonyls, carboxylic acid etc.</p> <p>CO: - 3 Students will familiarize with reduction of various functional groups.</p> <p>CO: - 4 Learn basic principles and examples of some rearrangement as Backmann's, Hofmann, Benzylic acid rearrangements.</p> <p>CO: - 5 Students will understand the synthesis of polycyclic aromatic compounds, Metallocene and non benzenoid compounds.</p>
Elective Paper-2 CH-505 Organic Synthesis-II	<p>CO: - 1 To explain the one group and two group C-X disconnection approach with FGI.</p> <p>CO: - 2 To recall the principles of protecting group and C-C one group disconnection.</p> <p>CO: - 3 To describe the examples of two group C-C disconnection in 1,3 and 1,5 di functionalized compounds.</p> <p>CO: - 4 To understand the ring synthesis in 1,2 &amp; 1,4 &amp; 1,6 difunctionalized compounds with two group C-C disconnection.</p>

  
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	<p>CO: - 5 To discuss the ketene, pericyclic reactions and ring synthesis of saturated heterocyclics.</p>
<p>Elective paper-3 CH-506 Heterocyclic Chemistry</p>	<p>CO: - 1 To develop the concept of nomenclature of heterocyclic compounds and properties of aromatic heterocycles.</p> <p>CO: - 2 To explain about the nonaromatic heterocyclic compounds and principles of the heterocyclic synthesis using cyclisation and cycloaddition.</p> <p>CO: - 3 To describe the preparation and chemical reaction of small ring heterocycles and benzo-fused five membered heterocyclic compounds.</p> <p>CO: - 4 To discuss the classification of meso-ionic heterocyclic compounds and synthesis of heterocyclic compound containing one hetero atom with ring size six.</p> <p>CO: - 5 To classify the heterocyclic compounds containing P, As, Sb and B atom and the synthesis and chemical properties of six membered heterocycles containing two or more hetero atom.</p>
<p>Elective Paper-4 CH-507 Chemistry of Natural products</p>	<p>CO: - 1 To learn the classification, preparation, isolation and occurrence of Terpenoids and Carotenoids.</p> <p>CO: - 2 Gives a detail information of chemical composition, synthesis and reactions of Alkaloids.</p> <p>CO: - 3 Students will able to identify the composition, synthesis and structure of Steroids.</p> <p>CO: - 4 To discuss the structure elucidation of plant pigments, their functions and synthesis of Hb and Chlorophyll.</p> <p>CO: - 5 To classify and identify the natural products prostaglandins, pyrethroids and rotenone.</p>
<p>Group-III Elective paper-1 CH-504 Analytical Chemistry</p>	<p>CO: - 1 Aims to provide the students a broad <b>overview</b> of <b>analytical chemistry</b>. This <b>unit</b> will <b>introduce</b> a wide variety of <b>chemometric</b> analyses including basic <b>statistics to minimize errors, precision linear regression</b>.</p> <p>CO: - 2 To apply fundamental principles of analytical chemistry in food analysis and use of chromatography techniques for organic phosphates.</p>

  
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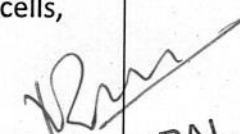
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	<p>CO: - 3 To analysis of the various water pollutants (Cd, Cu, Pb, Zn etc.) measurement of DO, COD, BOD and water pollution laws.</p> <p>CO: - 4 To apply the proximate analysis of soil and classification of fuels according to state.</p> <p>CO: - 5 To describe the analysis of sampling in clinical field and chromatographic measurements of drug analysis.</p>
Elective paper-2 CH-505 Physical Organic Chemistry	<p>CO: - 1 To signify the MOT, VBT theories with physical aspects. Applying these theories on organic compounds with their quantitative analysis.</p> <p>CO: - 2 To describe the principle of reactivity of organic compounds with physical significance and study of kinetic isotope effect.</p> <p>CO: - 3 To discuss the structural effects on reactivity and interpretation of energies and different equations.</p> <p>CO: - 4 To identify the properties of acid, base, electrophile and nucleophile using physical aspects.</p> <p>CO: - 5 To differentiate the reactivity of reagents on the basis of rate constants and curve crossing approach.</p>
Elective paper-3 CH-506 Chemical Dynamics	<p>CO: - 1 To describe the physical composition of atmosphere and kinetic of global warming.</p> <p>CO: - 2 To discuss the kinetic of autocatalysis, oscillatory reaction, enzyme inhibition and gas surface reactions.</p> <p>CO: - 3 Gives A detail study of kinetic of photochemistry and statistical mechanics of transition state theory.</p> <p>CO: - 4 To apply the kinetic on substitution reaction in organic and inorganic substances.</p> <p>CO: - 5 Students will familiar with kinetic of induced reactions in metal ion complexes.</p>
Elective Paper-4 CH-507 Electrochemistry	<p>CO: - 1 Students will get the knowledge about the conversation and storage of electrochemical energy, information about cells, batteries, generators etc.</p>

  
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	<p>CO: - 2 To discuss the corrosion, measurement of corrosion rate, inhibition of corrosion, passivation and stability of metals.</p> <p>CO: - 3 To provide information of wide use of electrochemistry in the biological system such as membrane potential, electrochemical mechanism of nervous system etc.</p> <p>CO: - 4 To apply the kinetics on electrode reactions, methods of determination of kinetic of waves and description about the electrocatalysis.</p> <p>CO: - 5 To describe the use of electrochemical principles in voltammetry, coulometry, potentiometry and stripping analysis.</p>
CH-509 M.Sc. Final Chemistry practical 1. Inorganic Chemistry	<p>CO: - 1 Enhance the skill of students in spectroscopic determination, quantitative determination of two or three component using volumetric and gravimetric methods and preparation of inorganic compounds.</p> <p>CO: - 2 To improve the chromatographic techniques and their application in various data.</p>
2. Practical Organic Chemistry	<p>CO: - 1 Develop the skill of students to separation of three organic compounds, their spectroscopic data analysis and formation of multi - step organic synthesis.</p> <p>CO: - 2 Apply the different methods to extraction of organic compounds from natural sources and spectrophotometry estimation of organic substances.</p>
3. Practical Physical Chemistry	<p>CO: - 1 Includes large number of kinetic experiments from which students are illustrate different principles of chemical kinetics. They are also expected to learn concepts of thermodynamics by carrying out experiments from the respective section. The course also includes experiments from polarography chemistry and from spectroscopy. In addition to the above knowledge, the students are trained to develop skill to plot the data and to carry out calculations</p>

  
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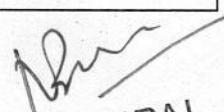
## PHYSICS

### Programme Education Objectives

PEO 1: Our Students will be able to apply their knowledge and abilities to make valuable contributions in their chosen fields as they seek jobs in academia, business, government, or other physics related fields.
PEO 2: Our Post-graduates will have knowledge of important and modern concepts that will meet the modern needs and development of Nuclear Physics.
PEO 3: Our Post-graduates apply their knowledge in various branches of Physics, leading them to higher education and research in a holistic, spiritual and ethical manner.
PEO4: Our Post-graduates will be trained in skills development courses, and laboratories.
PEO5: Our Students can enhance proficiency in their field of interest; they will show that they are capable of pursuing doctorate program (Ph.D.) or specialized training in physics or related fields..
PEO6: Our Post-graduates will render their selfless services for the nation and extend their service to the society.
PEO7: Our Post- graduates will be spiritually conscious and participate in the creation of the country through education.

### Programme Specific Outcomes (PSOs)

PSO1	Student will demonstrate adroitness in mathematics and the mathematical concepts for proper understanding of physics. And students will demonstrate knowledge of classical, electromagnetism, optical physics and modern physics and able to apply this knowledge to analyse physics problems.
PSO2	Student will show that they have learned laboratory skill, analyse the laboratory results and draw a valued conclusion.

  
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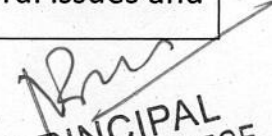
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PSO3	Ability to update knowledge to train the students to have basic interpersonal skill and sense of social responsibility that paves them a way to become a good team member and leaders and make ability to make future in physics and science field, Communication to meet the industry requirements in creating innovative career paths for immediate employment and for higher studies.
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## PROGRAM OUTCOMES (POs)

Program Outcomes (PO)	
PO1	<b>Scientific knowledge / Critical thinking:</b> Apply the knowledge of mathematics, physics, science and higher physics fundamentals to the solution of complex problems.
PO2	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex problems reaching substantiated conclusions using first principles of mathematics, apply physics principles along with other scientific conceptual attitude to analyze the problems related to society and to show the calibre for finding the solution.
PO3	<b>Development of solutions:</b> Design solutions for complex problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety associated with Physics like bio physics, and the cultural, societal, and environmental considerations.
PO4	<b>Conduct investigations of complex problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	<b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern tools and expertise in new and advanced techniques of computational Physics.
PO6	<b>The science and society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and

  
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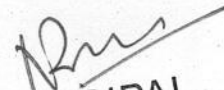
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	understand the value of research and applied research through dissertation/project component of the program.
PO7	<b>Environment and sustainability:</b> Understand the impact of the physics/science and its application in context of society and environmental and demonstrate the knowledge and its need for sustainable development.
PO8	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities. .
PO9	<b>Individual and team work:</b> possess effective communication skill to Function efficiently as an individual, and as a member or leader in diverse teams to apply physics in addressing various environmental issues.
PO10	<b>Communication:</b> Communicate effectively on complex activities with the scientific community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions .
PO11	<b>Project management and finance:</b> Demonstrate knowledge and understanding for project/ dissertation on recent topics thereby acquiring the ability to work as a member or leader in a team, to manage projects and in multidisciplinary environments.
PO12	<b>Life-long learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change and acquire training on research based learning, a pre-requisite to take up research, theoretical or experimental, after obtaining <b>M.Sc. degree.</b>

  
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## COURSE OUTCOMES:

M.Sc. final( Advanced Quantum Mechanics and Quantum field theory)

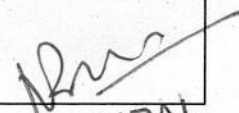
S.NO	Description
CO1	To know the solution of Schrödinger equations for different types of time dependent Hamiltonian will learn in detail about the scattering .
CO2	To explain the relativistic quantum mechanical equations, namely, Klein-Gordon equation and Dirac equation.
CO3	To knowledge of interaction of Bosons and Fermions particles and describe second quantization and related concepts.
CO4	To design a model of physical systems using common approximation techniques for making dynamical calculations.
CO5	To apply THE S-MATRIX and to draw Feynman graphs for different interactions

## COURSE OUTCOMES

M.Sc. final

( microwave electronics)

S.NO	Description
CO1	To understand The microwave frequency To understand the design and characteristics of various microwave components such as a way resonators, circulators, fibers.
Hu CO2	To Analyse and understand the design and working of microwave Tube like klystron, magnetron, gyatron etc.  To determine different parameters of microwave tubes.

  
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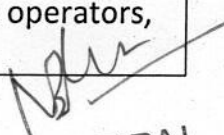
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Ki CO3	To make a use of various measurement technique specific microwave frequencies like attenuator, reflectometer etc. Two understand the use of vector network analysors and other specialized equipment for microwave measurements.
CO4	To understand the oprating Principles of devices such as Gunn diodes, IMPATT diode etc.  To analyse and design microwave antenas for efficient signal radiation.
CO5	To explore design and characteristics of the principle of microwave communication system.  To understand the principles and design of microwave communication system and satellite communication system

## COURSE OUTCOMES:

M.Sc. final (Solid state and statistical mechanics)

S.NO	Description
CO1	To know about basic principles of Canonical, Grand Canonical ensembles and appy to different applications. To understand Partition functions, Statistics, partition function for an ideal gas and calculation of thermodynamic probability.
CO2	To discuss quantum distribution functions like Bose Einstein and Fermi-Dirac statistics and to apply them to derive Planck's formula, Bose Einstein condensation. To know about quantization of harmonic oscillator and Fermion operators, creation and annihilation of phonon operators

  
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CO3	To understand the basic idea about Theory of Metals, use of Fermi-Dirac statistics in the calculation of thermal conductivity and electrical conductivity, Drude theory of light, absorption in metals. To explain the band theory, Bloch theorem, K.P. model, NFE model, tight binding method and pseudo-potential method.
CO4	To understand the lattice vibrations, phonons and in depth of knowledge of Einstein and Debye theory of specific heat of solids. To explain the basics theory of semiconductors and get the idea of photoconductivity, photo-luminescence.
CO5	To analyse the different types of magnetism from diamagnetism to ferromagnetism and domain theory. To understand the basic idea of the theory of superconductivity and their properties in the frame of BCS theory.

## Course outcome

M.Sc final ( Nuclear physics)

S.NO	Description
CO1	To understand the general nature of forces between nucleons, To analyze the ground state of deuteron using various potential models.
CO2	To explain the partial wave analysis of neutron-proton scattering and apply effective range theory to interpret scattering lengths and potential.
CO3	To understand the law of absorption and attenuation coefficient and to analyse the photoelectric effect, Compton effect and pair production.
CO4	To explain the magic number through shell model and appropriate selection rules . To apply the shell model to determine the spin and parity of nucleus.
CO5	To make a concept of alpha , beta and gamma decay and electric and magnetic multiple . To explain the partial wave analysis of nuclear cross section and statistical theory of nuclear reaction.

  
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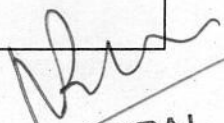
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## COURSE OUTCOMES:

M.Sc. previous ( classical mechanics and mathematical physics)

S.NO	Description
CO1	To Understand the basic concepts of coordinate systems and degrees of freedom and apply on various problems. learn about Hamilton's and Lagrange's Equations using calculus of variation and apply them to solve problems of mechanics.
CO2	To apply the Conservation principles, Noether's theorem, Eulerian angles and Euler's theorem and apply these concepts to relevant problems. Understand basic Lagrange's- Poisson's brackets and Canonical transformation then analyze their relations. Learn about the Action angle variables, Lagrangian formulation and their applications
CO3	To explain the tensors and apply it to differentiate between different types of tensors. To apply as a mathematical form of tensors in solving Maxwell's equations.
CO4	To apply the group theory to various physical systems. Investigate wave equations and diffraction theory using Fourier Transforms. Develop an understanding of Laplace transforms to solve differential equations.
CO5	To develop the concept of Laplace transform to solve differential equations, heat conduction problems, wave equation problem and future prediction of problems.

  
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# VIVEK P.G. COLLEGE KALWAR, JAIPUR

(Affiliated to University of Rajasthan & Govt. of Rajasthan)

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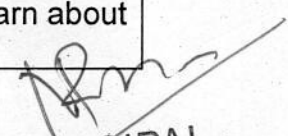
## COURSE OUTCOMES: M.Sc. previous (electrodynamics)

S.NO	Description
CO1	To explore boundary value problems in electrostatics as method of images and define a system of orthonormal functions.  To develop a basis to understanding of multiples, dipole moment, polarization, boundary value problems with dielectrics.
CO2	To explain the basic phenomenon of magneto statics, electromagnets, solenoid,toroid.  To develop the knowledge of electromagnetic fields, Maxwell's equations, conservations laws, scalar and vector potentials in different applications.
CO3	To apply Maxwell's equations to varios problems and find out their solutions.  To make a concept of solution involving the propagation and scattering of electromagnetic waves in different medium
CO4	To Understand about the special theory of Relativity and apply in electrodynamics.  To explain the characteristics of electromagnetic radiation by moving charges.
CO5	To develop the knowledge about the covariant formulation in electrodynamics. To make a concept of retarded time for charges undergoing acceleration.

## COURSE OUTCOMES:

M.Sc. previous (Quantum Mechanics and atomic molecular physics)

S.NO	Description
CO1	To expand the knowledge of quantum theory formulation and learn about operators & their properties.

  
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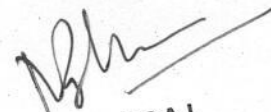
E-mail: info@vivekpgcollege.com

	apply new Dirac specific notation to formulate the various problems in quantum mechanics and find energy eigen values through diagonalizes the matrix in simple cases.
CO2	To describe the basic concept of perturbation theory, level splitting and radiative transitions and their application to physical situations. apply the perturbation theory to non-degenerate systems and distinguish Zeeman effect and Stark effect.
CO3	To develop a knowledge and understanding of the relation between conservation laws and symmetries. Express the relation between Coordinate and Momentum Representation. describe the angular momentum operators and C.G. Coefficients and analyze quantum many body problems.
CO4	To interpret the hydrogen spectrum. calculate energies of different states of Helium atom..solve bound state problems using connection formulas
CO5	To apply Heitler-London Method to find states of hydrogen molecule. analyze different types of spectra viz. Alkali metal spectra, Alkali earth metal spectra, IR spectra and Raman spectra.

## Course outcome

M.Sc previous ( Electronics and numerical analysis and computer programming)

S.NO	Description
CO1	To understand the concept of operational amplifier and integrated circuit as clipper ,clamper,multivibrators.
CO2	To Understand logic circuit of karanugh map and design combinational and sequential circuit.
CO3	To apply the concept of resistors and addressing microprocessor.
CO4	To understand the principles of numerical analysis, including error analysis

  
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CO5	To apply the numerical technique for solving the ordinary differential equations and partial differential equations, numerical integrations.
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