

**Bhairavnath Shikshan Mandal's**  
**Bhairavnath Vidnyan Mahavidyalaya**  
**Khutbav, Tal. Daund, Dist. Pune 412203**

**Faculty of Science**

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**Faculty of science outcome**

1. Students will have a firm foundation in the fundamentals and application of current scientific theories including those in following subjects...  
Chemistry, Zoology, Botany, Physics, Mathematics, Geography and Environmental science .
2. Students will be able to design and carry out scientific experiments or project as well as accurately record and analyses the results of such experiments.
3. Students will be skilled in problem solving, critical thinking and analytical reasoning as applied to scientific problems.
4. Students will be able to clearly communicate the results of scientific work in oral, written and electronic formats to both scientists and the public at large.
5. Students will be able to explore new areas of research in applied fields of science and technology.
6. Students will appreciate the central role of Science in our society and use this as a basis for ethical behavior in issues facing scientist including an understanding of environmental issues and key issues facing our society in energy, health and medicine.
7. Students will be able to explain why different fields of science is an integral activity for addressing social, economic, and environmental problems.
8. Students will be able to function as a member of an interdisciplinary problem solving team.

## Department of chemistry outcome

Upon completion of the B.Sc. in Chemistry ,undergraduate degree program students are able to:

1. Demonstrate an understanding of conventional facts and theories in:
  - a) Physical Chemistry
  - b) Inorganic Chemistry
  - c) Organic Chemistry
  - d) Analytical Chemistry
  - e) Industrial Chemistry and
  - f) Agriculture & Dairy Chemistry.
  
2. Demonstrate laboratory practical's and project to develop :
  - a) Basic laboratory skills
  - b) Common instruments in the areas of spectroscopy, electrochemistry and chromatography and
  - c) Safe chemical handling.
  
3. Demonstrate excellent a) oral and b) written communication skills, particularly through production of descriptive reports and oral presentations on individual chemical and physical studies or the scientific work of others.

## Zoology Department

### -: Learning Outcomes :-

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Sr. No.	Class	Name Of Paper	Learning Outcomes
1	F.Y.B.Sc. Semester I	Course: ZO- 111: Animal Diversity I (CBCS-2019 Pattern)	<ol style="list-style-type: none"><li>1. The student will be able to understand, classify and identify the diversity of invertebrates.</li><li>2. The students will be able to understand the complexity of invertebrates</li><li>3. The students will be understood role and functions of lower animals.</li><li>4. The students will be able to understand the linkage among the different groups of invertebrates.</li><li>5. The students able to understand the importance of classification of organisms based on five kingdom system.</li></ol>
		Course: ZO- 112: Animal Ecology CBCS-2019Pattern)	<ol style="list-style-type: none"><li>1. The learners will be able to identify and critically evaluate their own beliefs, values and actions in relation to professional and societal standards of ethics and its impact on ecosystem and biosphere due to the dynamics in population.</li><li>2. To understand anticipate, analyse and evaluate natural resource issues and act on a life style that conserves nature.</li><li>3. The Learner understands and appreciates the diversity of ecosystems and applies beyond the syllabi to understand the local lifestyle and problems of the community.</li></ol>

			<p>4. The learner will be able to link the intricacies of food chains, food webs and link it with human life for its betterment and for non-exploitation of the biotic and abiotic components.</p>
		<p>Course: ZO- 112: Practical Course (CBCS-2019Pattern)</p>	<p>1. The student will be able to identify and classify the animals based on their morphology.</p> <p>2. The students will be estimate different physic-chemical properties of water and soil.</p>
2	F.Y.B.Sc. Semester II	<p>Course: ZO- 121: Animal Diversity II (CBCS-2019 Pattern)</p>	<p>1. The student will be able to understand, classify and identify the diversity of invertebrates such as Arthropoda, Mollusca and Echinodermata.</p> <p>2. The students will be able to understand the complexity of invertebrates</p> <p>3. The students will be understood role and functions of lower animals.</p> <p>4. The students will be able to understand the linkage among the different groups of invertebrates.</p>
		<p>Course: ZO- 122: Cell Biology (CBCS-2019 Pattern)</p>	<p>1. The learner will understand the importance of cell as a structural and functional unit of life.</p> <p>2. The learner understands and compares between the prokaryotic and eukaryotic system and extrapolates the life to the aspect of development.</p> <p>3. The dynamism of bio membranes indicates the dynamism of life. Its working mechanism and precision are responsible for our performance in life.</p>
		<p>Course: ZO- 123: Practical Course (CBCS-2019 Pattern)</p>	<p>1. The student will be able to identify and classify the animals based on their morphology.</p> <p>2. The learner understands and differentiates prokaryotic and eukaryotic cells by observing cell structures.</p> <p>3. The students also understand cell division</p>
			<p>1. The student will be able to understand,</p>

3	S.Y.B.Sc. Semester I	Course: ZO- 231: Animal Diversity III (CBCS-2020 Pattern)	<p>classify and identify the diversity of lower vertebrates such as hemichordates, cephalochordates and urochordates.</p> <ol style="list-style-type: none"> <li>The students will be able to understand the complexity of higher vertebrates such as Pisces and Tetra pods.</li> <li>The students will be understood role and functions of higher animals.</li> <li>The students will be able to understand the linkage among the different groups of higher vertebrates.</li> </ol>
		Course: ZO- 232: Applied Zoology I (CBCS-2020 Pattern)	<p>❖ Unit: I- Sericulture</p> <ol style="list-style-type: none"> <li>The students will be able to understand the application of different kinds of beneficial animals for human welfare.</li> <li>Students learn about different kind of silk and silkworms.</li> <li>The students will be able to understand different methods of cultivation and harvesting of mulberry.</li> <li>The students will be able to understand different techniques of rearing of silkworms and equipment's used in rearing of silkworm.</li> </ol> <p>❖ Unit: II- Agricultural Pests and Their Control</p> <ol style="list-style-type: none"> <li>The students will be able to understand different types of pests that cause damage to agricultural field.</li> <li>The students understand the major insect's pest of agricultural importance.</li> <li>The students learn the non-insect's pest of agricultural importance.</li> <li>The learners also understand the pests control practices.</li> </ol>
		Course: ZO- 233: Practical Course (CBCS-2020 Pattern)	<ol style="list-style-type: none"> <li>The student will be able to identify and classify the animals based on their morphology.</li> <li>The student will be able to understand the different pests of agricultural pests, nature of damage and control measure.</li> </ol>
			<ol style="list-style-type: none"> <li>The student will be able to understand, classify and identify the diversity of higher vertebrates such as tetra-pods.</li> </ol>

4	S.Y.B.Sc. Semester II	Course: ZO- 241: Animal Diversity IV (CBCS-2020 Pattern)	<ol style="list-style-type: none"> <li>2. The students will be able to understand the complexity of higher vertebrates such as Reptiles, Aves and Mammals.</li> <li>3. The students will be understood role and functions of higher animals.</li> <li>4. The students will be able to understand the linkage among the different groups of higher vertebrates.</li> </ol>
		Course: ZO- 242: Applied Zoology II (CBCS-2020 Pattern)	<p>❖ Unit: I- Apiculture</p> <ol style="list-style-type: none"> <li>1. The students will be able to understand the application of different kinds of beneficial animals for human welfare.</li> <li>2. Learners understand the different kinds of honey bee species and their nesting behaviors.</li> <li>3. The students will be able to understand the morphology and life cycle of honey bee.</li> <li>4. The learner understands the basics about beekeeping tools, equipment, and managing beehives.</li> <li>5. Students also understand about different kinds of bee products and their uses.</li> </ol> <p>❖ Unit: II- Fishery</p> <ol style="list-style-type: none"> <li>1. The learner understands the basic information about fishery and different kinds of fishery.</li> <li>2. Students also understand about different kinds of fishes and their culturing and harvesting methods.</li> <li>3. The learner understands different fish products.</li> <li>4. The students will be able to understand different kinds of fish preservation techniques</li> </ol>
		Course: ZO- 243: Practical Course (CBCS-2020 Pattern)	<ol style="list-style-type: none"> <li>1. The student will be able to identify and classify the animals based on morphology.</li> <li>2. The students understand the economic importance of different aquatic animals.</li> </ol>

❖ **Departmental Outcomes:**

- The learners will be able to understand diversity of animals.

- The students will be able to understand the application of different kinds of beneficial animals for human welfare.
- The students will be able to understand, ecology of an environment and functioning of earth or biosphere.

### Subject: Chemistry

#### -: Learning Outcomes :-

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Sr. No.	Class	Name Of Paper	Learning Outcomes
1	F.Y.B.Sc. Semester I	Course: CH- 101: Physical Chemistry (CBCS-2019 Pattern)	<ol style="list-style-type: none"> <li>1. The student will be able to apply thermodynamic principle.</li> <li>2. The students will be able to understand the chemical equilibrium</li> <li>3. The students will be able to calculate entropy, bond energy, bond dissociation energy and resonance energy.</li> </ol>
		Course: CH- 103: Practical Course (CBCS-2019 Pattern)	<ol style="list-style-type: none"> <li>1. Importance of safety and lab safety while performing the experiments.</li> <li>2. Determination of thermodynamic parameters and concepts</li> </ol>
			<ol style="list-style-type: none"> <li>1. The student will be able to understand, various theories and principles applied relevel to atomic structures.</li> <li>2. The students will be able to attainment the stable electronic configuration.</li> <li>3. The students will be understood role and functions of lower animals.</li> </ol>

2	F.Y.B.Sc. Semester II	Course: CH- 201: Inorganic Chemistry (CBCS-2019 Pattern)	4. The students will be able to understand origin of quantum mechanisms and its needs to understand structure of hydrogen atom.
		Course: CH- 203: Practical Course (CBCS-2019 Pattern)	<ol style="list-style-type: none"> <li>1. Inorganic estimation of volumetric analysis.</li> <li>2. Synthesis of organic compounds.</li> <li>3. Analysis of commercial products.</li> <li>4. Purification of organic compounds.</li> </ol>
3	T.Y.B.Sc. Semester I	Course: CH- 332: Inorganic Chemistry (2013 Pattern)	<ol style="list-style-type: none"> <li>1. The student will be able to understand, various types of ligands.</li> <li>2. Learners understands different terms used in co-ordination chemistry.</li> <li>3. The students will be able to explain various types of isomerism.</li> <li>4. The students will be able to explain magnetic properties of CFT spectra.</li> </ol>
		Course: CH- 343: Inorganic Chemistry (2013 Pattern))	<ol style="list-style-type: none"> <li>1. The student will be able to understand, meaning of terms of f- block elements and inner transition element.</li> <li>2. IUPAC nomenclature for super heavy elements with atomic number 100 onwards.</li> <li>3. The student will be able to understand, role of metal in bioinorganic chemistry.</li> <li>4. The student will be able to understand, difference between conductor and semiconductor.</li> <li>5. Qualitative survey of the substitution of co-ordination complex.</li> </ol>
		Course: CH- 34:8 Inorganic Chemistry	1. Students able to determine the concentration of given solution by colorimetric method.

4	T.Y.B.Sc. Semester II	Practical Course (2013 Pattern))	<p>2. Students able to synthesize inorganic compound.</p> <p>3. Inorganic estimation using volumetric analysis.</p> <p>4. Inorganic qualitative analysis.</p>
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## Department of Analytical Chemistry

### -: Learning Outcomes :-

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Sr. No.	Class	Name Of Paper	Learning Outcomes
		<p style="text-align: center;">Course: CH-202 Analytical Chemistry</p>	<p><b>1. Introduction to Analytical Chemistry</b></p> <p>Analytical Chemistry –branch of chemistry Perspectives of analytical Chemistry analytical problems</p> <p><b>2. Calculations used in Analytical Chemistry</b></p> <p>Calculations of mole, molar concentrations and various units of concentrations which will be helpful for preparation of solution Stoichiometric calculation Define term molar concentration, molar equilibrium concentration and Percent Concentration. SI units, distinction between mass and weight Units such as parts per million, parts per billion, parts per thousand, solution-dilatant volume ratio, function density and specific gravity of solutions.</p> <p><b>3 .Qualitative Analysis of Organic Compounds</b></p> <p>Basics of type determination, characteristic tests and classifications, reactions of different functional groups. Separation of binary mixtures and analysis Elemental analysis - Detection of nitrogen, sulfur, halogen and phosphorous by Lassigen’s test. Purification</p>

1	F.Y.B.Sc.  Semester II	(CBCS-2020 Pattern)	<p>techniques for organic compounds.</p> <p>4. Chromatographic Techniques – Paper and Thin layer Chromatography Basics of chromatography and types of chromatography</p> <p>Theoretical background for Paper and Thin Layer Chromatography</p> <p>5. pH metry</p> <p>pH meter and electrodes for pH measurement Measurement of pH ,Working of pH meter, Applications of pH meter</p> <p>Reference</p>
2	S.Y.B.Sc.  Semester III	<p>Course: CH-301 Physical and Analytical Chemistry (CBCS-2020 Pattern)</p>	<p>1. Chemical Kinetics:</p> <p>Define / Explain concept of kinetics, terms used, rate laws, molecularity, order. Explain factors affecting rate of reaction. discuss expression for half-life and examples of zero order, first order, and second order reactions. Derivation of Arrhenius equation evaluation of energy of activation graphically .Solve / discuss the problem based applying theory&amp;equations.</p> <p>2. Surface Chemistry</p> <p>Define / explain adsorption, classification of given processes into physical and chemical adsorption. Discuss factors influencing adsorption, its characteristics, Explanation of adsorption results in the light of Langmuir adsorption isotherm .Solve / discuss problems using theory.</p> <p>3. Errors in Quantitative Analysis</p> <p>Define, explain and compare meaning of accuracy and precision. Apply the methods of</p>

			<p>expressing the errors in analysis from results.</p> <p><b>Explain / discuss different terms related to errors in quantitative analysis. Solve problems applying equations</b></p> <p><b>4. Volumetric Analysis</b></p> <p><b>Explain / define different terms in volumetric analysis such as units of concentration, indicator, equivalence point, end point, standard solutions, primary and secondary standards. Explain / discuss acid-base titrations, complex metric titration / precipitation titration / redox titration.</b></p> <p><b>Apply volumetric methods of analysis to real problem in analytical chemistry / industry</b></p>
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Sr. no.	Class	Name of Paper	Learning outcome
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1	F.Y.B.Sc. CH-102 Chemistry Paper II CBCS 2019 pattern Semester I	Organic Chemistry	<ol style="list-style-type: none"> <li>1. The students are expected to understand the fundamentals, principles, and recent developments in the subject area.</li> <li>2. It is expected to inspire and boost interest of the students towards chemistry as the main subject.</li> <li>3. To familiarize with current and recent developments in Chemistry.</li> <li>4. To create foundation for research and development in Chemistry.</li> </ol>
2	S.Y.B.Sc. CH-302 Chemistry Paper II CBCS 2019 Pattern Semester I	Inorganic and Organic Chemistry	<ol style="list-style-type: none"> <li>1. Understanding the concept , theories and important term involving in construction of molecule from different atoms molecular orbital theory (AO, MO, sigma bond, pi bond, bond order, magnetic property of molecules, MOT,LCAO principle etc).</li> <li>2. Apply MOT to explain bonding in diatomic molecules other than explained in syllabus.</li> <li>3. Define different terms related to the coordination chemistry</li> <li>4. Explain Werner's theory of coordination compounds. Differentiate between primary and secondary valency. Correlate coordination number and structure of complex ion.</li> <li>5. Identify and draw the structures aromatic hydrocarbons from their names or from structure name can be assigned</li> <li>6. Explain / discuss synthesis of aromatic hydrocarbons,important reactions of aromatic hydrocarbon and there mechanism ,reagent and reactions.</li> <li>7. Identify and draw the structures alkyl / aryl halides from their names or from structure name can be assigned,synthesis of alkyl / aryl halides, Nucleophilic Substitution (SN1 , SN2 and SNI) reactions.</li> <li>8. Identify and draw the structures alcohols / phenols from their names or from structure name can be assigned.</li> <li>9. Explain / discuss synthesis of alcohols /</li> </ol>

			phenol and mechanism of various reactions involved.
3	S.Y.B.Sc. CH-402 Chemistry Paper II CBCS 2019 Pattern Semester II	Inorganic and Organic Chemistry	<ol style="list-style-type: none"> <li>1. To understand isomerism in coordination complexes ,types of isomerism in coordination complexes.</li> <li>2. Apply principles of VBT to explain bonding in coordination compound of different geometries.</li> <li>3. Explain principle of CFT, how to apply crystal field theory to different type of complexes (Td, Oh, Sq. Pl complexes) ,Explain: i) strong field and weak field ligand approach in Oh complexes</li> <li>4. Explain spectrochemical series, tetragonal distortion / Jhon-Teller effect in Cu(II) Oh complexes only.</li> <li>5. Identify and draw the structures aldehydes and ketones from their names or from structure name can be assigned, reaction and synthesis</li> <li>6. Identify and draw the structures carboxylic acids and their derivatives from their names or from structure name can be assigned, Explain / discuss synthesis of carboxylic acids and their derivatives.</li> <li>7. Identify and draw the structures amines from their names or from structure name can be assigned, explain / discuss synthesis of carboxylic amines.</li> <li>8.Perform inter conversion of functional groups.</li> </ol>
4	T.Y.B.Sc CH-333 Chemistry Paper III 2013 Pattern Semester I	Organic Chemistry	<p>Students will gain an understanding of Definations ,Concept ,Reactions,Reagent and make application of there knowlage in practical work and research work of following topics :</p> <ol style="list-style-type: none"> <li>1. Strength of organic acids and bases</li> <li>2. Stereochemistry of disubstituted cyclohexane</li> <li>3. Nucleophilic substitution at aliphatic Carbon</li> <li>4. Reactions of unsaturated hydrocarbons and carbon oxygen double bond</li> <li>5. Elimination Reactions</li> </ol>

			6. Aromatic Electrophilic and Nucleophilic substitution reactions
5	T.Y.B.Sc CH-343 Chemistry Paper III 2013 Pattern Semester II		<ol style="list-style-type: none"> <li>1. the hybridization and geometry of atoms and the three-dimensional structure of organic molecules</li> <li>2. the reactivity and stability of an organic molecule based on structure, including conformation and stereochemistry</li> <li>3. an understanding of nucleophiles, electrophiles, electronegativity, and resonance</li> <li>4. the prediction of mechanisms for organic reactions</li> <li>5. how to use their understanding of organic mechanisms to predict the outcome of reactions</li> <li>6. how to design syntheses of organic molecules</li> <li>7. how to determine the structure of organic molecules using IR and NMR spectroscopic techniques</li> </ol>
6	T.Y.B.Sc CH-349 Chemistry Paper III 2013 Pattern	Organic Chemistry Practical	<ol style="list-style-type: none"> <li>1. to improve basic laboratory skills of students.</li> <li>2. Common instruments in the areas of spectroscopy, electrochemistry and chromatography and</li> <li>3. Safe chemical handling.</li> <li>4. student able to carry out separation and qualitative analysis of the binary Mixtures on micro scale using micro scale</li> <li>5 student able to do Organic Estimations.</li> </ol>