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| | Program : | B.Sc - Chemistry, Botany, Zoology (CBZ) | | |
| | CHEMISTRY | | | |
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| | PO Code | Programme Outcomes | | |
| | PO1 | Analyze critically and evaluate constructively the concept of science and effectively bring out the knowledge derived from that, organize and apply that knowledge skillfully and ethically to provide constructive solutions to social, economic and environmental problems faced by the society globally. | | |
| | PO2 | Apply scientific theories and concepts to critically debate, evaluate and create solutions to meet the needs of social, economic and environmental requirements of the society. | | |
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| Semester | CourseCode | CourseName | CO Code | Course Outcomes |
| I | CHEM1F | Chemistry 1 | CO1 | Explain the basic concepts of mathematics for efficient learning and application in chemistry |
| | CHEM1F | Chemistry 1 | CO2 | Apply appropriate techniques of analytical chemistry, conduct experiments, analyze data and interpret results with an understanding of the limitations |
| | CHEM1F | Chemistry 1 | CO3 | Recall the basic concepts of atomic structure and identify patterns in molecular bonding and relate to their chemical properties |
| | CHEM1F | Chemistry 1 | CO4 | Analyze, interpret and identify crystal systems using X-ray crystallography. |

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| | CHEM1F | Chemistry 1 | CO5 | Explain HSAB concepts, its applications in different areas and its limitations. Discuss the importance of different non-aqueous solvents, their chemical reactions and applications. |
| | CHEM1F | Chemistry 1 | CO6 | Categorize the different binary solutions and deduce their behavior with change in external parameters. |
| | CHEM1F | Chemistry 1 | CO7 | Predict the reactivity of an organic compound based on its structure, justify the mechanism based on chemical effects and develop systematic methods for the preparation of different compounds |
| | CHEM1F | Chemistry 1 | CO8 | Recall the basic knowledge of organic chemistry to name new compounds and formulate their conformations. |
| II | CHEM2F | Chemistry 2 | CO1 | Apply the law of thermodynamics to thermal cycles, understand the significance of state variables, thermodynamic functions, illustrate their roles in determining equilibrium under different conditions and solve related problems. |
| | CHEM2F | Chemistry 2 | CO2 | Explain the terms in phase rule and interpret the phase diagrams in unary and binary systems |
| | CHEM2F | Chemistry 2 | CO3 | Explanation of radioactivity, its measurement, major components of a nuclear reactor and applications of tracer techniques |

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| | CHEM2F | Chemistry 2 | CO4 | Illustrate methods to determine the molecular weight of inorganic polymers and discuss some commercially important polymers |
| | CHEM2F | Chemistry 2 | CO5 | Understand the properties of coordination compounds, their structures and stability. Apply Crystal Field Theory to understand the magnetic properties and describe the stability of metal complexes using stepwise formation constant and thermodynamic parameters |
| | CHEM2F | Chemistry 2 | CO6 | Create interest in different magnetic properties and functional properties of structural materials and smart materials |
| | CHEM2F | Chemistry 2 | CO7 | Apply various rules to understand the stability of alkenes and reactions of dienes and alkynes |
| | CHEM2F | Chemistry 2 | CO8 | Elaborate electrophilic substitution reactions of benzene under the influence of activating and deactivating groups. Predict aromaticity based on Huckel's rule and illustrate the molecular orbital picture of benzene. |
| III | CHEM3F | Chemistry 3 | CO1 | Identify the challenges in the conservation of water and design feasible solutions to overcome the limitations . Formulating and implementing green solutions to some of the reactions which are hazardous to the bio-system and sensitizing the younger generation chemists to design, produce and generate greener products. |

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| | CHEM3F | Chemistry 3 | CO2 | Interpret the basic concepts involved in inorganic analysis. Infer the knowledge of buffers and their biological applications. |
| | CHEM3F | Chemistry 3 | CO3 | Explain the use of various industrial materials and their applications. Upgrade the conventional methods to design latest technologies for the economical and smarter production. |
| | CHEM3F | Chemistry 3 | CO4 | Explore the dynamic world of nano materials, interpret their unique properties and discover the plethora of possibilities of their applications in various fields for a better and smarter life. |
| | CHEM3F | Chemistry 3 | CO5 | Relate and examine the theories and concepts of electrochemistry. Develop deep knowledge of the application of measurements useful in analytical estimations. |
| | CHEM3F | Chemistry 3 | CO6 | Enumerate the fundamentals of the kinetics of chemical reactions followed by a detailed study of catalysis. |
| | CHEM3F | Chemistry 3 | CO7 | Understand the mechanisms to predict the outcome of various reactions. Relate elimination or substitution reactions to their energy profile diagrams |
| | CHEM3F | Chemistry 3 | CO8 | Discuss in detail alcohols, phenols and epoxides. Understand and recall mechanisms of aromatic electrophilic substitution reactions. Describe the synthetic application of Grignard reagents. |

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| IV | CHEM4F | Chemistry 4 | CO1 | Recall and integrate the characteristic properties of the lanthanoides and monitor their applications in revolutionizing industry and medical field. Identify and summarize the significance of organometallic compounds in the catalytic industry. |
| | CHEM4F | Chemistry 4 | CO2 | Utilize the knowledge of the latest technology, skills and tools in the production field to generate smarter and economical products |
| | CHEM4F | Chemistry 4 | CO3 | Compose and formulate ideas to create the much required energy harvesting sources like solar cells and fuel cells with the fundamental knowledge of the working of the electrochemical cells. |
| | CHEM4F | Chemistry 4 | CO4 | Illustrate the effect of absorption of light by matter. Application of the photochemical processes in different fields |
| | CHEM4F | Chemistry 4 | CO5 | Explain the principles and working of various instruments and application of these instruments for qualitative and quantitative analysis |
| | CHEM4F | Chemistry 4 | CO6 | Classify polymers and explain the mechanism of polymerization. Differentiate thermosetting and thermosoftening polymers with special mention to commercially important polymers |
| | CHEM4F | Chemistry 4 | CO7 | Recall the IUPAC nomenclatures. Detailed discussion of aldehydes and ketones |

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| | CHEM4F | Chemistry 4 | CO8 | Predict the mechanisms and compare the reactivity of different carboxylic acids and their derivatives. Understanding amines in detail and studying the various applications of biologically important amines |
| V | CHEM5BPF | Chemistry 5 | CO1 | Outline and exemplify the classification, reactions, properties and biological significance of proteins. |
| | CHEM5BPF | Chemistry 5 | CO2 | Explain and understand the chemical structure, reactions, properties, function and use of broad range of food carbohydrates and various components of nucleic acids |
| | CHEM5BPF | Chemistry 5 | CO3 | Contrast the structure of fats, phospholipids, steroids and explain various properties of the above macromolecules. Interpret the biological roles of diverse hormones and to study their mode of action |
| | CHEM5BPF | Chemistry 5 | CO4 | Categorize enzymes based on their action and understand the kinetic parameters of enzymatic reactions. Illustrate the coenzyme function of water soluble vitamins and select appropriate methods to control harmful effects of synthetic vitamins |
| | CHEM5BPF | Chemistry 5 | CO5 | Evaluate the basic theory and instrumentation of microwave, IR and UV/Vis spectroscopy as a qualitative and quantitative method. |

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| | CHEM5BPF | Chemistry 5 | CO6 | Understand the symmetry elements and the corresponding symmetry operations that lead to the classification of molecules into point groups |
| V | CHEM5OIF | Chemistry 6 | CO1 | Apply principles of coordination chemistry to explain how nature tailors properties of metal centers for specific applications in biochemical systems. |
| | CHEM5OIF | Chemistry 6 | CO2 | Outline the types of catalysis and applications of certain well known and industrially important reaction-specific catalysts used globally. |
| | CHEM5OIF | Chemistry 6 | CO3 | Imagine the structural formulae of organic compounds in a 3D perspective. Understand the importance of stereochemistry in organic chemistry and apply the knowledge gained in this course to a variety of chemical problems. Apply the knowledge in the synthesis, enantiomeric separation and characterisation of a range of chiral compounds in the laboratory for further research. |
| | CHEM5OIF | Chemistry 6 | CO4 | Examine the enantiomers, diastereomers and epimers of simple sugars. Understand how the ring structures of aldehyde and ketone sugars are formed. Construct the ring structure of any 5 or 6 carbon containing monosaccharide from its corresponding straight chain structure. |

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| | CHEM5OIF | Chemistry 6 | CO5 | Outline various reaction mechanisms of heterocyclic compounds. Illustrate different methods for the synthesis of 5- and 6-membered heterocyclic compounds and summarise their properties, and biological importance. |
| | CHEM5OIF | Chemistry 6 | CO6 | Distinguish and characterize various classes of natural products by their structures. Identify pharmaceutically active products of natural origin. |
| VI | CHEM6BOPCF | Chemistry 7 | CO1 | Understand complex biochemical pathways within living cells. Elaborate the importance of ATP. |
| | CHEM6BOPCF | Chemistry 7 | CO2 | Solution to various disorders caused due to impairment of various metabolic pathways in the living system. |
| | CHEM6BOPCF | Chemistry 7 | CO3 | Discuss the role of active methylene compounds in various organic syntheses, illustrate the mechanisms involved and propose the synthesis. Identify the importance of coupling reaction in dye industry. Apply organometallics in synthetic organic chemistry |

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| | CHEM6BOPCF | Chemistry 7 | CO4 | Understand and compare the principle and theory of various spectroscopic techniques. Determine the effect of conjugation on UV-Visible absorption spectrum. Interpret the spectra of compounds, determine functional groups and propose structures for compounds. Apply the knowledge in the characterisation of organic compounds in research and chemical industry. |
| | CHEM6BOPCF | Chemistry 7 | CO5 | Explain the principle of Raman and ESR spectroscopy and their application to simple molecules |
| | CHEM6BOPCF | Chemistry 7 | CO6 | Understand the working principle, experimentation and applications of Fluorescence Spectrometry, GC, HPLC, ion-exchange chromatography, CV, and thermogravimetric analysis |
| VI | CHEM6EPCF | Chemistry 8 | CO1 | Understand the basic principles of pharmacology, pharmacodynamics and pharmacokinetics. Outline the various stages and practical application of pharmacokinetics . Describe the various phases of clinical studies. Explain the rationale for the complete development plan (pharmaceutical, pre-clinical and clinical) according to the proposed therapeutic indication |

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| | CHEM6EPCF | Chemistry 8 | CO2 | Relate the concepts of active principles and lead compounds in drug discovery; Outline and critically appraise the principal steps in drug discovery Describe the technologies available and those in development of new drugs; Explore the therapeutic opportunities that might arise from the technology(gene therapy) |
| | CHEM6EPCF | Chemistry 8 | CO3 | Apply the concepts of enzyme inhibition, drug-receptor interaction, working of proton pumps and ion channel pathways in drug action with suitable illustrations. Relate the factors that modify the effect of drug action. Distinguish drug potency and efficacy. Construct dose-response curves to predict the safety margin of the drug |
| | CHEM6EPCF | Chemistry 8 | CO5 | Categorise the drugs based on pharmacological-application and interpret their mode of action with suitable illustration. Underrstand and compare the mechanism of action of each class of drug; relate drug-drug interaction and its impact in patient safety |

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| | CHEM6EPCF | Chemistry 8 | CO6 | Apply the basic concepts of buffers, acid-base theories and Henderson's equations in buffer preparations and evaluating their functions in pharmacy. Develop analytical skills in predicting the buffer concentrations and develop practical skills in preparing buffers required for an assay of drug. Assess the use of antioxidants in pharmacy. Discuss the role of radio pharmaceuticals in drug industry. Create an awareness about the factors involved in quality control of drugs. |
| | CHEM6EPCF | Chemistry 8 | CO4 | Outline the process of drug development and identify the critical factors and decision points in QSAR approach. Evaluate the advantages of combinatorial organic synthesis in scaling up production of drugs to meet increasing demand |
| | CHEM6EECF | Chemistry 8 | CO1 | Understand the concept and importance of entrepreneurship and entrepreneur in relation to the characteristics, functions, challenges and types of entrepreneurs. |
| | CHEM6EECF | Chemistry 8 | CO2 | Outline the functioning of the cosmetic industry in terms of raw materials used, Indian standard specifications for production, formulation of cosmetics and quality assurance. |

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| | CHEM6EECF | Chemistry 8 | CO3 | Evaluate the nutritional requirements for different age groups, sex, and health conditions through understanding the concept of nutritional value. Explain food production in terms of processing, preservation, additives, qualitative analysis and adulteration. |
| | CHEM6EECF | Chemistry 8 | CO4 | Evaluate the importance of the given soil / water / plant through analysis of the physical and chemical properties of the given soil / water and plants. |
| | CHEM6EECF | Chemistry 8 | CO5 | Understand the drugs in terms of WHO definition, nomenclature, dosage forms, formulations, quality analysis, adulteration and toxicology. |
| | CHEM6EECF | Chemistry 8 | CO6 | Describe the importance of nanomaterials for various applications in daily life, based their properties of various nanomaterials |
| | CHEM6EECF | Chemistry 8 | CO7 | Mention the salient features of various rules and acts related to food, cosmetics and drug |
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| | BOTANY | | | |
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| | PO Code | Programme Outcomes | | |
| | PO1 | To understand and appreciate the diversity of Flora. | | |
| | PO2 | To gain knowledge of simplest to most complex plant forms | | |
| | PO3 | To provide baseline information on applied aspects of botany | | |

| | PO4 | To foster interaction of students regarding conservation of endemic plants | | |
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| Semester | CourseCode | CourseName | CO Code | Course Outcomes |
| | | | CO1 | To know about the microbial diversity and to understand the fundamental functioning of primitive cells. |
| I | BOT1DNP1A | Diversity of Non Vascular plants Part I | CO2 | To understand the bacterial structure and the diseases caused by them in plants. |
| | | | CO3 | To understand the bacterial structure and the diseases caused by them in plants. |
| | | | CO4 | The study of the simplest aquatic plant classifications. |
| | | | CO5 | Study the primitive algal forms in detail. |
| II | BOT2DNVPA | Diversity of Non Vascular plants part II and Plant Anatomy | CO1 | This paper emphasizes on fungi which is a very important group of plants as many of them are economically important. |
| | | | CO2 | As productivity and control of diseases is a major concern, this paper highlights the importance of VAM, nematophagous fungi, and lichens in the improved growth of plants. |
| | | | CO3 | Students are made aware of some of the common diseases and their control using biofertilizers. |
| | | | CO4 | The study of Bryophyta helps the students to understand the process of evolution of these plants from Thallophyta. |
| | | | CO5 | This paper helps to study tissues and tissue organization in plant kingdom. |

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| III | BOT3DVPEA | Paper 3- Diversity Of Vascular Plants and Ecology | CO1 | The students will be able to learn about the general characters of Pteridophytes and the life cycle of different classes of Pteridophyte with specific examples and the role of these plants in evolution to show better advanced characters. |
| | | | CO2 | The students will be able to learn about the general characters of Gymnosperms and the life cycle of different classes of gymnosperms with specific examples and the role of these plants in evolution. |
| | | | CO3 | The students will learn about plant fossils, types and the process of their formation, geological time scale to understand the evolutionary process and its application in exploration of fossil fuels. |
| | | | CO4 | The students will learn about the various ecological factors and the interaction of biotic and abiotic factors. They will also understand the concept of ecosystems and conservation and its application in conserving the ecosystem with insitu and exsitu conservation methods. |
| | | | CO5 | The students will learn about the phytogeographical diversity of India and also in detailed about Karnataka and the application of remote sensing in mapping the vegetation. |
| IV | BOT4CMB | Cytogenetics and Molecular Biology | CO 1 | To understand the life processes at sub-cellular and molecular level |

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| | | | CO 2 | To understand the principles of inheritance at individual and population level |
| | | | CO 3 | To understand the significant theories of evolution and its historical progress through ages |
| | | | CO 4 | To understand and apply the principles and techniques of molecular biology |
| V | BOT5PPA | Plant Physiology | CO1 | The student will be able to analyze the mechanism by which plants are taking up water and minerals and using it for their nutrition. |
| | | | CO2 | 2. The students will gain knowledge about photosynthesis which is the process by which plants prepares food in the presence of light. |
| | | | CO3 | 3. The student will get to know how the plants translocate the food that is prepared primarily in the leaves to the different parts of the plant. |
| | | | CO4 | 4. The student will be able to appreciate the different types of respiration happening in plants. |
| | | | CO5 | 5. The student will understand the importance of the role of different plant growth regulators and their mode of action in plants. |
| | | | CO6 | 6. The student will be able to distinguish between the different plant movements. |
| | BOT5TEBLA | Paper 5: Taxonomy, Economic Botany, Embryology of Angiosperms | CO 1 | Understand the basic concept of Taxonomy |
| | | | CO 2 | Gain knowledge and information on differnt types of inflorescence and fruits |

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| | | | CO 3 | Help the students to appreciate the economic value of plants |
| | | | CO 4 | Understand the characteristic features of families to which the plant belongs |
| | | | CO 5 | Understand the concept of developmental and experimental biology |
| VI | BOT6BTABA | Paper 7 : Biotechnology and Applied Botany | CO1 | Exposure to industrial biotechnology and Students can come out with entrepreneurship based techniques |
| | | | CO2 | Exposed to environmental awareness |
| | | | CO 3 | Able to learn the plant tissue culture techniques |
| | | | CO 4 | Awareness about the medicinal plants |
| | | | CO 5 | Knowledge about agricultural and horticultural crops |
| | BOT6EATA | Paper 8: Elective: Advanced Taxonomy | CO1 | The student will gain competence in identification of plants. |
| | | | CO2 | The student realizes the importance of herbarium technique. |
| | | | CO3 | The students will be able to connect other branches of botany in solving taxonomic problems. |
| | | | CO4 | The students will be to appreciate the importance of plants for mankind. |
| | | | CO5 | The students will be able to understand the concept of ethnobotany. |
| | | | CO6 | The student gains knowledge about the different systems of classification of angiosperms and it's evolution |

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| | | | CO7 | The student will be able to appreciate the role of botanical garden in taxonomy. |
| | BOT6EAPA | Paper 8: Elective: Advanced Physiology | CO1 | Gain knowledge on the structure and functions of cell organelles |
| | | | CO2 | Analyze the bacterial photosynthesis and respiration |
| | | | CO3 | Understand the working and applications of various modern techniques |
| | | | CO4 | Will be able to understand the enzyme mechanism and purification of enzymes |
| | | | CO5 | Understands the concepts of physiological mechanism of plants to different stresses |
| | | | CO6 | Apply end to end applications and significance of hydroponics and aeroponics |
| ZOOLOGY | | | | |
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| | PO Code | Programme Outcomes | | |
| | PO1 | Analyze critically and evaluate constructively the concept of science and effectively bring out the knowledge derived from that, organize and apply that knowledge skillfully and ethically to provide constructive solutions to social, economic and environmental problems faced by the society globally. | | |
| | PO2 | Apply scientific theories and concepts to critically debate, evaluate and create solutions to meet the needs of social, economic and environmental requirements of the society. | | |
| | PO3 | To understand and appreciate the diversity of Flora and fauna; to foster interaction of students regarding | | |

| | | conservation of endemic plants and animals | | |
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| | PO4 | To gain knowledge of simplest to most complex plant forms; to provide baseline information on applied aspects of botany | | |
| | PO 5 | To acquire knowledge about diversity of the animal kingdom – their morphology, anatomy, physiology, genetics, evolution and social organization | | |
| | PO 6 | Enable students to apply the acquired knowledge for holistic development of self and society and also to pursue research | | |
| Semester | CourseCode | CourseName | CO Code | Course Outcomes |
| I | ZOO1NCID | Non Chordata I | CO1 | To become familiar with the invertebrate phyla and their diversity |
| | | | CO2 | To understand the concept of evolution starting from the most simple unicellular forms – Protozoans to multicellular Annelida |
| | | | CO3 | To gain knowledge about animals that are successful parasites and their modifications for a parasitic life |
| | | | CO4 | To understand the concept of evolution starting from the most simple unicellular forms – Protozoans to multicellular Annelida |
| II | ZOO2NCLCD | Non Chordata - II and Lower Chordata | CO1 | To become familiar with the rest of the invertebrate phyla and their diversity. |
| | | | CO2 | To understand the concept of evolution of protochordates and chordates |
| | | | CO3 | To gain knowledge about the lower chordates and the diversity in Super class Pisces |

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| | | | CO4 | To get to know the economic importance of fishes and Pisciculture |
| III | ZOO3CAD | Higher Chordata, Human Anatomy and Comparative Anatomy | CO1 | To introduce the students to the diversity among higher chordates, their origin, and adaptation to their environment |
| | | | CO2 | To educate the students about human anatomy and functioning of various systems |
| | | | CO3 | To create an awareness about the similarities and differences and evolutionary trends in various organ systems in the vertebrates |
| IV | ZOO4CBIHD | Cell Biology, Immunology & Histology | CO1 | To make the students aware about the cell organelles cytoskeleton and their dynamic functions |
| | | | CO2 | To make them appreciate the interaction between the cells and cell division. |
| | | | CO3 | To educate them about complex activities like cell signaling and cell death |
| | | | CO4 | To create an awareness about the importance of our immune system, cancer and organ transplantation |
| V | ZOO5GMBED | Paper - 5: Genetics, Molecular Biology and Evolution | CO1 | To become familiar with the process of inheritance and variation from the normal Mendelian laws |
| | | | CO2 | To update the students about the latest molecular biology techniques and genetic engineering |
| | | | CO3 | To impart knowledge about inherited disorders, inborn errors and the possibilities of improving the human race |

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| | | | CO4 | To become familiar with different schools of thought explaining the concept of origin of life on Earth by studying classical theories |
| | | | CO5 | To gain knowledge about the modern concepts of evolution |
| | | | CO6 | To follow the path of evolution from primitive forms to the present day complex forms and outline of major transitions in evolution – from origin of life on earth to hominid evolution |
| | ZOO5GPD | Paper - 6: General Physiology | CO1 | To create awareness of the various physiological processes occurring in our body |
| | | | CO2 | To appreciate the body's ability to maintain homeostasis, the control of digestion by the nervous, endocrine systems and micro fauna |
| | | | CO3 | Understand the physiological mechanism of circulation, clotting of blood and respiration |
| | | | CO4 | The complex mechanism of excretion coupled with osmoregulation and formation of Urine is understood by the students |
| | | | CO5 | Learns about excitable tissue, the mechanism of muscle contraction, nerve conduction and transmission |
| | | | CO6 | Understands the mechanism and similarities in sensory perceptions and the concept of thermoregulation |
| VI | ZOO6EERMD | Paper 7: Elect - Ecology & | CO1 | To enlighten students about the intricate relationship between the |

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| | | Research Methodology | | environment and all forms of life |
| | | | CO2 | To make them understand the abiotic factors and their influence as limiting factors and the laws of thermodynamics |
| | | | CO3 | To make them appreciate the various interactions between organisms and the concepts of population ecology |
| | | | CO4 | To create awareness regarding environment pollution, the effects of human interference and conservation of wild life |
| | | | CO5 | To enlighten the students about the basic requirements and methodology required for research |
| | | | CO6 | To teach the students about the importance of statistics in research and learn to write a project report. |
| | ZOO6EAPLTD | Paper 7: Elect - Applied Physiology & Lab Techniques | CO1 | Students get knowledge about pathophysiology of disorders of digestive system and precautionary measures to be taken |
| | | | CO2 | Create awareness about the ill effects of cigarette smoking, silicosis, pulmonary hypertension, common cold ,how to reduce asthma attacks and cope with the same |
| | | | CO3 | Study complex mechanism of excretion coupled with osmoregulation and formation of urine |
| | | | CO4 | Learns about excitable tissue, the mechanism of muscle contraction, nerve conduction and transmission |

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| | | | CO5 | 5. Understands the mechanism and similarities in sensory perceptions and the concept of thermoregulation. |
| | ZOO6ENBD | Paper 7: Elect - Neurobiology | CO1 | To understand the relationship between Zoology and Psychology |
| | | | CO2 | To learn the functions of the nervous system and how it influences behavior |
| | | | CO3 | Understand the neuronal basis of emotions, stress, addiction and psychological disorders |
| | | | CO4 | Observe that learning, memory, speech and pain are controlled by neurons |
| | ZOO6DBED | Paper 8: Development Biology and Ethology | CO1 | To understand the process of fertilization and development in formation of an embryo in different animals |
| | | | CO2 | To learn the concept of organizers and the role of genes in development |
| | | | CO3 | To create awareness about the reproductive cycle, causes of infertility and use of contraception |
| | | | CO4 | To enlighten students about animal behaviour and understand various means of communication among animals. Social organization and instinctive behaviour such as migration and parental care |