



# VKV GOVT DEGREE COLLEGE

**KOTHAPETA, Dr BR AMBEDKAR KONASEEMA DT.**  
Affiliated to Adikavi Nannayya University (Accredited by NAAC "B" Grade)  
(An ISO 9001:2015 certified by HYM International Certifications Pvt. Ltd.)





**V.K.V GOVERNMENT DEGREE COLLEGE KOTHAPETA**  
**(Accredited by NAAC “B”Grade)**  
**(An ISO 9001:2015 Certified College by HYM International Certifications Pvt.Ltd.)**

**Program out comes**

**Program- B. Sc –CBZ**

**Aims and objectives of B.Sc Program:** Develop the ability to apply the knowledge acquired in the classroom and laboratories to specific problems in concern subjects, understand better outcomes for society.

**PROGRAMME OUTCOME**

**PO 1. Apply the knowledge of various branches of Zoology and General biology meant both for a graduate terminal course and for higher studies.**

**PO 2. Develop positive attitude towards sustainable development.**

**PO 3. Understand the unity of life with the rich diversity of organisms and their ecological and Evolutionary significance**

**PO 4. Acquire basic skills in the observation and study of nature, biological techniques, experimental skills and scientific investigation.**

**PROGRAM SPECIFIC OUTCOMES**

**PSO1. Identify and list out common animals**

**PSO2. Explain various physical changes in our bodies**

**PSO3. Analyze the impact of environment on our bodies**

**PSO4. Understand various genetic abnormalities**

**PSO5. Develop respect for nature**

**PSO6. Explain the role and impact of different environment conservation programs**

**PSO7. Identify animals beneficial to humans**

**PSO8. Identify various potential risk factors to health of humans**

**PSO9. Explain the importance of genetic engineering**

**PSO10. Use tools of information technology for all activities related to zoology**

## **BSC -CBZ Course Outcome**

**Bachelor of Science offers theoretical as well as practical knowledge about different subject areas. This course forms the basis of science for coherent understanding of the academic field to pursue multi and interdisciplinary science careers in future.**

**These subject areas include Physics, Chemistry, Mathematics, Computer Science and Botany and Zoology.**

**Able to plan and execute experiments or investigations, analyze and interpret data information collected using appropriate methods.**

**It helps to develop scientific temper and thus can prove to be more beneficial for the society as the scientific developments can make a nation or society to grow at a rapid pace through research. Think critically; follow innovations and developments in science and technology.**

## **B.Sc. CBZ PROGRAMME OUTCOME**

**The B. Sc. program enabled the student to enhance their critical thinking during their three year period of study and the curriculum stimulates the mental thoughts and assumptions of the students.**

**This helps the students to take up practical work and compare the results with their assumptions, there by leading to accuracy and validity of the practical knowledge.**

**This analysis leads to take decisions at intellectual, organization and personal from different perspectives of life.**

**Students of the program able to learn all basic concepts in biological and chemical sciences which are very much the need of the hour as there is a dearth of good students in the area of basic sciences in the country.**

**The students would be equipped to continue higher studies in any of the branches of Life Sciences and Chemical Sciences. The modules on tissue culture, molecular biology and genetics, taxonomy, economic botany, ethno pharmacology, analytical chemistry etc., make them fit to be employable in respected fields.**

**This course encourages the student to take up advanced studies and research in Botany, Zoology and Chemistry and pursue their goals.**

## **CAREER OPPORTUNITIES FOR B Sc CBZ STUDENTS**

**1. after completing B Sc degree, one can get employed in non scientific sectors in**

**Addition to scientific sectors. They can seek out for career in forestry,**

**Horticulture, research laboratories, Government, Corporate,**

**2. The course has wide range of options available in terms of subjects, topics,**

**Fields and associated area. B. Sc graduates can opt to join a post graduate**

**Level degree programme in their respective field or ailed subject to peruse**

**Further studies.**

**3. Some students have also been known to opt for non science master degree**

**Programme like journalism, animation, computer technology, management,**

**Business administration, hospitality sector and many others as their field of**

**Study after completion of their B.Sc. graduation.**

**4. Apart from this science graduates can also find jobs in business, BPO,**

**Marketing, banking and finance sectors and so on.**

## **DEPARTMENT OF BOTANY**

### **NAME OF THE PROGRAMME: B.Z.C (BOTANY)**

#### **PROGRAMME OUTCOMES (PO)**

**PO1.** Knowledge and understanding: Origin of life, diversity of plants in terms of structure, function, reproduction and ecological roles. Plant systematics, role of plants in ecosystem and different phytogeographic regions of India and World. economic importance of plants like NTFP. Medicinal and aromatic ornamental etc.

**PO2.** Intellectual skills: Student able to carry out independent survey or research in various areas of the subject. Logical interpretation of ideas and concepts into a organised form by searching in internet.

**PO3.** Practical skills: Giving opportunities to students to handle equipments, conduct experiments and skill development practices like nursery and horticultural practices in field is laboratory.

**PO4 .** As a Botanist: Aware and understand local plant resources, assess and access plant diversity, its importance for society and ecology, health and hazards, legal and environmental issues and conservation of biodiversity practice with responsibility.

**PO5.** Ethics: Students will able to learn ethical principles to mitigate environmental issues like global warming, climate change and disasters biodiversity conservation

**PO6.** Acquire the skills in handling scientific instruments, scientific data collection and developing logical and scientific conclusions. Through project works case studies.

**PO7.** Promote students to go for Higher Education and also employment opportunities in Academic and research institutes, drug, Pharma & Dairy industries , forest and environmental sectors , FCI , Civil supply corporation and their public & private sectors and research

#### **PROGRAMME SPECIFIC OUTCOMES (PSO)**

**PSO1.** Develop the fundamental skills to function effectively as professionals and continue learning within the field of Biology.

**PSO2.** Learn modern technologies in multidisciplinary environment and apply appropriate techniques, terrestrial and aquatic ecosystems plant wealth to explore plants.

**PSO3.** Create an awareness of the impact of water plants on the environment, society, appraise role of plant flora in environmental sustainability.

## **COURSE OUTCOMES OF BOTANY (CO)**

### **SEM-I- Theory**

#### **Title of the Paper: Fundamentals of Microbes and Non-vascular plants**

At the completion of this course a student will be able to:

**CO-1** Understand origin of life on the earth, diversity among viruses and transmission of plant viral diseases and their control

**CO-2** Understand prokaryotic cell structure, mode of nutrition, reproduction special groups of bacteria and economic importance of microbes.

**CO-3** Understand and identify morphological characters, reproduction in Fungi & Lichens (Rhizopus and Puccinia) and economic importance

**CO-4** Understand and describe the characteristics and life history of Algae (Spirogyra and Polysiphonia), its economic importance especially sea weeds and phytoplanktons

**CO-5** Understand, Recall and explain the evolutionary trends among amphibians of plant kingdom for their shift to land habitat and their role ecology and rock weathering.

### **SEM-I- Practical**

#### **Title of the Paper: Fundamentals of Microbes and Non-vascular plants**

At the completion of this course a student will be able to:

**CO- 1.** Demonstrate the techniques of use of lab equipment, preparing slides and identify the material and draw diagrams exactly as it appears

**CO- 2.** Observe and identify microbes and lower groups of plants on their own

**CO -3.** Understand and identify morphological and reproductive structures of algae green brown and red algae,BGA.

**CO- 4.** Understand and identify the external and reproductive structures of fungi & Lichens (Phytophthora, Albugo,Rhizopus Penicillium and Puccinia)

**CO- 5.** Understand morphological anatomical and reproductive diversities in liverworts and moss plants. Identification of Tobacco mosaic disease, Citrus canker and Blast of Rice and other Fungal ,Bacterial and viral plant diseases in laboratory as well as in field.

## **SEM-II-Theory**

### **Title of the Paper: Basics of Vascular Plants & Phytogeography**

**At the completion of this course a student will be able to:**

**CO- 1.** Understand the diversity of habitats, Classify and compare Pteridophytes based on their morphology, anatomy, reproduction and life cycles

**CO-2.** Understand the morphological structure and life history of Gymnosperms

**CO-3.** Critically understand various taxonomical aids for identification of Angiosperms and distinguishing features of various systems of classification.

**CO-4.** Analyze the morphology of the most common Angiosperm plants of their localities and recognize their families.

**CO-5** Understand and Locate different phytogeographical regions of the world and India and can analyze their floristic wealth.

## **SEM-II-Practical**

### **Title of the Paper: Basics of Vascular Plants & Phytogeography**

**At the completion of this course a student will be able to:**

**CO- 1.** Demonstrate the techniques of section cutting, preparing slides, identifying of the material and drawing exact figures.

**CO- 2.** Compare and contrast the morphological, anatomical and reproductive features of vascular plants

**CO- 3.** Identify the local angiosperms of the families prescribed to their genus and species level and prepare herbarium

**CO-4 .** Exhibit skills of preparing slides, identifying the given twigs in the lab and drawing figures of plant twigs, flowers and floral diagrams as they are.

**CO- 5.** Prepare and preserve specimens of local wild plants using herbarium techniques

### **SEM-III: Theory**

**Title of the Paper: Anatomy and Embryology of Angiosperms, Plant Ecology and Biodiversity**

**At the completion of this course a student will be able to:**

**CO-1** Imparting an insight into organization of tissues and tissue systems in plants  
Understand internal structure of the most evolved group of plants Angiosperm.

**CO-2** Understand, Illustrate and interpret various aspects of Angiosperm embryology

**CO-3** Discuss the basic concepts of plant ecology, and evaluate the effects of environmental and biotic factors on plant communities

**CO-4** Appraise various qualitative and quantitative parameters to study the population and community ecology

**CO-5** Understand; Correlate the importance of biodiversity and consequences due to its loss. Enlist the endemic/endangered flora and fauna from two biodiversity hot spots in India and assess strategies for their conservation

### **SEM-III: Practical**

**Title of the Paper: Anatomy and Embryology of Angiosperms, Plant Ecology and Biodiversity**

**able to At the completion of this course a student will be:**

**CO-1** Get familiarized with techniques of section making, staining and microscopic study of vegetative, anatomical and reproductive structure of plants

**CO-2** Observe externally and under microscope, identify and draw exact diagrams of the material in the lab

**CO-3** Demonstrate application of methods in plant ecology and conservation of biodiversity and qualitative and quantitative aspects related to populations and communities of plants

**CO-4** Can understand hot spots of biodiversity

**CO-5** Able to recognize different threatened group of plants.



#### **SEM-IV Paper-IV A Theory**

**Title of the Paper: Plant Physiology and Metabolism**

**At the completion of this course a student will be able to:**

**CO-1** Understand plant structures in the context of physiological functions of plants in relation to water

**CO-2** Understanding of the mechanisms for procurement of mineral ions by plants and mineral nutrition and the role these minerals play in organic molecule synthesis and use

**CO-3** Know the physiological details of photosynthesis and metabolites synthesized by plants respiration.

**CO-4** Learn detailed pathway of carbohydrate metabolism

**CO-5** Learn about the growth and development of plants and its regulations.

#### **SEM-IV Paper-IV A Practical**

**Title of the Paper: Plant Physiology and Metabolism**

**At the completion of this course a student will be able to:**

**CO-1** Understand the concept of Osmosis, Water potential through Rheodiscolor leaf

**CO-2** Demonstrate the process of Transpiration through cobalt chloride and Ganong's photometer

**CO-3** Isolate different photosynthetic pigments chromatographic technique

**CO-4** Identify the deficiency of different mineral elements through photographs

**CO-5** Understand the path of water in plant body through Ascent of sap

#### **SEM-IV: PAPER-IV B Theory**

**Title of the Paper: Cell biology, Genetics and Plant breeding**

**At the completion of this course a student will be able to:**

**CO-1** Distinguish prokaryotic and eukaryotic cells and design the model of a cell  
Understand and explain the structure and composition of plant cell wall, plasma membrane

**CO-2** Understand the morphology, types, structure and organization of DNA in Chromosomes

**CO-3** Understand Mendelian laws of inheritance and concepts of Linkage and Crossing over in inheritance plants

**CO-4** Understand the traditional plant breeding methods and selection process for improved varieties

**CO-5** Understand the importance of biotechnology in Crop improvement using mutations, Somaclonal variations and molecular markers

#### **SEM-IV: PAPER-IV B Theory**

**Title of the Paper: Cell biology, Genetics and Plant breeding**

**At the completion of this course a student will be able to:**

**CO-1** Understand the structure of a plant cell and its organelles

**CO-2** Understand and study various stages of mitosis and DNA packing through micrograph

**CO-3** Study the effect of temperature on permeability of cell membrane

**CO-4** Solve numerical problems on Mendel's laws of inheritance

**CO-5** Understand and demonstrate emasculation and bagging in hybridization technique.

**CO-6** Distinguish prokaryotic and eukaryotic cells and design the model of a cell.

**CO-7** Explain the organization of a eukaryotic chromosome and the structure of genetic material.

**CO-8** Demonstrate techniques to observe the cell and its components under a microscope.

**CO-9** Discuss the basics of Mendelian genetics, its variations and interpret inheritance of traits in living beings.

**CO-10** Elucidate the role of extra-chromosomal genetic material for inheritance of characters.

**CO-11** Evaluate the structure, function and regulation of genetic material.

**CO-12** Understand the application of principles and modern techniques in plant breeding.

#### **SEM-V: PAPER V (6D) Theory**

##### **Course 6D: Gardening and Landscaping**

##### **I. Learning Outcomes:**

Students at the successful completion of the course will be able to:

1. Acquire a critical knowledge about the aesthetic value, types and styles of gardens.
2. Perform field operations in a garden by understanding the role of a gardener.
3. Identify various ornamental plants and explain the growth habits.
4. Propagate garden plants through various propagation techniques.
5. Demonstrate skills of designing and developing a garden.

## **Course 6D: Gardening and Landscaping – Practical syllabus**

### **IV. Learning Outcomes:**

On successful completion of this practical course, student will be able to:

1. Perform various skills related to gardening.
2. Identify the living and non-living components required for garden development.
3. Identify the pests and diseases of garden plants and control the same.
4. Demonstrate skills of making bonsai and developing lawn.
5. Make landscape design using CAD.

### **SEM-V: PAPER V (7D) Theory**

## **Course 7D: Agroforestry**

### **I. Learning Outcomes:**

Students at the successful completion of the course will be able to:

1. Understand the concepts and economic value of agroforestry.
2. Acquire a critical knowledge on systems and design of agroforestry.
3. Explain silviculture practices in relation to agroforestry.
4. Understand the role of agroforestry to reclaim the waste lands.
5. Perform skills in relation to tree measurement techniques.

### **Course 7D: Agroforestry**

## **Practical syllabus**

### **IV. Learning Outcomes:**

On successful completion of this practical course, student will be able to:

1. Identify suitable tree species for agroforestry and their products.
2. Demonstrate skills on raising tree species from seeds and by vegetative propagation.
3. Perform skills on measurements related to wood-based products.
4. Estimate biomass in an energy plantation

## **EMPLOYMENT OPPORTUNITIES**

**After completion of this course students can get employment in:**

- ⌘ Botanical survey of India.
- ⌘ National and International virology laboratories.
- ⌘ Biodiversity Conservation Centers
- ⌘ Plant growth Centers.
- ⌘ Biology Instrumentation labs.
- ⌘ Molecular Biology Research centers.
- ⌘ Biotechnology research centers.
- ⌘ National and International Forensic laboratories.

## **DEPARTMENT OF ZOOLOGY**

### **B.Sc. PROGRAMME OUTCOME**

The B. Sc. programme enabled the student to enhance their critical thinking during their three year period of study and the curriculum stimulates the mental thoughts and assumptions of the students. This helps the students to take up practical work and compare the results with their assumptions, thereby leading to accuracy and validity of the practical knowledge. This analysis leads to take decisions at intellectual, organization and personal from different perspectives of life.

Students of the programme learn all basic concepts in biological and chemical sciences which are very much the need of the hour as there is a dearth of good students in the area of basic sciences in the country. The students would be equipped to continue higher studies in any of the branches of Life Sciences and Chemical Sciences. The modules on tissue culture, molecular biology and genetics, taxonomy, economic botany, ethno pharmacology, analytical chemistry etc., make them fit to be employable in respected fields.

This course encourages the student to take up advanced studies and research in Botany, Zoology and Chemistry and pursue their goals.

### **CAREER OPPORTUNITIES FOR B Sc CBZ.**

1. After completing B Sc degree, one can get employed in non scientific sectors in

Addition to scientific sectors. They can seek out for career in forestry, horticulture, research laboratories, Government, Corporate,



2. The course has wide range of options available in terms of subjects, topics, Fields and associated area. B. Sc graduates can opt to join a post graduate level degree programme in their respective field or ailed subject to peruse further studies.

3. Some students have also been known to opt for non science master degree programme like journalism, animation, computer technology, management, business administration, hospitality sector and many others as their field of study after completion of their B.Sc. graduation.

4. Apart from this science graduates can also find jobs in business, BPO, marketing, banking and finance sectors and so on.

### **COURSE OUTCOMES ZOOLOGY PROGRAM OUTCOMES, PROGRAM SPECIFIC OUT COMES AND COURSE OUTCOMES**

#### **ZOOLOGY PROGRAM OUTCOMES:**

1. Students perceive the knowledge and skill in the fundamentals of animal sciences, understands the interactions among various living organisms.

2. Interpret complex interactions among the various animals of different phyla, their distribution and their relationship with the environment.

3. Learner gains the knowledge about comparative anatomy and developmental biology

4. Correlates the physiological processes of animals and relationship of organ system, gains the knowledge about Human endoskeleton and anatomical features of organs.

5. Understands the ecologically important and harmful insects and various controlling methods of insect pest.

6. Understands about various concepts of genetics and its importance in human health and complex evolutionary processes.

7. Apply the knowledge of internal structure of cell, its functions, perceive the knowledge about immunology.

8. Gains the knowledge of agro based small scale industries like sericulture, fish farming, poultry, dairy industry.

9. Understands the importance about environmental conservation process, pollution control, toxicology, biodiversity and protection of endangered species.

#### **PROGRAM SPECIFIC OUTCOMES:**

1. Understand the nature and basic concepts of cell biology, genetics, taxonomy, physiology, ecology and applied Zoology.

2. Analyse the relationships among animals, plants and microbes.

3.Performes the procedure as per laboratory standards in the areas of Taxonomy, Physiology, Ecology, Cell biology, Genetics, Applied Zoology, Clinical Science, Tools and techniques of Zoology, Toxicology, Entamology, Nematology, Sericulture, Biochemistry, Aquaculture, Immunology and Research methodology.

4. Gains the knowledge about research methodologies through project work, thereby contributes the knowledge for welfare of the society.

#### **COURSE OUTCOMES:**

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| <b>B.Sc, SEMESTER I</b><br><b>COURSE NO: 1</b><br><b>PAPER I:ANIMAL DIVERSITY</b><br><b>BIOLOGY OF NONCHORDATES</b><br><b>CREDITS: 4</b> | <p>Students will able to describe and comprehend the vast animal diversity on earth.</p> <p>They will able to perceive the insight into diagnostic features of different phyla through the various aspects of physiology, morphology, habits, habitats and adaptations in non-chordates life forms. They are able to recognize the ecological role of invertebrates.</p>   |
| <b>B.Sc, SEMESTER I</b><br><b>COURSE NO:1</b><br><b>PRACTICAL PAPER I:ANIMAL DIVERSITY BIOLOGY OF NONCHORDATES</b><br><b>CREDITS: 2</b>  | <p>Learner will able to identify and classify nonchordates and chordates through their distinguishing taxonomic features. Student can distinguish non-chordates and chordates through its morphological features. Student will gain the skill of mounting technique.</p>   |
| <b>B.Sc, SEMESTER II</b><br><b>COURSE NO: 2</b><br><b>PAPER II: ANIMAL DIVERSITY</b><br><b>BIOLOGY OF CHORDATES</b><br><b>CREDITS: 4</b> | <p>The course will help the students to learning about the organization, function and adaptive strengths and weaknesses of our own bodies, and how these traits have been shaped by our evolutionary history. At the end of the course the students will develop skills of integrative and synthetic thinking by demonstrating how to organize anatomical details into general explanations based on developmental, functional and evolutionary principles, how to draw connections between anatomical changes and how to use fundamental concepts of comparative anatomy , to construct scientific explanations and formulate new questions and lines of inquiry.</p> |
| <b>B.SC, SEMESTER II</b><br><b>COURSE NO: 2</b><br><b>PRACTICAL PAPER II: ANIMAL DIVERSITY BIOLOGY OF</b>                                | <p>Learner will able to apply define scientific terminology used in the context of CHORDATES anatomy. Compare and contrast the anatomical systems of</p>   |

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| <b>CHORDATES. CREDITS; 2</b>  | <b>different vertebrates and identify common traits across species and/or groups. Understands the key events in frog and chick embryology development.</b>  |
| <b>B.Sc, SEMESTER III</b><br><b>COURSE NO:3</b><br><b>PAPER III: CYTOLOGY,GENETICS AND EVOLUTION</b><br><b>CREDITS : 4</b>                              | <b>The learner will able to understand the Cytology at cellular and system level. It helps the students to understands the interactions and interdependence of physiological and biochemical processes. Students are taught about detailed concepts of cytology, cell organelles, genetics and evolution.</b><br><b>Learner will gain good experimental qualitative skills in encompassing preparation of laboratory reagents, conducting experiments, satisfactory analysis of data and interpretation of results.</b> |
| <b>B.Sc, SEMESTER III</b><br><b>COURSE NO:3</b><br><b>PRACTICAL PAPER III</b><br><b>CYTOLOGY,GENETICS AND</b><br><b>EVOLUTION</b><br><b>CREDITS : 2</b> | <b>Practical skill promotes the ability to think laterally, in an integrating manner and develop interdisciplinary approach. Student will able to distinguish histological details about cells and cell originals.</b>  |
| <b>B.Sc, SEMESTER IV</b><br><b>COURSE NO:4</b><br><b>EMBRYOLOGY,PHYSIOLOGY,AND ECOLOGY</b><br><b>REDITS: 4</b>  | <b>The course enhances the understanding of fundamental complement of Embryology which have significant impact on human health and understanding of physiology, ecology.</b><br><b>Students perceive the knowledge about the concepts of Ecology, awareness about ecosystems.</b>   |
| <b>B.Sc, SEMESTER IV</b><br><b>COURSE NO:4</b><br><b>EMBRYOLOGY,PHYSIOLOGY,AND ECOLOGY.</b><br><b>CREDITS: 2</b>  | <b>Student able to identify different kinds of egg parts of chordates understands the different physiological functions.</b>  |
| <b>B.Sc, SEMESTER V</b><br><b>COURSE NO:5</b><br><b>ANIMAL BIOTECHNOLOGY VA</b><br><b>CREDITS: 3</b>  | <b>The student will gain comprehensive and detailed understanding of tools of Recombination technology. The ability to use conclusions that are based on DNA technology data. The ability to understand the concepts of animal cell technology</b>  |
| <b>B.Sc, SEMESTER V</b><br><b>ANIMAL BIOTECHNOLOGY VA</b>   | <b>Student will develop problem solving skills and able to identify tools of recombinant</b>  |

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| <b>CREDITS:3</b>  | technology. Learner can distinguish different types of DNA sequencing methods  |
| <b>B.Sc, SEMESTER V<br/>COURSE NO:5<br/>ANIMAL HUSBANDRY VB<br/>CREDITS: 3</b>  | The student will gain comprehensive and detailed understanding of Animal husbandry. The ability to use conclusions that are based on cattle's and breeders. The ability to understand the concepts of dairy technology   |
| <b>B.Sc, SEMESTER VB<br/>ANIMAL HUSBANDRY<br/><br/>CREDITS:3</b>  | Student will develop problem solving skills and able to identify tools of dairy cattle's and buffaloes. Learner can distinguish different types of Indian cattle's   |
| <b>B.Sc, SEMESTER VI<br/>COURSE NO:6 PAPER VIIA<br/>IMMUNOLOGY<br/>CREDITS:3</b>  | Learner will able to understand about principles of instruments used in IMMUNOLOGY. Student will able to understand the importance of immunity organelles and its function. The course improves the understanding about lymph cells , transplantation immunology, cancer biology , provides the basic knowledge regarding immune system, types of immunity, properties of antigen - antibodies and allows the student to create insight as how to improve their immune system and good health. |
| <b>B.Sc, SEMESTER VI<br/>COURSE NO:6<br/>PRACTICAL PAPER VIIA<br/>IMMUNOLOGY<br/>CREDITS:3</b>                                  | Student develops the skill of SMEAR preparation method to study of blood<br><br>Permanent slide preparation techniques like double staining technique can enhance laboratory soft skills in students. Student will able to identify different types of cell organelles and blood cell types.   |
| <b>CLUSTER VIII-B<br/><br/>B.Sc, SEMESTER VI<br/>COURSE NO:6 PAPER VIII-BI<br/>Principles of aquaculture<br/><br/>CREDITS:3</b> | Course improves the understanding of Principles of aquaculture. Understands about importance of aquaculture.<br><br>Imparts the knowledge about fish, and aquaculture.<br>Provides the technical knowledge aquaculture   |
| <b>B.Sc, SEMESTER VI COURSE NO:6.<br/>PRACTICAL PAPER VIII-BI:<br/>Principles of aquaculture<br/>CREDITS:3</b>                  | Learner will able to identify different TYPES OF AQUACULTURES  |
| <b>B.Sc, SEMESTER VI<br/>COURSE NO:6 PAPER VIII-BII<br/>Aquaculture management</b>  | Imparts the knowledge to the student regarding fish biology.   |



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| <b>CREDITS:3</b>   | <b>Student able to describe the relation between fish culture and aquaculture, Student able to understand the Aquaculture management</b> |
| <b>B.Sc, SEMESTER VI<br/>COURSE NO:6 PAPER VIII-BII<br/>Practical's Aquaculture management<br/>CREDITS:3</b> | <b>Student will able to identify different types of aquaculture managements</b>  |
| <b>B.Sc, SEMESTER VI<br/>COURSE NO:6 PAPER VIII-BIII<br/>Post harvest technology<br/>CREDITS</b>             | <b>Students know the importance of the post harvest technology, and understanding the different types of processing methods.</b>         |
| <b>B.Sc, SEMESTER VI<br/>COURSE NO:6 PAPER VIII-BIII<br/>Practical's Post harvest technology<br/>CREDITS</b> | <b>Project works on<br/>1.fish breeding centre<br/>2.feed manufacturing unit<br/>3.shrimp hatchery<br/>4.shrimp processing</b>           |

### **CAREER OPPORTUNITIES:**

1. After the completion of course student has the option to go for higher studies i.e. M.Sc and can do research for the welfare of mankind.
2. They can opt M.Sc in medical field and non medical field. In medical field one can perceive M.Sc in anatomy, physiology, medical biochemistry, medical microbiology, embryology, M.Sc in neuroscience, biotechnology, forensic science, pharmacology, medical biotechnology, cell and molecular biology and genetics. In non medical field one can opt M.Sc in applied zoology, general zoology, bioscience, entomology, food and nutrition, environmental science, biostatistics and bioinformatics.
3. After higher studies student can join as scientist in central research institutions and in universities. They can even look for professional job oriented courses.
4. Graduates and post graduates can enter teaching field both in secondary and higher education departments.
5. Animal biologist can work as administrator in zoological parks, zoos and sanctuaries.
6. Under graduates can join as research assistant in animal tissue culture lab and fisheries research institution.
7. Students can opt jobs in clinical research centers, toxicology labs, forensic department, pollution control board and medical coding centers.
8. Student can get jobs as animal nutritionist, ecologist, environmental consultant, field trial officer, marine scientist, nature conservation officer, and research scientist in life science, science writer.
9. Aquaculture, poultry, vermiculture and dairy are agro based industries in India that enables students to get self employment.
10. Students have the option to join Indian civil services

## **DEPARTMENT OF CHEMISTRY**

### **P O s , P S O s & C O s**

#### **B.Sc Chemistry:**

The Chemistry is one of the subjects in the science programs offered in the V.K.V Government Degree College. The combinations are M.P.C (Mathematics, Physics, Chemistry), B.Z.C (Botany, Zoology, Chemistry). The undergraduate course in Chemistry is intended to introduce the fundamental aspects of all chemistry students. Students learn about different sections of chemistry during three year degree course, which enables them to identify their area of chemical expertise and hence provides the basic foundation of their higher studies. They develop laboratory skills, critical thinking and reasoning to address different aspects of chemistry. One of the main objectives of Skill Enhancement Courses (SEC) is to inculcate skills related to the domain subject in students. The syllabus of SEC will be partially skill oriented. Hence, teachers shall also impart practical training to students on the skills embedded in syllabus citing related real field situations.

## **DEPARTMENT OF CHEMISTRY**

### **B.Sc Chemistry**

#### **PROGRAMME OUTCOMES**

1. **Theoretical Knowledge:** Upon completion of the B.Sc chemistry, this program covers different fields of chemistry such as Organic, Physical, Inorganic areas. Chemistry majors are able to recognize and apply the principles of atomic and molecular structure to predict physical, chemical properties and chemical reactivity of compounds.
2. **Laboratory Skills:** Upon completion of a degree, chemistry majors are able to employ critical thinking and scientific inquiry in the performance, design, interpretation and documentation of laboratory experiments, at a level suitable to succeed at an entry-level position in chemical industry, pharmaceutical industry or a chemistry graduate program.
3. **Quantitative Skills:** Upon completion of a chemistry degree, chemistry background students are able to interpret and analyze quantitative data of different chemical experiments.
4. **Instrumentation:** Upon completion of a B.Sc in Chemistry degree, students are able to understand theoretical concepts of instruments that are commonly used in most chemistry fields as well as interpret and use data generated in instrumental chemical analyses. They can operate instruments used chemical analysis.

## **PROGRAMME SPECIFIC OUTCOMES**

- ✓ Creating attention in environmental problems.
- ✓ Increasing working knowledge of instruments.
- ✓ Obtaining the knowledge of pharmaceutical tables.
- ✓ Social awareness about the quality of water and food.
- ✓ Increasing the practical skill of the students,
- ✓ Creating Awareness about plastic garbage and recycle methods.

## **DEPARTMENT OF CHEMISTRY**

### **COURSE OUTCOMES**

#### **Semester –I** (Inorganic & Physical Chemistry)

This semester contains five units

Course outcomes:

At the end of the course, the student will be able to;

- Understand the basic concepts of p-block elements.
- Explain the difference between solid, liquid and gases in terms of intermolecular interactions.
- Apply the concepts of gas equations, pH and electrolytes while studying other chemistry courses.

#### **Laboratory Course – I** (Qualitative Mixture analysis)

Course outcomes:

At the end of the course, the student will be able to;

- Understand the basic concepts of qualitative analysis of inorganic mixture
- Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
- Apply the concepts of common ion effect, solubility product and concepts related to qualitative analysis

## **DEPARTMENT OF CHEMISTRY**

### **Semester –II**

Course name: Paper II (Organic & General Chemistry)

The Semester – II contains five units

Course outcomes:

At the end of the course, the student will be able to;

- Understand and explain the differential behavior of organic compounds based on fundamental concepts learnt.

- Formulate the mechanism of organic reactions by recalling and correlating the fundamental properties of the reactants involved.
- Learn and identify many organic reaction mechanism including Free Radical Substitution, Electrophilic Addition and Electrophilic Aromatic Substitution.
- Correlate and describe the stereochemical properties of organic compounds and reactions.

### **Laboratory Course – II ( Volumetric Analysis Lab)**

**Course outcomes:**

**At the end of the course, the student will be able to;**

- Use glassware, equipment and chemicals and follow experimental procedures in the laboratory.
- Understand and explain the volumetric analysis based on fundamental concepts learnt in ionic equilibria.
- Learn and identify the concepts of a standard solutions, primary and secondary standards.
- Facilitate the learner to make solutions of various molar concentrations.
- This may include: The concept of the mole; Converting moles to grams; Converting grams to moles; Defining concentration; Dilution of Solutions; Making different molar concentrations.

## **DEPARTMENT OF CHEMISTRY**

### **Semester –III**

**Course name: Paper III (Organic & Spectroscopic Chemistry)**

**The Semester – III contains five units**

**Course outcomes:**

**At the end of the course, the student will be able to;**

**Understand preparation, properties and reactions of haloalkanes, haloarenes and oxygen containing functional groups.**

**Use the synthetic chemistry learnt in this course to do functional group transformations.**

**To propose plausible mechanisms for any relevant reaction**

### **Laboratory Course – III ( Organic Preparations & IR spectral analysis lab)**

**Course outcomes:**

**On the completion of the course, the student will be able to do the following:**

- how to use glassware, equipment and chemicals and follow experimental procedures in the laboratory
- how to calculate limiting reagent, theoretical yield, and percent yield
- how to engage in safe laboratory practices by handling laboratory glassware, equipment, and chemical reagents appropriately
- how to dispose of chemicals in a safe and responsible manner  
how to perform common laboratory techniques including reflux, distillation, recrystallization, vacuum filtration.



➤ how to create and carry out work up and separation procedures  
how to critically evaluate data collected to determine the identity, purity,  
and

percent yield of products and to summarize findings in writing in a clear and  
concise manner

## **DEPARTMENT OF CHEMISTRY**

### **Semester –IV (4)**

**Course name: Paper IV (Inorganic, Organic & Physical Chemistry)**

**The Semester – IV contains five units**

**Course outcomes:**

**At the end of the course, the student will be able to;**

- **To learn about the laws of absorption of light energy by molecules and subsequent photochemical reactions.**
- **To understand the concept of quantum efficiency and mechanisms of photochemical reactions.**

### **Laboratory Course – IV (4) (Organic Qualitative analysis lab)**

**Course outcomes:**

**At the end of the course, the student will be able to;**

- **Use glassware, equipment and chemicals and follow experimental procedures in the laboratory**
- **Determine melting and boiling points of organic compounds**
- **Understand Application of concepts of different organic reactions studied in theory part of organic chemistry**

## **DEPARTMENT OF CHEMISTRY**

### **Semester –IV (5)**

**Course name: Paper IV (Inorganic & Physical Chemistry)**

**Course outcomes:**

**At the end of the course, the student will be able to;**

- **Understand concepts of boundary conditions and quantization, probability distribution, most probable values, uncertainty and expectation values**
- **Application Of Quantization To Spectroscopy.**
- **Various types of spectra and their use in structure determination.**

### **Laboratory Course – IV (5)**

**(Conductometric and Potentiometric Titrimetric lab)**

**Course outcomes:**

**At the end of the course, the student will be able to;**

- **Use glassware, equipment and chemicals and follow experimental procedures in the laboratory**
- **Apply concepts of electrochemistry in experiments**
- **Be familiar with electroanalytical methods and techniques in analytical chemistry which study an analyte by measuring the potential (volts) and/or current (amperes) in an electrochemical cell containing the analyte.**

**Semester –V**

**Course outcomes:**

**Laboratory Course - V**

**This laboratory course contains the following Organic Qualitative Analysis experiments**  
**Analysis of an organic compound through systematic qualitative procedure for functional group identification including the determination of melting point and boiling point with suitable.**

**DEPARTMENT OF CHEMISTRY**

**Semester –V**

**Course name: SKILL ENHANCEMENT COURSE ELECTIVE**

**Paper -6B (Analytical Methods in Chemistry-1)**

**Learning Outcomes:**

**Students after successful completion of the course will be able to:**

- 1. Identify the importance of solvent extraction and ion exchange method.**
- 2. Acquire knowledge on the basic principles of volumetric analysis and gravimetric analysis.**
- 3. Demonstrate the usage of common laboratory apparatus used in quantitative analysis.**
- 4. Understand the theories of different types of titrations.**
- 5. Gain knowledge on different types of errors and their minimization methods.**

**Lab Course name: SKILL ENHANCEMENT COURSE ELECTIVE**

**Paper -6B (Analytical Methods in Chemistry Lab-1)**

**Learning Outcomes:**

**On successful completion of this practical course, student shall be able to:**

- 1. Estimate Iron(II) using standard Potassium dichromate solution**
- 2. Learn the procedure for the estimation of total hardness of water**
- 3. Demonstrate the determination of chloride using Mohr's method**
- 4. Acquire skills in the operation and calibration of pH meter**
- 5. Perform the strong acid vs strong base titration using pH meter**

**Course name: SKILL ENHANCEMENT COURSE ELECTIVE**

**Paper -7B (Analytical Methods in Chemistry-2)**

**Learning Outcomes:**

**Students after successful completion of the course will be able to:**

- 1. Identify the importance of chromatography in the separation and identification of compounds in a mixture**
- 2. Acquire a critical knowledge on various chromatographic techniques.**
- 3. Demonstrate skills related to analysis of water using different techniques.**
- 4. Understand the principles of spectro chemistry in the determination of metal ions.**
- 5. Comprehend the applications of atomic spectroscopy.**

**Lab Course name: SKILL ENHANCEMENT COURSE ELECTIVE**

**Paper -7B (Analytical Methods in Chemistry Lab-2)**

**Learning Outcomes:**

**On successful completion of this practical course, student shall be able to:**

- 1. Perform the separation of a given dye mixture using TLC**
  - 2. Learn the preparation of TLC plates**
  - 3. Demonstrate the separation of mixture of amino acids using paper chromatography**
  - 4. Acquire skills in using column chromatography for the separation of dye mixture**
- Co-Curricular Activities:**

**a) Mandatory: (Lab/field training of students by teacher ( lab:10+field:05):**

- 1. For Teacher: Training of students by the teacher in laboratory and field for not less than 15 hours on the field techniques/skills of determination of hardness of water, using the calorimeter and or Spectrophotometer, preparation of TLC plate, identification of spots in TLC and Paper chromatographic techniques, loading of column, selection of solvent system, separation of amino acids and dyes mixture using chromatographic techniques.**

- 2. For Student: Student shall visit a related industry/chemistry laboratory in**

**Universities/research organizations/private sector facility and observe the chromatographic techniques used for the separation of compounds. Write their observations and submit a hand written fieldwork/project work report not exceeding 10 pages in the given format to the teacher.**

- 3. Max marks for Fieldwork/project work Report: 05.**

**4. Suggested Format for Fieldwork/project work: Title page, student details, index page, details of place visited, observations, findings, and acknowledgements.**

- 5. Unit tests (IE).**

## **b) Suggested Co-Curricular Activities**

- 1. Training of students by related industrial experts.**
- 2. Assignments, Seminars and Quiz (on related topics).**
- 3. Visits to facilities, firms, research organizations etc.**
- 4. Invited lectures and presentations on related topics by field/industrial experts.**

## **DEPARTMENT OF COMPUTERS**

### **1. Aim and objectives of UG program in Subject: Computer Science**

The Objectives of this Program describes what students are expected to know and be able to do by the time of graduation. The Computer Science Department's Bachelor of Science program must enable students to attain, by the time of graduation:

- An ability to identify, formulate and develop solutions to computational challenges.
- An ability to design, implement and evaluate a computational system to meet desired needs within realistic constraints.
- An ability to function effectively on teams to accomplish shared computing design, evaluation, or implementation goals.
- An understanding of professional, ethical, legal, security, and social issues and responsibilities for the computing profession.
- An ability to communicate and engage effectively with diverse stakeholders.
- An ability to analyze impacts of computing on individuals, organizations, and society. Recognition of the need for and ability to engage in continuing professional development.
- An ability to use appropriate techniques, skills, and tools necessary for computing practice.
- Effectively utilizing their knowledge of computing principles and mathematical theory to develop sustainable solutions to current and future computing problems.
- Developing and implementing solution based systems and/or processes that address issues and/or improve existing systems within in a computing based industry.

### **2. Learning outcomes of Subject Computer Science:**

- Students will be able to communicate in written and oral forms in such a way as to demonstrate their ability to present information clearly, logically, and critically.
- Students will be able to apply mathematical and computing theoretical concepts in solution of common computing applications, such as computing the order of an algorithm.
- Students will be able to complete successfully be able to program small-to-mid- size programs on their own. Sufficient programming skills will require use of good practice, e.g., good variable names, good use of computational units, appropriate commenting strategies.

- Students will be able to use appropriately system design notations and apply system design engineering process in order to design, plan, and implement software systems
- In a self-selected area of depth in Computing, students will demonstrate a depth of knowledge appropriate to graduate study and/or lifelong learning in that area. Students should be able to read for understanding materials in that area beyond those assigned in coursework.
- Students will be prepared for a career in an information technology oriented business or industry, or for graduate study in computer science or other scientific or technical fields.
- Use systems development, word-processing, spreadsheet, and presentation software to solve basic information systems problems

|                  |                                |                   |
|------------------|--------------------------------|-------------------|
| <b>B Sc</b>      | <b>Semester: II</b>            | <b>Credits: 4</b> |
| <b>Course: 2</b> | <b>DATA STRUCTURES USING C</b> | <b>Hrs/Wk: 4</b>  |

**Aim and objectives of Course:**

To introduce the fundamental concept of data structures and to emphasize the importance of various data structures in developing and implementing efficient algorithms.

**Learning outcomes of Course:**

Upon successful completion of the course, a student will be able to: Understand available Data Structures for data storage and processing.

Comprehend Data Structure and their real-time applications - Stack, Queue, Linked List, Trees and Graph

Choose a suitable Data Structures for an application

- Develop ability to implement different Sorting and Search methods
- Have knowledge on Data Structures basic operations like insert, delete, search, update and traversal
- Design and develop programs using various data structures
- Implement the applications of algorithms for sorting, pattern matching etc.

|                  |                                   |                   |
|------------------|-----------------------------------|-------------------|
| <b>B Sc</b>      | <b>Semester: III</b>              | <b>Credits: 4</b> |
| <b>Course: 3</b> | <b>DATABASE MANAGEMENT SYSTEM</b> | <b>Hrs/Wk: 4</b>  |

**Aim and objectives of Course:**

The objective of the course is to introduce the design and development of databases with special emphasis on relational databases.

**Learning outcomes of Course:** Upon successful completion of the course, a student will be able to:

**Gain knowledge of Database and DBMS.**

**Understand the fundamental concepts of DBMS with special emphasis on relational data model.**

**Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database**

**Model data base using ER Diagrams and design database schemas based**

- on the model. Create a small database using SQL.**
- Store, Retrieve data in database.**

|                  |   |                   |
|------------------|---|-------------------|
| <b>B Sc</b>      | <b>Semester: IV</b>                           | <b>Credits: 4</b> |
| <b>Course: 4</b> | <b>OBJECT ORIENTED PROGRAMMING USING JAVA</b> | <b>Hrs/Wk: 4</b>  |

**Aim and objectives of Course:**

**To introduce the fundamental concepts of Object-Oriented programming and to design & implement object oriented programming concepts in Java.**

**Learning outcomes of Course:**

**Understand the benefits of a well-structured program**  
**Understand different computer programming paradigms**

**Understand underlying principles of Object-Oriented Programming in Java**  
**Develop problem-solving and programming skills using OOP concepts**

**Develop the ability to solve real-world problems through software development in high-level programming language like Java**

|                   |   |                   |
|-------------------|---|-------------------|
| <b>B Sc</b>       | <b>Semester :V(Skill Enhancement Course - Elective)</b> | <b>Credits: 4</b> |
| <b>Course: 6B</b> | <b>Internet of Things</b>                               | <b>Hrs/Wk: 4</b>  |

**Learning Outcomes: Students after successful completion of the course will be able to:**

- 1. Appreciate the technology for IoT**
- 2. Understand various concepts, terminologies and architecture of IoT systems.**
- 3. Understand various applications of IoT**
- 4. Learn how to use various sensors and actuators for design of IoT.**
- 5. Learn how to connect various things to Internet.**
- 6. Learn the skills to develop simple IOT Devices.**



|                   |   |                   |
|-------------------|---|-------------------|
| <b>B Sc</b>       | <b>Semester :V(Skill Enhancement Course - Elective)</b> | <b>Credits: 4</b> |
| <b>Course: 7B</b> | <b>Application Development using Python</b>             | <b>Hrs/Wk: 4</b>  |

**Learning Outcomes:** Students after successful completion of the course will be able to:

1. Understand and appreciate the web architecture and services.
2. Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
3. Demonstrate proficiency in handling Strings and File Systems.
4. Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
5. Interpret the concepts of Object-Oriented Programming as used in Python.
6. Apply concepts of Python programming in various fields related to IOT, Web Services and Databases in Python.

## **DEPARTMENT OF PHYSICS**

### **COURSE OBJECTIVES & OUTCOMES OF PHYSICS**

**Academic year 2021-22**

**Semester- I**

**Course: I B.Sc(Physics)–MPC, MPCs**

**Subject: Mechanics, waves & oscillations**

#### **Course Objectives**

1. This course would enhance the basic knowledge and skills regarding principles involved in Mechanics which helps the students in their daily life.
2. This course would enable the students to understand the concepts of simple harmonic motion and acquire basic knowledge regarding the Ultrasonic Waves which helps the students in their daily life
3. This syllabus will provide the basic requirements for their higher studies.
4. This course will provide a theoretical basis for doing experiments in related areas.

#### **Course Outcomes**

1. Understand Newton's laws of motion and motion of variable mass system and its
2. application to rocket motion and the concepts of impact parameter, scattering cross section.
3. Apply the rotational kinematic relations, the principle and working of gyroscope its applications
4. the precessional motion of a freely rotating symmetric top.
5. Comprehend the general characteristics of central forces
6. the application of Kepler's laws to describe the motion of planets and satellite in circular orbit through the study of law of Gravitation.

7. Understand postulates of Special theory of relativity and its consequences such as length contraction, time dilation, relativistic mass and mass-energy equivalence.
8. Examine phenomena of simple harmonic motion and the distinction between undamped, damped and forced oscillations
9. the concepts of resonance and quality factor with reference to damped harmonic oscillator.
10. Appreciate the formulation of the problem of coupled oscillations and solve them to obtain normal modes of oscillation and their frequencies in simple mechanical systems.
11. Figure out the formation of harmonics and overtones in a stretched string
12. acquire the knowledge on Ultrasonic waves, their production and detection and their applications in different fields.

**Academic year 2021-22**

**Semester- II**

**Course: I B.Sc (Physics)–MPC, MPCs**

**Subject: wave Optics**

#### **Course Objectives**

1. This course would enable the students to understand the concepts of Abberations , Interference , Diffraction, Polarisation and Lasers, optical fibres which helps the students in their daily life.
2. This syllabus will provide the basic requirements for their higher studies.
3. This course will provide a theoretical basis for doing experiments in related areas.

#### **Course Outcomes**

1. Understand the phenomenon of interference of light and its formation in (i) Lloyd's single mirror due to division of wave front and (ii) Thin films, Newton's rings and Michelson interferometer due to division of amplitude.
2. Distinguish between Fresnel's diffraction and Fraunhofer diffraction and observe the diffraction patterns in the case of single slit and the diffraction grating.
3. Describe the construction and working of zone plate and make the comparison of zone plate with convex lens.
4. Explain the various methods of production of plane, circularly and polarized light and their detection and the concept of optical activity.
5. Comprehend the basic principle of laser, the working of He-Ne laser and Ruby lasers and their applications in different fields.
6. Explain about the different aberrations in lenses and discuss the methods of minimizing them.
7. Understand the basic principles of fibre optic communication and explore the field of

**Academic year 2021-22**

**Semester- III**

**Course: II B.Sc (Physics)–MPC, MPCs**

**Subject: Heat & Thermodynamics**

**Course Objectives**

1. This course would enable the students to understand the concepts of heat and temperature, heat transfer, entropy, production of low temperature, liquefaction of gases and thermal radiation which helps the students in their daily life.
2. This syllabus will provide the basic requirements for their higher studies.
3. This course will provide a theoretical basis for doing experiments in related areas.

#### **Course Outcomes**

1. Understand the basic aspects of kinetic theory of gases, Maxwell-Boltzmann distribution law, equipartition of energies, mean free path of molecular collisions.
2. the transport phenomenon in ideal gases
3. Gain knowledge on the basic concepts of thermodynamics, the first and the second law of thermodynamics,
4. the basic principles of refrigeration, the concept of entropy, the thermodynamic potentials and their physical interpretations.
5. Understand the working of Carnot's ideal heat engine, Carnot cycle and its efficiency
6. Develop critical understanding of concept of Thermodynamic potentials, the formulation of Maxwell's equations and its applications.
7. Differentiate between principles and methods to produce low temperature and liquefy air and also understand the practical applications of substances at low temperatures
8. Examine the nature of black body radiations and the basic theories.

**Academic year 2021-22**

**Semester- IV**

**Course: II B.Sc (Physics)–MPC, MPCs**

**Subject: Electricity, Magnetism and Electronics**

#### **Course Objectives**

1. This course would enable the students to understand the concepts of Electricity, Magnetism, dielectrics, electromagnetism, A.C circuits, basic electronics and digital electronics which helps the students in their daily life.
2. This syllabus will provide the basic requirements for their higher studies.
3. This course will provide a theoretical basis for doing experiments in related areas.

#### **Course Outcomes**

1. Understand the Gauss law and its application to obtain electric field in different cases
2. formulate the relationship between electric displacement vector, electric polarization, Susceptibility, Permittivity and Dielectric constant.
3. Distinguish between the magnetic effect of electric current and electromagnetic induction and apply the related laws in appropriate circumstances.
4. Understand Biot and Savart's law and Ampere's circuital law to describe and explain the generation of magnetic fields by electrical currents.
5. Develop an understanding on the unification of electric and magnetic fields and Maxwell's equations governing electromagnetic waves.

6. Phenomenon of resonance in LCR AC-circuits, sharpness of resonance, Q-factor, Power factor and the comparative study of series and parallel resonant circuits.
7. Describe the operation of p-n junction diodes, zener diodes, light emitting diodes and transistors
8. Understand the operation of basic logic gates and universal gates and their truth tables.

**Academic year 2021-22**

**Semester- IV**

**Course: II B.Sc (Physics)–MPC, MPCs**

**Subject: Modern Physics**

#### **Course Objectives**

1. This course would enable the students to understand the concepts of Atomic & Molecular Physics, Matter waves, Uncertainty Principle, Quantum Mechanics, Nuclear properties, crystal structure and super conductivity which helps the students in their daily life.
2. This syllabus will provide the basic requirements for their higher studies.
3. This course will provide a theoretical basis for doing experiments in related areas.

#### **Course Outcomes**

1. Develop an understanding on the concepts of Atomic and Modern Physics, basic elementary quantum mechanics and nuclear physics.
2. Develop critical understanding of concept of Matter waves and Uncertainty principle.
3. Get familiarized with the principles of quantum mechanics and the formulation of Schrodinger wave equation and its applications.
4. Examine the basic properties of nuclei, characteristics of Nuclear forces,
5. salient features of Nuclear models and different nuclear radiation detectors.
6. Classify Elementary particles based on their mass, charge, spin, half life and interaction.
7. Get familiarized with the nano materials, their unique properties and applications.
8. Increase the awareness and appreciation of superconductors and their practical applications

**Academic year 2021-22**

**Semester- V**

**Course: III B.Sc (Physics)–MPC, MPCs**

**Subject: Electricity, Magnetism and Electronics**

#### **Course Objectives**

1. This course would enable the students to understand the concepts of Electricity, Magnetism, dielectrics, electromagnetism, A.C circuits, basic electronics and digital electronics which helps the students in their daily life.
2. This syllabus will provide the basic requirements for their higher studies.
3. This course will provide a theoretical basis for doing experiments in related areas.

#### **Course Outcomes**

1. Understand the Gauss law and its application to obtain electric field in different cases
2. formulate the relationship between electric displacement vector, electric polarization, Susceptibility, Permittivity and Dielectric constant.
3. Distinguish between the magnetic effect of electric current and electromagnetic induction and apply the related laws in appropriate circumstances.
4. Understand Biot and Savart's law and Ampere's circuital law to describe and explain the generation of magnetic fields by electrical currents.
5. Develop an understanding on the unification of electric and magnetic fields and Maxwell's equations governing electromagnetic waves.
6. Phenomenon of resonance in LCR AC-circuits, sharpness of resonance, Q- factor, Power factor and the comparative study of series and parallel resonant circuits.
7. Describe the operation of p-n junction diodes, zener diodes, light emitting diodes and transistors
8. Understand the operation of basic logic gates and universal gates and their truth tables.

**Academic year 2021-22**

**Semester- V**

**Course: III B.Sc (Physics)–MPC, MPCs**

**Subject: Modern Physics**

#### **Course Objectives**

1. This course would enable the students to understand the concepts of Atomic & Molecular Physics, Matter waves, Uncertainty Principle, Quantum Mechanics, Nuclear properties, crystal structure and super conductivity which helps the students in their daily life.
2. This syllabus will provide the basic requirements for their higher studies.
3. This course will provide a theoretical basis for doing experiments in related areas.

#### **Course Outcomes**

1. Develop an understanding on the concepts of Atomic and Modern Physics, basic elementary quantum mechanics and nuclear physics.
2. Develop critical understanding of concept of Matter waves and Uncertainty principle.

3. Get familiarized with the principles of quantum mechanics and the formulation of Schrodinger wave equation and its applications.
4. Examine the basic properties of nuclei, characteristics of Nuclear forces,
5. salient features of Nuclear models and different nuclear radiation detectors.
6. Classify Elementary particles based on their mass, charge, spin, half life and interaction.
7. Get familiarized with the nano materials, their unique properties and applications.
8. Increase the awareness and appreciation of superconductors and their practical applications

**Academic year 2021-22**

**Semester- VI**

**Course: III B.Sc (Physics)–MPC,MPCs**

**Subject: Renewable Energy (Elective)**

**Course Objectives:**

1. This course would enable the students to understand the concepts of energy, conventional and non conventional energy sources, environmental effects of production and utilization of different forms of energy, energy consumption across the globe with a focus on India, solar, wind, ocean, hydrogen and bio energies which helps the students in their daily life.
2. This syllabus will provide the basic requirements for their higher studies.
3. This course will provide a theoretical basis for doing experiments in related areas.

**Course Out comes:**

1. The learner will be able to describe the environmental aspects of non-conventional energy sources, in comparison with various conventional energy sources.
2. Tell the need of renewable energy sources.
3. Describe the use of solar energy in various applications like solar heating, cooling, desalination, drying, cooking and power generation.
4. Explain the applications of wind energy using wind turbines.
5. Describe the advantages and disadvantages of Ocean energy.
6. Explain the applications of Bio gas plants.

**Academic year 2021-22**

**Semester- VI**

**Course: III B.Sc (Physics)–MPC,MPCs**

**Subject: Solar Thermal & Photovoltaic Aspects (Cluster-C1)**



### **Course Objectives:**

1. This course would enable the students to understand the concepts of spectral distribution of solar energy, Solar thermal collectors, solar cells, solar modules, solar arrays, and solar PV systems, solar thermal applications and solar pv applications which helps the students in their daily life.
2. This syllabus will provide the basic requirements for their higher studies.
3. This course will provide a theoretical basis for doing experiments in related areas.

### **Course Outcomes:**

1. The learner will be able to describe the solar intensity measurement using Angstroms Pyrheliometer.
2. Describe the construction, working and efficiencies of different solar collectors.
3. Explain the efficiency, fill factor of a solar cell.
4. Analyze the working of Solar PV system.
5. Differentiate various thermal applications of solar energy like solar heaters, coolers, dryers, desalinators, cookers, power generators.

**Academic year 2021-22**

**Semester- VI**

**Course: III B.Sc (Physics)–MPC,MPCs**

**Subject: Wind, Hydro and Ocean energies (Cluster-C2)**

### **Course Objectives :**

1. This course would enable the students to understand the concepts of wind energy conversion systems, design of wind turbine, wind energy applications, small hydro power systems, ocean thermal, tidal and wave energy systems which helps the students in their daily life.
2. This syllabus will provide the basic requirements for their higher studies.
3. This course will provide a theoretical basis for doing experiments in related areas.

### **Course Outcomes:**

1. The student can Identify Winds energy as alternate form of energy and to know how it can be tapped.
2. Understand the Ocean thermal, Wave & Tidal energy, its mechanism of production and its applications
3. Distinguish the micro, mini and small hydro power systems.

**Academic year 2021-22**

**Semester- VI**

**Course: III B.Sc (Physics)–MPC,MPCs**

**Subject: Energy Storage devices (Cluster-C3)**

**Course Objectives :**

1. This course would enable the students to understand the concepts of principles involved in Primary and secondary batteries, super conducting magnetic energy storage systems, Fuel cells, which helps the students in their daily life.
2. This syllabus will provide the basic requirements for their higher studies.
3. This course will provide a theoretical basis for doing experiments in related areas.

**Course Out comes:**

1. The student can able to differentiate the primary, secondary batteries.
2. Explain the various applications of SMES systems, and their performance.
3. Discuss the construction and working principle of Fuel Cell and differentiate the different types of fuel cells.
4. Describe the various applications of Fuel Cells.

**Programme: B. Sc Physics**

**Programme Objectives:**

1. Students are expected to become confident with analytical and quantitative skills to study and understand the world around.
2. Develop laboratory skills throughout the curriculum with hands on experience in experimental techniques and tools.
3. Learn various approaches to data analysis and become comfortable using computational methods to analyze and solve problems.
4. Students develop a solid grasp of core concepts and applications in various branches of physics like classical mechanics, electricity, sound, light, etc

**PROGRAMME OUTCOMES FOR B. Sc (Physics) COURSE**

On successful completion of Under Graduate programme (BSc), students will be able to:

- |               |   |
|---------------|---|
| <b>PO 1 :</b> | Acquire comprehensive Knowledge and effectively apply such knowledge and skills to address various issues.                          |
| <b>PO 2 :</b> | Acquire self learning skills and adopt them for emerging demands at work place and life.  |
| <b>PO 3 :</b> | Access ICT tools effectively and have a knowledge of software applications to analyze data.   |
| <b>PO 4:</b>  | Develop scientific thinking process and use the technology for communication and entertainment and more for the benefit of mankind. |
| <b>PO 5:</b>  | Predict problems, frame hypothesis, investigate and interpret the empirical data.   |
| <b>PO 6:</b>  | Learn group dynamics and deal individually as well as with teams and groups to perform effectively in diverse teams /groups.        |

- PO 7 :** Develop Efficient Communication & Life Skills and present significant information clearly and concisely to interested groups.
- PO 8 :** Understand Environmental Sustainability, propagate and follow environment friendly practices.
- PO 9 :** Develop Societal conciseness, involve voluntarily in societal development activities and address societal issues at regional, national, global level.
- PO10 :** Identify the goals, objectives and components of a project and decide the appropriate time of completion.

### **PROGRAMME SPECIFIC OUTCOMES**

#### **B.SC (MPC)**

After completion of the Graduation in B.Sc., the student will able to :

**PSO 1:** Understand the theoretical concepts of physical and chemical properties of materials and the role of mathematics in dealing with them in a quantitative way.

**PSO 2:** Analyse the concepts of mathematics, physics and chemistry and understand the relation among them like physical chemistry, mathematical modelling of physics and chemistry problems. Skills needed to handle instruments and adopt lab procedures to study physical chemical properties of materials.

**PSO 3:** Mathematical, numerical techniques required to model them.

**PSO 4:** Ability to interlink the skills and knowledge in mathematics, physics and chemistry and develop an aptitude to address the problems.

**PSO 5:** Learn problem solving techniques related to Mathematics, Physics and Chemistry

### **PROGRAMME SPECIFIC OUTCOMES**

#### **B.SC (MPCS)**

After completion of the Graduation in B.Sc., the student will able to :

**PSO 1:** Understand the concepts of vector spaces, group theory, quantum mechanics, optical, thermal, electrical, mechanical properties of a materials, probability, algorithm design, data base

**PSO 2: Understand the concepts of vector spaces, group theory, quantum mechanics, optical, thermal, electrical, mechanical properties of a materials, probability, algorithm design, data base**

**PSO 3: Analyse the concepts of mathematics, physics and computers science able to relate them in numerical programming of models of physical systems.**

**PSO 4: Acquire the skills to study the properties of materials, implementation of numerical algorithms by using various**

**PSO 5: Ability to interlink the skills developed and acquires an aptitude to address the problems in simulations of material properties, web and mobile app development.**